

Mohamed Behnassi
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Kirit N. Shelat *Editors*

Vulnerability of Agriculture, Water and Fisheries to Climate Change

Toward Sustainable Adaptation
Strategies

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Mohamed Behnassi • Margaret Syomiti Muteng'e
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Editors

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 Springer

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About NRCS

The North-South Center for Social Sciences (NRCS) is a research institution founded by a group of researchers and experts from both Global South and North as an independent and apolitical institution. Based in Morocco, NRCS aims to develop research and expertise in many social sciences areas with global and local relevance from a North-South perspective and an interdisciplinary approach. As a Think Tank, NRCS aspires to serve as a reference locally and globally through rigorous research and active engagement with the policy community and decision-making processes. NRCS is currently chaired by Mr. Mohamed Behnassi, Doctor Professor of Global Sustainability and Human Security Politics.



Preface

Human activity is increasingly changing the global environment at an unprecedented rate while humanity is facing a range of complex and interrelated challenges: global warming, ecosystem disruption, biodiversity loss, and for many, increasing difficulty in meeting basic human needs for energy, food, water, and shelter. As a result, environmental issues are inextricably linked to many aspects of local, regional and global development, human security and politics.

A series of recent events have generated interest in food security and food systems, particularly the recent news coverage of high food prices which were variously blamed on biofuels, growing demand for meat and dairy products, commodity speculation, and climate. Other arguments have arisen about the potential impacts of climate change on food availability and water – as the projections of climate change become even more serious – and about the role of integrated policy and governance in shaping food security. The price increases highlighted the connections between food systems in different places – e.g. drought in Australia and demand for meat in Asia, biofuel policy in the USA and Latin America, and between the local food movement in Europe and export farmers in Africa. The challenges facing food systems will accelerate in the coming decades, as the demand for food will double within the next 25–50 years, primarily in developing countries, and with the WTO agriculture talks in disarray, making options for reforming trade policy highly contentious.

Food security and agricultural growth remain high on the science, policy and development agendas. Most research linking global change and food systems focuses solely on the impact of climate change on agricultural production, or the impact of agriculture on land use, pollution and biodiversity. However, interactions with other aspects of the food system – such as food processing, packaging, transporting and consumption, and employment derived from these activities – are often overlooked. There are also important new questions about the interactions between the governance of climate and food such as those associated with carbon trading and labeling, and the role of the private sector in carbon mitigation and in the management of food systems.

Technical prescriptions alone will not manage efficiently the food security challenge. Adapting to the additional threats to food security arising from major environmental changes requires an integrated food system approach, not just a focus on agricultural practices. Many key issues for the research agenda can be highlighted here: adapting food systems to global environmental change requires more than just technological solutions to increase agricultural yields; tradeoffs across multiple scales among food system outcomes are a prevalent feature of globalized food systems; within food systems, there are some key underexplored areas that are both sensitive to environmental change but also crucial to understanding its implications for food security and adaptation strategies; scenarios specifically designed to investigate the wider issues that underpin food security and the environmental consequences of different adaptation options are lacking; price variability and volatility often threaten food security; and more attention needs to be paid to the governance of food systems and to the changing of eating patterns.

Addressing food systems holistically, rather than separate components such as agriculture, markets or nutrition, demands the engagement of multiple disciplines and researchers to understand the causes and drivers of vulnerability. This volume is a contribution to the constructing of this new paradigm.

Agadir, Morocco
Nairobi, Kenya
Noida, India
Ahmedabad, India

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I have been honored to share the editorship of this book with my colleagues: Margaret Syomiti Muteng’e (Research Scientist, Kenya Agricultural Research Institute-KARI, Kenya), Dr. R. Gopichandran (Principal Research Scientist and Director of Vigyan Prasar, India), and Dr. Kirit N. Shelat (Executive Chairman, National Council for Climate Change, Sustainable Development and Leadership-NCCSD, India) whose commitment and insight made the editing process a wonderful experience and a mutual learning process.

On behalf of my co-editors, I would like to gratefully and sincerely thank the members of the Scientific Committee who have actively contributed to the peer-review of the pre-selected chapters. Deepest thanks go also to all participants in ICCAFFE2011 who made this event possible even if not all could contribute to this volume. We are grateful to the institutions for their support of this book project. In particular, we thank the sponsors of the 2011 Conference, which in addition to NRCS, include the GIZ and the IRD.

While the real value of this volume should be credited to chapters’ authors, whose papers have been accepted for publication after a double-blind peer-review, any shortcomings or omissions remain the editors’ responsibility. However, the editors and the publisher are not accountable for any statement made or opinion expressed by the chapters’ authors.

Mohamed Behnassi

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Ms. Margaret Syomiti has achieved a lot in her research career development: Mentoring Orientation skills in August 2010; AWARDS' Women Leadership and Management Course, in September 2011; and IFS-AWARD science writing, communication and presentation skills course held in February 2011. With AWARD facilitation, she could have the international membership of Women Organizing for Change in Agriculture and Natural Resource Management (WOCAN). During 2011–2014, she is an international Ph.D. Graduate Fellow in Livestock Climate-Collaborative Research Support Program (LCC-CRSP) for Adapting Livestock Systems to Climate Change of Colorado State University. During her research career, Ms. Syomiti has authored and co-authored several scientific papers, which have been published in refereed journals and conference proceedings.

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Abbreviations and Acronyms

ABARE	Australian Bureau of Agricultural and Resource Economics
ADAFSA	Abu Dhabi Agriculture and Food Safety Authority
ADFCA	Abu Dhabi Food Control Authority
ADP	Agricultural Development Programme
AEZ	Agro-Ecological Zones
ANOVA	Analysis Of Variance
ANRH	Agence Nationale des Ressources Hydrauliques
APMC	Agricultural Produce Market Committee
AWC	Arab Water Council
BCM	Billion Cubic Meters
CA	Copenhagen Accord
CC	Climate Change
CCAFS	Climate Change, Agriculture and Food Security
CCI	Climate Change Impacts
CGIAR	Consultative Group on International Agricultural Research
CP	Compromise Programming
CSIRO	Commonwealth Science and Industrial Research organization
EAD	Environment Agency – Abu Dhabi
ECHAM3TR	European Centre Hambourg, Germany
EPA	US Environmental Protection Agency
ESF	European Social Fund
ET	Evapotranspiration
FAO	Food and Agriculture Organization
GCM	General Circulation Models
GEF	Global Environment Facility
GFDL	Geophysical Fluid Dynamics Laboratory
GGA	Grain Growers Association
GHE	Greenhouse Effect
GHGs	Greenhouse Gases
GISS	Goddard Institute for Space Studies
HDI	Human Development Index

HLPE	High Level Panel of Experts on Food Security and Nutrition
HMRDF	Hellenic Ministry of Rural Development and Food
ICBA	International Center for Biosaline Agriculture
ICRISAT	International Crop Research Institute for the Semi- Arid Tropics
IFPRI	International Food Policy Research Institute
ILUC	Indirect land use change
INM	National Meteorological Institute
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
IRMS	Isotope Ratio Mass Spectrometer
IUCN	International Union for Conservation of Nature
IWASRI	International Water logging and Salinity Research Institute
IWMI	International Water Management Institute
KISR	Kuwait Institute for Scientific Research
KP	Kyoto Protocol
KSU	King Saud University
LCA	Life Cycle Assessment
LUT	Land Utilization Types
MEECC	Ministry of Environment, Energy and Climate Change
MENA	Middle East and North Africa
MOA	Ministry of Agriculture
MOP	Multi-Objective Programming
MREP	Mona Reclamation Experimental Project
NAMA	Nationally Appropriate Mitigation Action
NAPA	National Adaptation Programme of Action
NATCOM	India's Second National Communication
NEPAD	The New Partnership for Africa's Development
NRCS	North-South Center for Social Sciences
NSRF	National Strategic Reference Framework
NSSG	National Statistical Service of Greece
ONM	Office National de la Météorologie
OSU	Oregon State University
PICCMAT	Policy Incentives for Climate Change Mitigation Agricultural Techniques
RCM	Regional Climate Model
RIRDC	Rural Industries Research and Development Corporation
RPWRC	Red Palm Weevil Research Chair
SAC	Space Application Centre
SCAR	Standing Committee on Agricultural Research
SIC	Soil Inorganic Carbon
SLR	Sea Level Rise
SOM	Soil Organic Matter
TCD	Thermo-Conductive Detector
UAE	United Arab Emirates

UKHI	United Kingdom Meteorological Office High Resolution
UNDP	United Nation development Program
UNEP	United Nation Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WANA	West Asia North Africa
WBGU	German Advisory Council on Global Change
WGP	World Gross Product
WHO	World Health Organization
WR	Water Requirement
WUE	Water-Use Efficiency Evaluation
WUE	Water Use Efficiency

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