



**FOOD
SECURITY
AND
GLOBAL
ENVIRONMENTAL
CHANGE**

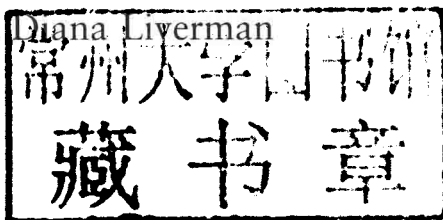
Edited by
**John Ingram, Polly Ericksen
and Diana Liverman**

Food Security and Global Environmental Change

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Preface

Human activities, including those related to producing, processing, packaging, distributing, retailing and consuming food, are partly responsible for changing the world's climate through emissions of greenhouse gases and changes in land use. These activities are also contributing to other aspects of global environmental change (GEC), including changes in freshwater supplies, air quality, nutrient cycling, biodiversity, land cover and soils. Simultaneously, increases in population and wealth are leading to ever-growing demands by society for food, while increasing urbanization is leading to proportionally fewer people producing food; the next few decades are likely to see more of conditions contributing to the 'perfect storm' caused by the need to simultaneously provide 50 per cent more food, 50 per cent more energy and 30 per cent more fresh water – without further degrading the natural resource base upon which our food security largely depends. Furthermore, there is growing concern that GEC will threaten food security, particularly for those more vulnerable sections of society.

Attaining food security for all is clearly more complicated than just producing more food; the world produces more than enough food for everyone, yet – even today – over 1 billion people do not have access to sufficient food and go to bed hungry. The fundamental issue, therefore, concerns *access* to food rather than food production. This concept is well captured by the working definition of food security adopted by the 1996 World Food Summit held under the auspices of the Food and Agriculture Organization of the United Nations: food security is the state achieved such that 'all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life'. While many other definitions of food security exist, central tenets are the notion of access and sustainability.

Concerns about the additional challenges that GEC – and particularly climate change – will bring to meeting food security have risen sharply on political and policy agendas in recent years. Of course, the underlying twin issues of food security (*vis-à-vis* food production) and GEC have been on science agendas for much longer, and indeed research on the interactions of the two emerged well over a decade ago. Many national and international research organizations and groups have thus been addressing various aspects of the food security–GEC agenda. As the research interest has spread beyond the conventional GEC and agricultural communities, it has become

increasingly clear that both socio-economic and biogeophysical factors determine food security. More recent research rightly includes, for example, studies on societal perceptions of GEC; vulnerability of food systems to GEC; seasonal weather forecasting and risk mitigation; and identifying the spatial and temporal levels of climate information needed by the range of stakeholders involved in the food security debate.

As the importance of interdisciplinarity emerges ever more strongly, research needs to build on the wealth of disciplinary studies that have characterized most GEC and food-related research to date. New interdisciplinary agendas need to be set to move research forward based on an integrated framing of the issues and challenges involved in the interactions between food security and GEC. These research agendas need to be determined by a range of stakeholders that includes the policy- and decision-makers who struggle daily with meeting both food security and environmental objectives.

Challenges for research include responding to new needs for developing adaptation agendas and facilitating communication amongst policy-makers, resource managers and researchers working at a range of levels on spatial, temporal and jurisdictional scales. Further, developing research agendas in support of food security policy formulation needs to recognize that setting such policy is complicated, needs systematic analysis that cuts across these scales and levels, and is only going to become more complicated under the pressure of global environmental change. Drawing on experiences of the Global Environmental Change and Food Systems (GECAFS) international research project of the Earth System Science Partnership, and a wide range of other research endeavours, this book aims to help set the stage for further research on this critical set of issues.

The book is structured in five parts. Part I introduces the background and context for research on food security and GEC and makes the case for taking a systems approach (the 'food system') for researching what appears to be an otherwise dauntingly complex set of issues. Drawing on and synthesizing a wide range of literature, the fundamental issues of food system vulnerability to GEC and the broad food system adaptation agenda are then covered in Part II. While Parts I and II set a broad conceptual and state-of-the-science foundation for thinking about *research content*, the next two parts review and discuss a range of more practical considerations about the *research process*. Part III reviews and synthesizes lessons learnt from a range of stakeholder engagement approaches, given that stakeholder interaction is crucial at all stages of the food security–GEC research endeavour. Part IV makes the case for, and discusses lessons learnt from, efforts to undertake research at the regional level. This is between the global and local levels which characterize most food security studies. Collectively, these first four parts synthesize the knowledge and experiences derived from a great many stakeholders including policy-makers, resource managers, business interests, donors, civil society and researchers. Finally, Part V looks ahead by reviewing a number of emerging 'hot topics' in the food security–GEC debate. These topics include many of the emerging food security challenges we will face, and help set a new agenda for the research community at large.

The central message of this synthesis is clear: an innovative research approach that integrates a wide range of concepts and methods is needed if science is to support policy formulation and resource management more effectively; as the requirement for more equitable access to food for all grows, so too grows the need for best science to underpin the development of more effective food systems. The food security–GEC community worldwide has clearly already made an impressive contribution, but many challenges remain. It is essential to address these in a structured and systematic manner.

John Ingram, Polly Ericksen and Diana Liverman
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John Ingram, Polly Ericksen and Diana Liverman

List of Acronyms and Abbreviations

AIACC	Assessments of Impacts and Adaptation to Climate Change
AMPRIP	Agricultural Marketing Promotion and Regional Integration Project
ASB	Alternatives to Slash and Burn Project
CAADP	Comprehensive Africa Agriculture Development Programme
CAP	Common Agricultural Policy
CARICOM	Caribbean Community
CAWMA	Comprehensive Assessment of Water Management in Agriculture
CCAFS	Climate Change, Agriculture and Food Security
CCCCC	Caribbean Community Climate Change Centre
CFS	Committee on World Food Security
CGIAR	Consultative Group on International Agricultural Research
CIMH	Caribbean Institute for Meteorology and Hydrology
COMESA	Common Market for Eastern and Southern Africa
CRN	Collaborative Research Network Program
CRSP	Collaborative Research Support Program
CSA	commodity systems analysis
CSR	corporate social responsibility
Danida	Danish International Development Agency
DFID	UK Department for International Development
DG SANCO	EU Directorate General for Health and Consumer Affairs
EFSA	European Food Safety Authority
ENSO	El Niño Southern Oscillation
ESCR-Net	International Network for Economic, Social and Cultural Rights
ESSP	Earth System Science Partnership
EU	European Union
FANR	Directorate for Food, Agriculture and Natural Resources
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FAO	Food and Agriculture Organization
FEWS NET	Famine Early Warning System
FSC	Forest Stewardship Council

GEC	global environmental change
GECAFS	Global Environmental Change and Food Systems
GEO	Global Environmental Outlook
GESA	Global Food Security Assessment
GHG	greenhouse gas
GHI	Global Hunger Index
GIEWS	Global Information and Early Warning System
GM	genetically modified
GMO	genetically modified organism
GPN	global production network
GSC	global supply chain
HDR	Human Development Report
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
IAI	Inter-American Institute for Global Change Research
IAM	integrated assessment models
IFPRI	International Food Policy Research Institute
IGBP	International Geosphere-Biosphere Programme
IGP	Indo-Gangetic Plains
IHDP	International Human Dimensions Programme on Global Environmental Change
IIASA/GAEZ	International Institute for Applied Systems Analysis Global Agroecological Zones
IPCC	Intergovernmental Panel on Climate Change
IRGC	International Risk Governance Council
LCA	life-cycle analyses
LFS	local food systems
MA	Millennium Ecosystem Assessment
MDG	Millennium Development Goal
MRC	Mekong River Commission
MSC	Marine Stewardship Council
NAFTA	North American Free Trade Agreement
NGO	non-governmental organization
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
PAGE	Pilot Assessment of Global Ecosystems
RAPID	Research and Policy in Development
REDD	Reduced Emissions from Deforestation and Degradation
RENEWAL	Regional Network on AIDS, Livelihoods and Food Security
RFID	radio-frequency identification
SAARC	South Asian Association for Regional Cooperation
SADC	Southern Africa Development Community
SAfMA	Southern African Sub-Global Assessment
SCOPE	Scientific Committee on Problems of the Environment
SES	social-ecological system
SOFA	State of Food and Agriculture
SOFI	State of Food Insecurity

SPS	Sanitary and Phytosanitary Standards
START	Global Change System for Analysis, Research and Training
TBT	technical barriers to trade
TNC	transnational corporations
UKFSA	UK Food Security Assessment
UN	United Nations
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	US Agency for International Development
USDA	US Department of Agriculture
VAM	Vulnerability Assessment and Mapping
WB	World Bank
WCRP	World Climate Research Programme
WDR	World Development Report
WFP	World Food Programme
WHS	World Hunger Series
WRI	World Resources Institute
WRR	World Resources Report
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization
WWF	World Wide Fund for Nature
WWI	Worldwatch Institute

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