How does climate change alter agricultural strategies to support food security? Agricultural Adaptation to Climate Change in Africa

Handbook Of Climate Change And Agroecosystems: The Agricultural Model Intercomparison And Improvement Project (Agridap) Integrated Crop And Economic Assessments – Joint Publication With Asa, Cssa, And Sssa (In 2 Parts)

Climate Change: Climate Change and Food Security

Climate Change Adaptation and Land Use Options for Smallholder Farmers in Malawi

Modeling the Decisions of Malian Farmers as Climate Change Decreases Their Food Security

Agricultural Economic Report

Agriculture and Global Environmental Change

Food Security and Climate Change Impacts of Climate Change on Food Security in Small Island Developing States

Vulnerability of Agriculture, Water and Fisheries to Climate Change

Food Security, Farming, and Climate Change to 2050

Climate Change and Global Food Security

Food Security in the United States

Climate Change and Land

West African Agriculture and Climate Change

Climate Change and Food Security with Emphasis on Wheat

Climate change and agriculture

Adaptation in the Republic of Korea to 2050

Climate Smart Agriculture

Adaptation to Climate Change in Agriculture

Food security in a world of natural resource scarcity

Understanding Risks and Uncertainties in Energy and Climate Policy

Food Security and Biodiversity Conservation under Global Change

Sustainable Food and Agriculture Systems Modeling

Crop Growth Simulation Modelling

And Climate Change

Climate Change and Agriculture in India: Impact and Adaptation

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the high prevalence of subsistence farming, food insecurity, and extreme poverty in this region, there is a great need for practical adaptation strategies. The book includes empirical research in Ethiopia, Kenya, South Africa, Tanzania, and other Sub-Saharan countries, and the conclusion summarizes policy-relevant findings from the 10 countries. The book is aimed at advancing student, researchers, and funding agencies’ understanding of the potential for climate change responses. It also will provide supplementary reading for courses in environment and development and in agricultural economics. Agricultural systems will have to adapt to socio-economic and climate change in order to sustain food security in the future. However, these adaptations will likely drive negative environmental impacts, e.g., the loss of biodiversity. A key question, therefore, is how food security can be achieved, and, at the same time, how biodiversity can be preserved in the future. This dissertation aims to address this question by using the scenario and simulation methodology applied in four distinct studies. Study 1 investigates how biodiversity and food security can be reconciled under different simulated socio-economic and climate change conditions in Uganda. Study 2 tests the hypothesis that climate change impacts on food security requires analysis of mean crop yield as well as year-to-year crop yield variability. Study 3 comprehensively assesses the impacts of climate change on rain-fed crop yields in Africa and their potential implications on the continents’ food security. Finally, study 4 evaluates the effect associated with three different sources of uncertainty in simulated climate data on the modelling of mean crop yield and year-to-year crop yield variability. Climate Change and Food Security: Challenges and Solutions will be of interest to experts and decision makers who are interested in the development of global food security strategies.
farmers reported taking no action in response to floods. In response to drought, farmers reported switching to other crops in 16 percent of the communes, and changed planting dates in 19 percent, while only 7 percent of the communes reported no adaptation in farming practices. These findings indicate the need for intervention to help farmers adapt to climate change. In particular, and to increase coping capacity to meet climate change impacts, this book highlights the need for intervention in farmers’ farming practices. This book provides conceptual framing, giving an overview of the CSA concept and grounding it in core economic principles. The second section is devoted to a set of case studies illustrating the economic basis of CSA in terms of reducing vulnerability, increasing adaptive capacity and ex-post risk coping. The final section addresses policy issues related to climate change. Providing information on this new and important field in an approachable way, this book helps make sense of CSA and fills intellectual and policy gaps by defining the concept and placing it within an economic decision-making framework. This book will be of interest to agricultural, environmental, and natural resource economists, development economists, and scholars of development studies, climate change, and agriculture. It will also appeal to policy-makers, development practitioners, and members of governmental and non-governmental organizations interested in agriculture, trade, and climate change mitigation and adaptation. The book highlights the role (in particular as observed in Japan and neighboring Asian countries) of global warming as a topic of interest to environmentalists, scientists, as well as farmers around the world. The threat of food shortages and famine especially becomes a major concern as a result of recent climate shifts. Impacts of Climate Change on Food Security in Small Island Developing States discusses the repercussions of a shifting climate on food production and availability in small island nations. Comprised of research-based chapters on topics relevant to crop management, soil fertility, and sustainable development, the book is appropriate for environmental researchers, food scientists, economists,_upper-level students seeking the latest information on agricultural concerns amid a changing climate. ... this book is a very useful resource for the lawyer... makes a good start by presenting a wide-ranging portfolio of multidisciplinary research that will assist in progressing the task, challenging though it may be. ... Chris Rodgers, Environmental Liability This book explores the interaction between climate change and the agriculture sector. Agriculture is essential to the livelihood of people and nations, especially in the developing world; therefore, any impact on it will have significant economic, social, and political ramifications. Climate Change and Global Food Security, bestselling editor Ratan Lal heads up a team of the world’s top soil scientists and ecologists to document the history of this impending agricultural crisis and explore possible solutions. Throughout this timely text, the authors address six complex themes: 1. The impact of projected climate change on soil quality, water resources, temperature regime, and growing season duration on net primary productivity of different biomes 2. Soil carbon dynamics under changing climate 3. The impact of changes in climate conditions on crop yields and food production in different regions of the world 4. World food demands and supply during the 21st century 5. Policy and economic responses related to carbon trading and enhancing agricultural production 6. Research and development priorities for enhancing soil carbon pool and food security. This hard-hitting text is essential reading for anyone involved with soil and crop sciences as...
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well as policy makers and change agents who need to come to the forefront of this issue armed with the latest information and viable solutions. Managing climate variability and change remains a key development and food security issue in Bangladesh. Despite significant investments, floods, droughts, and cyclones during the last two decades continue to cause extensive economic damage and risks to ongoing efforts to reduce poverty. This book examines the implications of climate change on food security in Bangladesh and identifies adaptation measures in the agriculture sector using a comprehensive integrated framework. First, the most recent science available is used to characterize current climate and hydrology and its potential changes. Second, country-specific survey and biophysical data is used to derive more realistic and accurate agricultural impact functions and simulations. A range of climate risks (i.e. warmer temperatures, higher carbon dioxide concentrations, changing characteristics of floods, droughts and potential sea level rise) is considered to gain a more complete picture of potential agriculture impacts. Third, while estimating changes in production is important, economic responses may have some degree buffer against the physical losses predicted, and an assessment is made of these. Food security is dependent not only on production, but also future food requirements, income levels and commodity prices. Finally, adaptation possibilities are identified for the sector. This book is the first to combine these multiple disciplines and analytical procedures to comprehensively address these impacts. The framework will serve as a useful guide to design policy intervention strategies and investments in adaptation measures. This book assesses the vulnerability impacts of climate change in a top-down approach and following a bottom-up approach. Important looking at the sustainable food production, the authors compared the cost-benefit of adaptation costs from 2015 to 2065. It was found that a 15% adaptation capacity is more efficient for Malaysia in order to combat the climate change effects on the food sector. This book has developed a quantitative adaptive model namely, the Malaysian Climate and Economy (MCE) model, based on the dynamic Computable General Equilibrium (CGE) modelling structure to examine food sustainability and adaptation strategies. Malaysia is experiencing an unusual combination of droughts and extreme rainfall events that can be attributed to climate change. These unusual events and consequences leave Malaysian policymakers looking for ways to make Malaysia self-sufficient in terms of agriculture. It is assumed that climate change effects may result in increasing food insecurity and vulnerability in the future. Policy measures are in place to lessen the likely climatic effects overall, but there is an urgent need to develop an adaptation policy for the future. Achieving food security and economic developmental objectives in the face of climate change and rapid population growth requires systems modelling approaches, for example in the design of sustainable agriculture farming systems. Such approaches increase our understanding of system responses to different soil and climatic conditions, and provide insights into the effects of various variable climate change scenarios, providing valuable information for decision-makers. Further, in the agricultural sector, systems modelling can help optimise crop management and adaptation measures to boost productivity under variable climatic conditions. Presenting key outcomes from crop models used in agricultural systems this book is a valuable resource for professionals interested in using modelling approaches to manage the growth and improve the quality of various crops. Future climatic and agro-ecological changes in Africa are uncertain and associated with high degrees of spatial and temporal variability and change is differently simulated within divergent climate-crop models and crop breeding stations. Furthermore, uncertainty emerges in local contexts, not just in response to climatic systems, but to social, economic, and political systems, and often with implications for the appropriateness and adoption of technologies or the success of alternative cropping systems. This book examines the challenges of adaptation in smallholder farming in Africa, analysing the social, economic, political and climatic uncertainties that impact agriculture in the region and the range of solutions proposed. Drawing on case studies of genetically modified crops, conservation agriculture, and other ‘climate smart’ solutions in eastern and southern Africa, the book identifies how uncertainties are framed ‘from above’ as well experienced ‘from below’, by farmers themselves. It provides a compelling insight into why ideas about adaptation emerge, from whom, and with what implications. This book offers a unique perspective and will be highly relevant to students of climate change adaptation, food security and poverty alleviation, as well as policy-makers and field practitioners in international development and agronomy. Southern African Agriculture and Climate Change: A Comprehensive Analysis examines the food security threats facing eight of the countries that make up southern Africa — Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland, Zimbabwe, and Zambia. This book presents the challenges faced by agriculture to achieve the objective of food security for all in the region. Southern Africa’s population is expected to grow at least through mid-century. The region will also see income growth. Both will put increased pressure on the natural resources needed to produce food, and climate change makes the challenges greater. Southern Africa is already experiencing rising temperatures, shifting precipitation patterns, and increasing extreme events. Without attention to adaptation, the poor will suffer. Through the use of hundreds of scenario maps, models, figures, and detailed analysis, the editors and contributors of Southern African Agriculture and Climate Change present plausible future scenarios that combine economic and biophysical characteristics to explore the possible consequences for agriculture, food security, and resources management to 2050. They also offer recommendations to national governments and regional economic agencies already dealing with the vulnerabilities of climate change and deviations in environment. Decisionmakers and researchers will find Southern African Agriculture and Climate Change a vital tool for shaping policy and studying the various and likely consequences of climate change. The first of three books in IFPRI’s climate change in Africa series, West African Agriculture and Climate Change present plausible future scenarios that combine economic and biophysical characteristics to explore the possible consequences for agriculture, food security, and resources management to 2050. They also offer recommendations to national governments and regional economic agencies already dealing with the vulnerabilities of climate change and deviations in environment. Decisionmakers and researchers will find West African Agriculture and Climate Change a vital tool for shaping policy and studying the various and likely consequences of climate change.
continuously increases, economies modernize, and incomes rise, wheat production will have to increase dramatically to secure it as a reliable and sustainable food source. Since covering more land area with wheat crops is not a sustainable option, future wheat crops must have consistently higher yields and be able to resist and/or tolerate biotic and abiotic stresses that result in low yields. High-yielding, disease-resistant, and good quality wheat, this book will aid in research efforts to increase and stabilize wheat production worldwide. Written by an international team of experts, Climate Change and Food Security with Emphasis on Wheat is an excellent resource for academics, researchers, and students interested in wheat and grain research, especially as it is relevant to food security. Covers a wide range of disciplines, including plant breeding, genetics, agronomy, physiology, pathology, quantitative genetics and genomics, biotechnology and gene editing. Explores the effect of climate change on biotic stresses (stripe rust, stem rust, leaf rust, Karnal bunt, spot blotch) on wheat production and utilization. Focuses on whole genome sequencing and next-generation sequencing technologies to improve wheat quality and address the issue of malnutrition in developing world. This book looks at the current state of food security and climate change, discusses the issues that are affecting them, and the actions required to ensure there will be enough food for the future. By casting a much wider net than most previously published books to include select novel approaches, techniques, genes from crop diverse genetic resources or relatives— it shows how agriculture may still be able to triumph over the very real threat of climate change. Food, security and Climate Change: Feeding our future in uncertain times is a companion to an interdisciplinary undergraduate or graduate level class. Unless action is taken now to make agriculture more sustainable, productive and resilient, climate change impacts will seriously compromise food production in countries and regions that are already highly food-insecure. The Paris Agreement, adopted in December 2015, represents a new beginning in the global effort to stabilize the climate before it is too late. It recognizes the importance of food security in the international response to climate change, as reflected by many countries prominent focus on the agriculture sector in their planned contributions to adaptation and mitigation. To help put those plans into action, this report identifies strategies, financing opportunities, and data and information needs. It also describes transformative policies and institutions that can overcome barriers to implementation. The State of Food and Agriculture is produced annually. Each edition contains an overview of the current global agricultural situation, as well as more in-depth coverage of a topical theme. This open access book analyzes and seeks to consolidate the use of robust quantitative tools and qualitative methods for the design and assessment of energy and climate policies. In particular, it examines energy and climate polices and associated risks, as well as the diverse economic, social, and environmental impacts that energy systems and associated policies can have on food security. It looks at individual factors resulting from different methodologies and based on different data. This book aims to resolve some of the controversy by exploring and comparing the different methodologies and data that scientists use to understand climate’s effects on food security. In explains the nature of the climate threat, the ways in which crops and farmers might respond, and the potential role for public and private investment to help agriculture adapt to a warmer world. This broader understanding should prove useful to both scientists and policymakers. Climate change is a complex problem, and it is especially challenging for policymakers to respond. The book is especially suitable as a companion to an interdisciplinary undergraduate or graduate level class. Access Free Modeling Climate Change Food Security and Population
negative effects of climate change on food security can be counteracted by broad-based economic growth, particularly improved agricultural productivity and robust international trade in agricultural products to offset regional shortages. In pursuit of these goals, policymakers should increase public investment in land, water, and natural resources, and maintain relatively free international trade and other policies to use the benefits of climate change impacts. Managing climate variability and change remains a key development and food security issue in Bangladesh. Despite significant investments, floods, droughts, and cyclones during the last two decades continue to cause extensive economic damage and impair livelihoods. Climate change will pose additional risks to ongoing efforts to reduce poverty. This book examines the implications of climate change on food security in Bangladesh and identifies adaptation measures in the agriculture sector using a comprehensive integrated framework. First, the model was improved and characterized by a new set of climate and hydrology and its potential changes. Second, country-specific survey and biophysical data is used to derive more realistic and accurate agricultural impact functions and simulations. A range of climate risks (i.e., warmer temperatures, higher carbon dioxide concentrations, changing characteristics of floods, droughts, and potential sea level rise) is considered to gain a more complete picture of potential agriculture impacts. Third, while estimating changes in production is important, economic responses may to some degree buffer against the physical losses predicted, and an assessment is made of these. Food security is dependent not only on a cleaner climate but also future food demand. For the sectors, the model is designed to identify the first to combine these multiple disciplines and analytical procedures to comprehensively address these impacts. The framework will serve as a useful guide to design policy intervention strategies and investments in adaptation measures. Human activity is changing the global environment at an unprecedented rate while humanity faces a range of complex and interrelated challenges to local, regional and global development, human security and politics. Food security ranks high on the science, policy and development agenda. However, most research linking global change and food systems examines the impact of climate change on agricultural production, or the impact of agriculture on land use, pollution and biodiversity, overlooking interactions with other aspects of the food system - such as food processing, packaging, transportation and consumption and employment derived from these activities. This book demonstrates that new threats to food security which arise from environmental change require more than simply a focus on agricultural practices — what is needed is an integrated food system approach. The authors point out that the process of adapting food systems to global environmental change is not simply a search for technological solutions to increase agricultural yields. Tradeoffs across multiple scales among food systems outcomes are a prevalent feature of globalized food systems. Within food systems, there are key underexplored areas that are both sensitive to environmental change and crucial to understanding its implications for food security and adaptation strategies. The authors assert that technical prescriptions alone will not efficiently manage the food security challenge. This book is their contribution to a new paradigm, which addresses food systems holistically by engaging researchers in multiple disciplines to understand the causes and drivers of vulnerability. The purpose of the paper is to identify how climate change affects how we should approach the adaptation of agricultural food systems (including both food security and sustainability). We also identify implications for FAO (Food and Agriculture Organization of the United Nations) and CGIAR priorities. Food insecurity is a pressing issue not only in developing countries, but in communities across the United States (US). Food insecurity is the lack of nutritional, sufficient, accessible, and reliable culturally-appropriate food. At least 42.2 million people across the US face food insecurity. Food insecurity has been associated with institutional barriers, gender, indigeneity, citizenship, human immunoodeficiency virus (HIV) status, racialization, and poverty. Further, a lack of sufficient, nutritious food is associated with serious health outcomes. Food insecure populations have higher rates of chronic disease, mental health issues, and obesity. Considering the negative health outcomes associated with food insecurity, and its relationship with environmental, economic, political, and sociological trends, a review of the current literature was conducted, and a novel systems model was created using the Tonn methodology. This systems model defines and organizes relationships between key indicators identified via a comprehensive literature review. Data were collected from over 100 sources, scored, and analyzed from using environmental scanning and futures analysis. Results suggested that of the indicators food production, food production infrastructure, and ecosystem health. Trends in political climate and social inequity conditions were positive, although social inequity implied component changes remained negative. Therefore, while the model predicts decreased social inequity and improved political climate, these values were still negative in relation to food security. Sensitivity analyses revealed no unexpected effects with the removal of climate change and political climate components. Therefore, model effects were not driven solely by the trends in political climate and climate change, rather the model as a whole. Overall, policy-makers, nutrition, and other stakeholders must begin to address food insecurity in light of the findings. A multi-disciplinary and multi-sectoral intervention could reduce the risk of negative health outcomes associated with food insecurity around the world in the next 20 years. Future studies must examine the effective policies and interventions targeted at vulnerable populations considering the complex relationship between environmental, economic, political, and sociological driving factors. Sustainable Food and Agriculture: An Integrated Approach is the first book to look at the imminent threats to sustainable food security through a cross-sectoral lens. As the world faces food supply challenges posed by the declining growth rate of agricultural productivity, accelerated deterioration of quantity and quality of natural resources that underpin agricultural production, climate change, and hunger, poverty and malnutrition, a multi-faceted understanding is key to identifying practical solutions. This book gives stakeholders a common vision, concept and methods that are based on proven and widely agreed strategies for continuous improvement in sustainability at different scales. While information on policies and technologies that would enhance productivity and sustainability of individual agricultural sectors is available to some extent, literature is practically devoid of information and experiences for countries and communities considering a comprehensive approach (cross-sectoral policies, strategies and technologies) to EPA. This book is the first effort to fill this gap, providing information on proven options for enhancing productivity, profitability, equity and environmental sustainability of individual sectors and, in addition, how to identify opportunities and actions for exploiting cross-sectoral synergies. Provides proven options of integrated technologies and policies, helping new programs identify appropriate existing programs. Presents mechanisms/tools for balancing trade-offs and proposes indicators to facilitate decision-making and progress measurement. Positions a comprehensive and informed review of the next effective place for effective decision-making, comparing policy scenarios. This Food Policy Report presents research results that quantify the climate change impacts mentioned above, assesses the consequences for food security, and estimates the investments that would offset the negative consequences for human well-
Top agricultural scientists from around the world have taken up the challenge of sustainable agriculture, with the specific focus on integrating agronomic, climatological, biophysical and socio-economic perspectives and processes. Every chapter (of the Handbook) contributes to addressing the growing food-security challenges facing the world. Foreword by Jeffrey Sachs, Director of the Earth Institute at Columbia University.

Climate effects on agriculture are of increasing concern in both the scientific and policy communities because of the growing population and the greater uncertainty in the weather during growing seasons. Changes in production are directly linked to variations in temperature and precipitation during the growing season and often to the offseason changes in weather because of soil water storage to replenish the soil profile. This is not an isolated problem but one of worldwide interest because each country has concerns about their food security. The Agricultural Model Intercomparison and Improvement Project (AgMIP) was developed to evaluate agricultural models and intercompare their ability to predict climate impacts. In sub-Saharan Africa and South Asia, South America and East Asia, AgMIP regional research teams (RRTs) are conducting integrated assessments to improve understanding of agricultural impacts of climate change (including biophysical and economic impacts) at national and regional scales. Other AgMIP initiatives include global gridded modeling, data and information technology (IT) tool development, simulation of crop pests and diseases, site-based crop-climate sensitivity studies, and aggregation and scaling.