ISSN 1684-8241

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Coping with a changing climate:

considerations for adaptation and mitigation in agriculture

ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT SERIES

ENVIRONMENT [CLIMATE CHANGE] BIOENERGY MONITORING AND ASSESSMENT

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Background image in this page Illustration elaborated from
"L'Encyclopédie Diderot et D'Alembert"

Environment and Natural Resources series design: Pietro Bartoleschi, 2004

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ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT SERIES
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Coping with a changing climate:

considerations for adaptation and mitigation in agriculture

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Food and Agriculture Organization of the United Nations Rome, 2009

FOREWORD

Over one billion people around the world are undernourished because they lack easy and consistent access to affordable food. Climate change is already affecting all four dimensions of food security: food availability, food accessibility, food utilization and food systems stability. The impacts are both short-term, through more extreme weather events, and long-term through changing temperatures and precipitation patterns. Rural communities and livelihoods face immediate risk of increased crop failure, loss of livestock, and reduced availability of marine, aquaculture and forest products and new patterns of pests and diseases outbreak. People living in fragile ecosystems such as coasts, floodplains, mountain areas and semi-arid landscapes are most at risk.

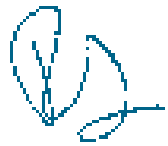
Agriculture, forestry and land use can also contribute to climate change mitigation through reducing greenhouse gas emissions and carbon sequestration. FAO promotes integration of adaptation and mitigation into food security efforts. However, true progress will require comprehensive approaches, close cooperation, synergy and coordination among the policy planners, institutions and local communities.

Adaptation and mitigation strategies should contribute to poverty reduction and at the same time must benefit the most vulnerable communities without harming the environment. Informing about climate change impacts, vulnerability patterns, coping and adaptive capacity as well as facilitating location specific adaptation and mitigation practices are of central concern.

The uncertainties related to climate change impacts and vulnerabilities are often considered as an impediment for concrete and immediate action. However, uncertainty is a fundamental component of climate impacts and cannot, in itself, be used as an excuse for inaction. This document elaborates on issues of less-than-perfect information on climate impacts and vulnerabilities, and need for better informed decisions on "resilient adaptation" by merging adaptation, mitigation and prevention strategies. It offers new perspectives

for policy-makers, institutions, societies and individuals on improved ways of identifying most at-risk communities and "best practices" of coping with current climate variability and extreme climate events.

We aim at contributing to approaches and considerations for adaptation and mitigation and improved ways of integrating present-day "best practices" with the longer-term strategies to cope with uncertain future climates.



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ABSTRACT

Changing climatic conditions are projected to affect food security from the local to global level. The predictability in rainy season patterns will be reduced, while the frequency and intensity of severe weather events such as floods, cyclones and hurricanes will increase; other predicted effects will include prolonged drought in some regions; and water shortages; and changes in the location and incidence of pest and disease outbreaks. Growing demand for biofuels from crops can place additional pressure on the natural resource base. New policy driven options are required to address the emerging challenges of attaining improved food security.

The first two chapters of this book presents historical evidence of relationship between climate and food security, as well as current challenges of world food security posed by climate change. The "**introduction**" chapter highlights the need for baseline diagnostics on impacts, vulnerability and resiliency patterns and decision making under uncertainty. **Chapter 2** elaborates on the impacts of climate change on agriculture and stresses how to effectively address these impacts, focusing on ecosystem goods and services and social well being. The chapter on "the setting: baseline information" underlines that mapping, such as capacity to cope in a country, is as important as mapping vulnerabilities to climate variability and change.

Climate change adaptation strategies are now a matter of urgency. Many potential adaptation options in agriculture have mitigation synergies, and similarly, several mitigation options for climate change could generate significant benefits for both food security and adaptation. **Chapter 3** on "Adaptation and mitigation" introduces the "four laws of ecology" and presents their continuing relevance to policy-makers when they identify, develop and implement adaptation and mitigation strategies.

In regard to climate change and the likelihood that future characteristics of climate will change in unknown ways, the existing "best practices" should be viewed as providing a source of tactical short-term response to a changing environment as opposed to untested strategic long-term responses.

Chapter 4 on "What to do at the national level" elaborates the fact that climate impacts and response mechanisms in the near term future are likely to be similar to those of the recent past, barring any abrupt changes in the atmosphere's local and global climatic characteristics.

Most climate impacts of concern to policy-makers are local. Adaptation and mitigation measures, which require poverty reduction and food security, must be customized to benefit the neediest of the needy. **Chapter 5** on "Short-term and long-term policy options" focuses on decision making under uncertainties; improved ways of identifying most at-risk communities and coping with current climate variability and extremes; and improved ways of integrating present-day tactical and "best practice" responses with the longer-term strategic needs.

The conclusion has key **take-home messages** from the FAO high level conference on "World Food Security: The Challenges of Climate Change and Bioenergy" are presented along with closing thoughts about having "no adaptation recommendations without ramifications" as well as suggestions for policy-driven strategic thinking about adaptation to and mitigation of climate change with a focus on improved food security.

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by Michael H. Glantz, René Gommes, Selvaraju Ramasamy

116 pages, 3 figures, 2 tables, 13 pictures
FAO Environment and Natural Resources Service Series, No. 15 – FAO, Rome, 2009

Keywords:
Climate change, bioenergy, food security, adaptation and mitigation in agriculture, coping with climate change in agriculture, short term and long term policy options, policy decisions under uncertainty.

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BANANA CROP DESTROYED BY HURRICANE MITCH (1998) IN HONDURAS

Climate change including extreme events such as storms and floods is making it even more difficult to grow and harvest produce from the land and threatens food security.

EXECUTIVE SUMMARY

- This report is an expanded version of a paper that was originally drafted to encourage participants to the FAO Expert Meeting on Adaptation and Mitigation to provide examples from their regions, sectors and disciplines to reinforce or challenge, as appropriate, the concepts presented in order to improve policy-makers' understandings of and preparations for coping with both the causes and the impacts of climate change on food security.
- The overarching goal in societal responses to climate change for the sake of enhancing food security must be a hybrid strategy, merging adaptation, mitigation and even prevention to produce an overall strategy of "resilient adaptation".
- Governments must decide how they want to systematically think about and then undertake adaptation and mitigation activities. The inherent issues related to national decision making must be evaluated to determine if governments are equipped to cope with the dynamic nature of the impacts of climate change. In other words, are governments able and ready to address twenty-first century climate change problems that are not covered under current policies and programmes?
- Policy-makers are now being pressed to cope with a changing climate, from its anthropogenic causes to its impacts on food security. In this task, they are not unarmed: They can rely on information, knowledge and experience derived from historical accounts of the impacts of climate, water and weather as well as scenarios derived from global and regional modeling activities.
- Many adaptation and mitigation actions to cope with climate change causes and impacts are worth undertaking in their own right.
- Many of the environmental changes that are occurring and those that are likely to occur in the future as a result of climate change are incremental and "slow onset," but they are cumulative. Policy-makers must improve the ways they choose to deal with such creeping changes in the environment as those changes will increasingly influence food security in negative ways.

- A significant number of examples exist of successful and of unsuccessful responses to changes in what we today consider to have been our "normal" climate of the past several decades. Examples of such responses are illustrative of societal vulnerabilities and resiliencies in the face of change, and they serve as a measure of societies' adaptive capacities over time.
- The numerous existing controversies and conflicts in agriculture, forestry and fisheries will most likely be affected by climate change. These controversies and conflicts must be made explicit, and their functional as well as their geographic "boundaries" must be identified and dealt with in a more global and systematic way.
- Adaptation and mitigation activities will be ongoing in order to keep up with changes in the climate, from the global to the local level.
- Adaptation and mitigation activities will generate their own set of impacts on socioeconomic sectors well beyond agriculture, and governments must be prepared to both anticipate and respond to them.
- Policy-makers must beware of short-term, short-sighted solutions. They must also beware of cost-benefit assessments that do not include non-quantitative analyses, such as considerations of social or cultural value conflicts that stem from multipurpose competition.
- Even if policy-makers are on the right track in regard to their development of strategies and tactics for adaptation, they not only have to choose the correct directions in which to move, but they also have to be concerned about the rate of change in the implementation of their policies. American humorist Will Rogers once remarked "Even if you are on the right track, you can still be run over if you are not moving fast enough."
- Prevention strategies and tactics must be pursued along with mitigation and adaptation.
- Do not wait for projections based on the output of scientific models of climate change to confirm what is already suspected or known about the impacts of climate trends, variations and extremes on food security.

ACRONYMS

AAAS	American Association for the Advancement of Science
AFOLU	Agriculture, Forestry and Other Land Use
AOC	Areas of Concern
BAU	Business As Usual
CGIAR	Consultative Group on International Agricultural Research
CI	Conservation International
COP	Conference of Parties
DMUU	Decision Making Under Uncertainty
DRC	Democratic Republic of Congo
FAO	Food and Agriculture Organization of the United Nations
FSIA	Food Security Impact Assessment
GEF	Global Environment Facility
GHG	Greenhouse Gases
GWP	Global Warming Potential
HLC	High Level Conference
HYV	High Yielding Varieties
IFAD	International Fund for Agricultural Development
ILEC	International Lake Environment Committee Foundation
IPCC	Intergovernmental Panel on Climate Change
IRRI	International Rice Research Institute
MA	Millennium Ecosystem Assessment
MDG	Millennium Development Goals
MOD	Manado Ocean Declaration
MSY	Maximum Sustainable Yield
NGO	Non-Governmental Organization
PRECIS	Providing Regional Climates for Impacts Studies
SWOC/T	Strengths, Weaknesses, Opportunities and Constraints/Threats
TECA	Technology for Agriculture
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WFP	World Food Programme
WFS	World Food Summit
WMO	World Meteorological Organization
WOC	World Ocean Conference
WOC-CTI	World Ocean Conference and Coral Triangle Initiative
WRI	World Resources Institute

SMALL-SCALE FARMERS IN AFRICA

Climate change affects everyone. But the worst hit will be hundreds of millions of small-scale farmers, herders, fishers and forest-dependent people who are already vulnerable and food insecure.