

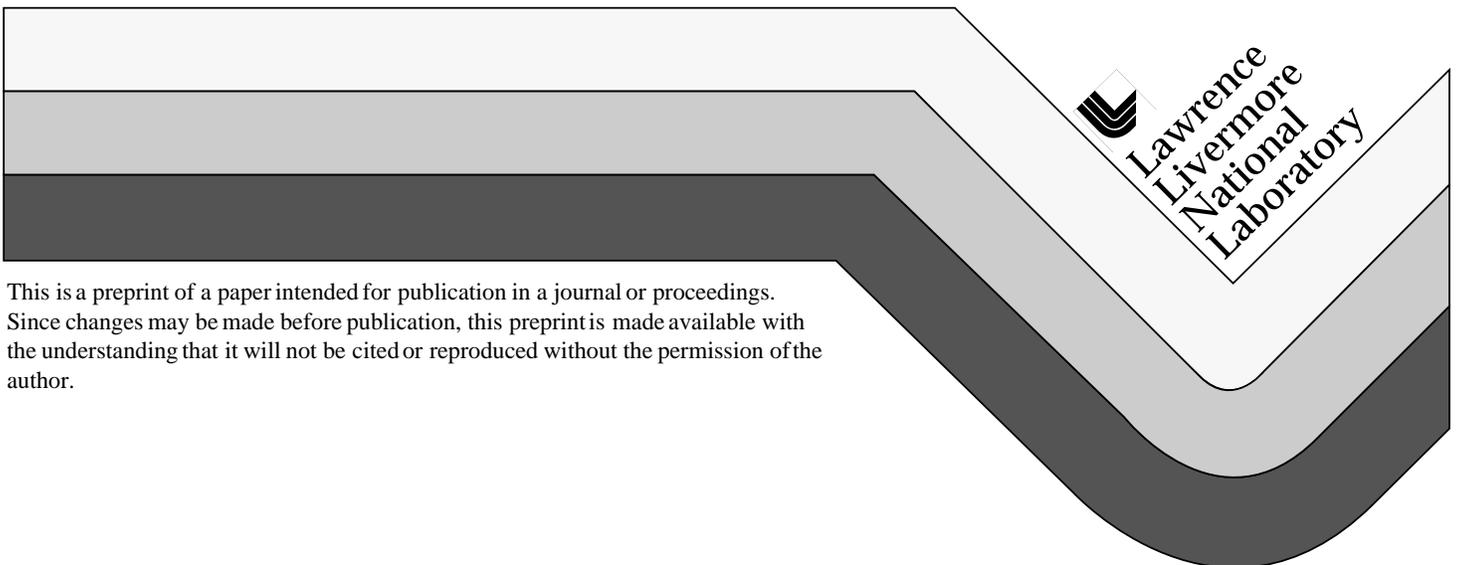
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PREPRINT

# National Assessment of the Consequences of Climate Change for the United States

M.C. MacCracken  
J.M. Melillo  
P.V. Dresler

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## NATIONAL ASSESSMENT OF THE CONSEQUENCES OF CLIMATE CHANGE FOR THE UNITED STATES

Michael C. MacCracken

Director designate, National Assessment Coordination Office, and  
Lawrence Livermore National Laboratory, Livermore, California

Jerry M. Melillo

Chairman, Steering Committee for the U. S. Climate Forum, and  
Marine Biological Laboratory, Woods Hole, Massachusetts

Paul V. Dresler

Chairman, USGCRP Working Group on National Assessments, and  
Department of the Interior, Washington DC

### 1. INTRODUCTION

The U. S. Global Change Research Program (USGCRP) is initiating a national assessment of the consequences of climate change and climate variability for the United States and the significance of these consequences for its people, its environment, and its economy. With the increasing certainty about human-induced effects on climate and with the recent evidence for increasing climate variability, it is particularly important that society be made more aware of what is happening, what the significance of the changes could be, and how to be better prepared to cope and adapt to the changes and variations.

This enhancement of USGCRP assessment activities is being undertaken to help strengthen two of the five central purposes of the USGCRP which have been emerging only slowly (see SGCR, 1997); in particular to analyze the environmental, socio-economic, and health consequences of global change; and to support state-of-the-science assessments of global environmental change issues. These purposes will complement and build upon the USGCRP efforts to observe and document changes in the Earth system, to understand why these changes are occurring, and to improve predictions of future global change. It is this overall package of activities, with research and assessment focused both nationally and internationally, that are needed to fulfill the expectations of the USGCRP.

The national assessment is being organized by the Subcommittee on Global Change Research as a public-private partnership and as a continuing process to provide a scientifically based evaluation and summary of current understanding. The assessment process will be designed to be comprehensive and integrative, to cou-

ple research by scientists with specific policy-relevant needs of stakeholders, to ensure scientific excellence and credibility, to be open and transparent, and to provide planners, managers, organizations, and the public with information needed to cope with and increase their resilience to natural climate fluctuations and projected climatic changes resulting from human activities. Of particular importance will be the participation of those with expertise in the atmospheric and oceanic sciences because of their strengths in fundamental research, observations, prediction, applications, assessment, and interactions with and communication of findings to the public, farmers and resource managers, the business community, and other stakeholders.

### 2. NATIONAL ASSESSMENT GOAL

The goal of the national assessment is to determine the local, regional, national, and international implications of climate change and climate variability within the United States in the context of other existing and potential environmental, economic, and social stresses. Of particular importance is understanding the regional mosaic of what has been and will be occurring as a result of the global-scale changes that are underway and will continue over the coming decades.

### 3. APPROACH TO THE NATIONAL ASSESSMENT

The national assessment process will be designed to establish and maintain a continuing, interactive dialogue among government officials, business and industry, planners and managers, non-profit organizations, the scientific research and education communities, and the public. A multi-pronged approach will be used to generate the needed information about the implications of climate change and variability for the United States:

- *Regional* assessment activities will focus on the issues of most importance at the regional level across the United States. Based on the distinctive

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\* *Corresponding author address:* Michael C. MacCracken, National Assessment Coordination Office, Suite 750, 400 Virginia Avenue, SW, Washington DC 20024; e-mail: mmaccracken@usgcrp.gov.

regional characteristics and potential consequences of climate change, eighteen regional workshops are being organized, encompassing every state and territory (see Table). In carrying out the regional assessments, it is expected that some combinations of workshop regions may be possible without losing the richness and diversity created by the more detailed regional focus.

- *Sectoral* assessment activities will focus on issues that are national in scope and of importance to the services and goods on which people, society and the economy depend. Eight sectors have been tentatively identified for consideration, including: food availability; water availability; human health; forests; ecosystem services; energy; urban services; and commerce, industry, and trade.
- *National* assessment activities will identify common themes and core issues concerning the implications of long-term climate change and variability for the United States. These findings will be integrated and consolidated into a synthesis report that will serve as a national summary for decision makers.

In addition, to promote consistency and coherence across the regions and sectors, a series of baseline scenarios will be prepared that provide the best estimates of how the nation is expected to develop economically, demographically, and technologically over

the next 50 years. A series of scenarios also will be developed that define the ranges of expected changes in climate, resource use, and ecosystem distribution for use in evaluating the potential consequences of long-term climate change for the U. S.

A strengthened assessment-oriented research program dedicated to supporting the development of useful information for decision-makers, and a broadly based research program aimed at improving fundamental understanding of the Earth system and as the basis for achieving improved predictive understanding will be essential partners in the national assessment process.

#### 4. ORGANIZATION AND RESPONSIBILITIES

The U. S. Global Change Research Program has a statutory mandate to undertake scientific assessments of the implications of climate change. Responsibility for this is assigned to the National Science and Technology Council (NSTC) within the Executive Branch of the Federal Government. Within the NSTC structure, the Subcommittee on Global Change Research (SGCR) of the NSTC's Committee on Environment and Natural Resources (CENR), which oversees the USGCRP, has assumed responsibility. To carry through the assessment process, responsibility for the analyses and for

Table of regional workshops being convened as part of the national assessment

Regional Workshop Region	Date (or planned date) of Workshop	Place of Workshop	Sponsoring Federal Agency(ies)
Central Great Plains	May 27-29, 1997	Fort Collins, CO	DOE
Alaska	June 3-6, 1997	Fairbanks, AK	DOI
Southeastern United States	June 25-26, 1997	Nashville, TN	NASA, NOAA
Northwestern United States	July 14-16, 1997	Seattle, WA	NOAA, NASA
Southwestern United States	Sept. 3-5, 1997	Phoenix, AZ	DOI
New England and northern New York	Sept. 3-5, 1997	Durham, NH	NSF
Middle Atlantic	Sept. 9-11, 1997	State College, PA	EPA
Northern Great Plains	Nov. 5-7, 1997	Fargo, ND	NASA
Rocky Mountains and Great Basin	Feb. 12-14, 1998	Salt Lake City, UT	DOI
Gulf Coast	Feb./March, 1998	Baton Rouge, LA	EPA
California	March, 1998	Santa Barbara, CA	NSF
Hawaii and the Pacific Islands	March, 1998	Honolulu, HI	FEMA, NOAA
Central Appalachians	April/May 1998		USDA
Great Lakes	Spring, 1998		EPA
Metropolitan East Coast	Spring, 1998	New York, NY	NSF
South Atlantic Coast, Puerto Rico, V.I.	Spring, 1998		NOAA
Texas and the southern Great Plains	Spring, 1998		USDA
Eastern Midwest	Spring, 1998		USDA

the preparation of the periodic assessment reports will be vested in both the scientific community and in those who will be affected and can and must cope with the consequences of long-term environmental change.

Responsibility for the national assessment process will be distributed among several entities:

- A *National Assessments of Global Change Oversight Committee* will be established to provide oversight for the national assessment process, to ensure its overall credibility and integrity, and to encourage timely progress. Members will be drawn from the regional, sectoral, and national communities and include representatives from public interest groups, business and industry, state and local governments, Congress, and the federal agencies. A *National Assessment Technical Advisory Committee* also will be established that includes leading scientists and technical experts in order to provide expert advice and review of the assessment process.
- A *National Assessment Synthesis Team* that includes leading scientists and experts will be established that will provide intellectual leadership and integration for the national assessment process, serve as a strong bridge between regions and sectoral aspects of the national assessment, and prepare the integrating synthesis report.
- *Regional, Sectoral, and Scenario Teams* also will be established. These teams will have direct responsibility for designing and developing baseline scenarios, and for assembling, analyzing, and considering the scientific findings and their implications for the regions and sectors. The assessment teams will be organized in a way that is open, inclusive, and multi-disciplinary.
- A *National Assessment Coordination Office* will be established by the SGCR, with staff coming from outside and within government. This office will have responsibility for coordinating and organizing the national synthesis. This office will be co-located and work in cooperation with the USGCRP's inter-agency coordination office and with the Working Group II Technical Support Unit of the Intergovernmental Panel on Climate Change (IPCC), for which the U.S. will continue to serve as the developed country co-chair.
- The *Working Group on National Assessments*, organized under the SGCR, will coordinate overall Federal Government participation in the national assessment and will assist in the initiation of regional and sectoral teams and help ensure a linking to emerging scientific information. In addition, this working group will coordinate plans for enhancing USGCRP and related research activities in areas underpinning the national assessment process.

## 5. PRODUCTS OF THE NATIONAL ASSESSMENT

In conducting the assessment, and in particular in starting the process with the regional workshops, four fundamental questions are being posed. These are:

- What are the current environmental stresses in the region or sectoral area and how would these be expected to play out in the future in the absence of climate change?
- How will projected changes in climate and climate variability exacerbate or ameliorate the effects of the existing regional or sectoral stresses, or introduce new stresses?
- What information is needed to provide better and more certain estimates of the consequences of climate change and variability?
- What strategies may help the region to cope with the anticipated consequences, especially in ways that also will help in coping with other stresses?

Addressing these questions will be vital if individuals and organizations are to better cope with the influences of climate change and variability over the next several decades.

The USGCRP is committed to providing the needed information through a continuing broad-scale, multi-sectoral assessment process. A series of national-level summary reports is envisioned for each region and each sector; these will be based on more-detailed findings and documentation generated for and published by each regional or sectoral assessment team. The set of national-level summary reports for each region and sector will be accompanied by a synthesis report that provides an overview and integration drawn from these reports.

## 6. SCHEDULE FOR THE NATIONAL ASSESSMENT

Regional workshops have begun, and sectoral activities will begin later this year. A session of the Aspen Global Change Institute's 1997 summer workshop was devoted to learning from the experiences of the early regional workshops and developing a plan for proceeding with initiation of the full national assessment process. This was followed by the U. S. Climate Forum, held on November 12-13, 1997, which brought together several hundred participants to expand and refine the set of questions that must be addressed in the national assessment for it to be useful for stakeholders.

It is planned that the initial set of regional and sectoral summary reports will be drafted in 1998, with revision and review completed by the middle of 1999. The first national synthesis report is to be completed by the end of 1999. It is envisioned that future updates will appear periodically, with the schedule in each region and sector depending primarily on the development of

new information and understanding. Legislation establishing the USGCRP calls for scientific assessments of global change to be conducted periodically.

## **7. ENSURING SCIENTIFIC CREDIBILITY AND RELEVANCE**

The credibility of national assessment reports will be ensured by requiring an open and inclusive process that encourages the participation of the most qualified scientific, technical, and socio-economic experts in their preparation. Assessment reports will be expected to fairly represent the range of expert opinion about particular issues, with careful recognition of risks and uncertainties. Draft and final assessment reports will be subject to an open and wide-reaching review process, and accommodation will be made for well-documented and reviewed alternative interpretations. Relevance to the needs of policymakers will be ensured by the continuing and close involvement of stakeholders and decision-makers. Internal and external evaluation processes will be developed in order that the continuing series of assessment activities and reports presents a clear and fair presentation of scientific understanding and stakeholder interests and needs.

## **8. OUTREACH AND COMMUNICATION**

The value of the assessment process depends on the broad communication of the findings and lessons emerging from the dialogue among the many and diverse stakeholder and the scientific communities. The U. S. Climate Forum held at the National Academy of Sciences on November 12-13, 1997 was the first major step to encourage national participation in the assessment process. The regional workshops, which provide the core of the assessment activity, and similar sectoral workshops over the next year will further encourage involvement and communication.

Assessment activities, workshop reports, and analytic findings also will be broadly communicated through the media, the Web, and other channels. Reports will be made widely and inexpensively available. Outreach also will be strongly encouraged through programs that target both formal (i.e., school-based) and informal (i.e., museum, park, and community-based) educational communities.

## **9. PARTICIPATION BY ATMOSPHERE AND OCEAN SCIENTISTS**

There are many opportunities for those in the atmosphere and ocean sciences to participate in the national assessment process, and it is essential that the participation be strong in several specific areas. First, it is important that there be participation in interpreting and analyzing of the projections of climate change made by global and regional (nested) models. While important

progress is being made in improving models, there remain important uncertainties and only ranges of future changes can be estimated. There is an important role for analysis in determining the consistency of simulations in projecting changes in major climatic features (e.g., the southwest monsoon, the Bermuda high, storm tracks) that tend to determine the regional weather--while models cannot yet predict the local departures of climate change from sub-continental scale estimates, significant insight is likely possible by using empirical relationships to relate local response to changes in the large-scale circulation.

Second, an essential context for understanding the vulnerability of regions or sectors to future climate change is understanding their sensitivity to past change and variations. Atmosphere and ocean scientists can play important roles by developing and interpreting records of the region's climate and participating in analyses of how these effects interacted with a region's environment and socio-economic activities.

Third, developing the means to cope with longer-term climate change can likely best be achieved by improving society's resilience to the natural year-to-year fluctuations in the climate. Thus, working with communities, resource agencies, businesses, and the public in helping to prepare for such events as strong Pacific warm events can be very important.

Fourth, participating in the development of public discussion and understanding about the world around us is vital. Education activities, both traditional and informal, are vital to helping the public, governmental and business leaders, and others who will be affected by climate change and variability to prepare and cope in ways that make society safer and more efficient.

These are only starting points. We invite you to help in these and many other ways. The assessment process is intended to be empowering rather than prescriptive, and we ask your help in making this so.

## **REFERENCES**

SGCR, 1997: *Our Changing Planet, The FY 1998 U. S. Global Change Research Program*. Available from the Subcommittee on Global Change Research, Washington DC (Web: <http://www.usgcrp.gov>)

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*Technical Information Department • Lawrence Livermore National Laboratory*  
*University of California • Livermore, California 94551*

