WORKING TOWARDS A NATIONAL ASSESSMENT

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Dr. Robert Corell, Director of the Geosciences Division at the National Science Foundation, provided information about the purpose of the workshop from a national perspective. The following is a summary of his talk.

In 1990, the Global Change Research Act mandated the preparation of (periodic) scientific assessments of global change. In 1997, the Subcommittee on Global Change Research (USGCRP), which coordinates the U.S. Global Change Research Program (USGCRP), initiated a national, scientifically based assessment of the consequences of climate change and climate variability for the people, environment, and economy of the United States. This assessment would provide an opportunity to foster the participation of people who use global change information throughout the country and to enhance their ability to plan for and to cope with climate changes and variations. This assessment would be a core activity of the USGCRP. The USGCRP's conduct of the assessment would be overseen by the National Science and Technology Council and the Office of Science and Technology Policy. The goal of the National Assessment would be to determine the local, regional, and national implications of climate change and climate variability within the United States in the context of other existing and potential future environmental, economic, and social stresses. Of particular importance would be understanding the regional mosaic of what has been and what will be occurring as a result of global change.

Dr. Corell emphasized that the National Assessment process has been designed to create a continuing dialog among government, business and industry, labor, nonprofit organizations, the scientific research and education communities, and the public. He indicated that a multi-pronged approach will be used to generate the needed information about the implications of climate change and variability for the United States:

1. **Regional Assessments:** 20 regional assessments will focus on the issues of most importance at the regional level across the United States. Each will begin with a scoping workshop involving an average of 100 regional participants in a dialogue about perspectives and priorities related to global change for that part of the country. Each workshop will be followed by a minimum of three activities: (1) quantitative analysis of 2-3 key issues; (2) continuous engagement of regional stakeholders; and (3) publication of a report in a common format. Many regional assessments will go beyond this scope in holding additional meetings, or publishing multiple products for different audiences.
2. **Sectoral Assessments**: Sectoral assessments will focus on issues that are national in scope and related to the goods and services on which people, society, and the economies depend. The first phase of the assessment will focus on five sectors: agriculture, water, human health, forest, and coastal areas and marine resources. However, the regional assessments will provide coverage (although not necessarily national) of many additional sectors and issues.
3. **National Synthesis**: A Synthesis Report will integrate key findings from the regional and sectoral assessments and will address overarching questions related to implications over the next 25 and 100 years.

To promote consistency and coherence across the regions and sectors, a series of guideline scenarios will be prepared that estimate how the nation is expected to develop economically, demographically, and technologically over the next 25 to 100 years. A series of scenarios also will be developed that define a range of changes in climate, resource use, and ecosystem distribution so that the potential consequences of long-term climate change for the United States can be evaluated.

As the first step of the regional assessment, all of the regional workshops have been asked to address four fundamental questions:

1. What are the current environmental stresses?
2. How will projected changes in climate and climate variability exacerbate or ameliorate existing stresses, or introduce new stresses?
3. What information is needed to provide better and more certain estimates of the consequences of climate change and variability?
4. What strategies may help the region or sector cope with the anticipated consequences of changes in climate? What opportunities exist for win-win solutions and approaches?

As the USGCRP conducts the National Assessment, a number of public-private partnerships will be established with the intent of creating a collaborative network of decisionmakers, scientists, and other interested parties. Those partnerships will underlie a continuing process that will produce periodically updated, scientifically –based evaluations and summaries of current understanding.

The assessment process will be designed to be comprehensive and integrative, to couple research by scientists with specific policy-relevant needs of stakeholders, to ensure scientific excellence and credibility, to be open to broad participation, and to provide planners, managers, organizations, and the public with information they will need to cope with natural climate fluctuations and projected climate changes.

A series of summary reports will describe the consequences of climate change and variability for regions and sectors. These will be based on more detailed findings and documentation published by each regional or sectoral assessment activity. The set of summary reports will be accompanied by a synthesis report that provides an overview and integration of the regional and sectoral reports. The first series of assessment reports was completed in late 1999. These reports will point to many issues requiring elaboration as part of the continuing research and assessment process.

To support the various assessment activities, a significant USGCRP priority will be an assessment-oriented research agenda as well as a strong, broadly based research program aimed at improving fundamental understanding of the earth system. A number of agencies already have regional research and assessment programs underway, and additional activities are being planned by a broader set of USGCRP agencies.

An open and inclusive process that encourages the participation of the most qualified scientific, technical, and socioeconomic experts will ensure the credibility of the National Assessment reports. Draft assessment reports will be subject to an open and wide-reaching review process, and well-documented and reviewed alternative interpretations will be accommodated. Continuing and close involvement of stakeholders and decisionmakers will ensure relevance to policymakers. Internal and external evaluation processes will ensure that the continuing series of assessment activities and reports present a clear and fair depiction of scientific understanding and stakeholder interests and needs.

Dr. Corell noted that the value of the assessment process will depend on communicating the findings and lessons emerging from the dialog among the many and diverse stakeholders and scientific communities. The U.S. Climate Forum, held at the Department of Commerce on November 12-13, 1997, was the first major step to encourage nationwide participation in the assessment process. Assessment activities, workshop reports, and analytic findings will be communicated broadly through the media, the World Wide Web, and other channels. Reports will be made widely and inexpensively available. Outreach also will occur through programs that target both the formal (i.e., school-based) and informal (i.e., museum, park, and community-based) educational communities.

Reasons for the assessment include:

1. **To Prepare the Nation for Future Change.** To assure that the United States is prepared for future change, the United States Global Change Research Program (USGCRP) has initiated a national assessment on the potential consequences of climate variability and change for the nation. The national assessment process will analyze and evaluate what is known about the potential consequences of climate variability and change for the nation, in the context of other pressures on the public, the environment, and the nation's resources.

2. **Responsive to Congressional Needs.** The USGCRP is mandated by statute with the responsibility to undertake scientific assessments of the potential consequences of global change for the United States in the "Global Change Research Act of 1990" (P.L. 101-606), which states the federal interagency committee for global change research of the National Science and Technology Council "shall prepare and submit to the President and the Congress an assessment which:

   • integrates, evaluates, and interprets the findings of the program and discusses the scientific uncertainties associated with such findings;

   • analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity;

   • analyzes current trends in global change, both human-inducted and natural, and projects major trends for the subsequent 25 to 100 years."

3. **Providing Input Into the Intergovernmental Panel on Climate Change.** The national assessment has been timed to provide input in the Third Assessment Report of the UNEP/WMO Intergovernmental Panel on Climate Change (IPCC), which has been working to integrate more regional detail into its analyses.

4. **Involving Stakeholders from a Broad Spectrum of Society.** The national assessment process will involve a broad spectrum of stakeholders from state, local, tribal, and federal governments; business; labor; academia; nonprofit organizations; and the general public.

5. **Linking Scientists and Stakeholders.** The assessment will link research by scientists to specific needs of the stakeholders; and will provide planners, managers, organizations, and the public with the information needed to increase resilience to climate variability and cope with climate change.

6. **Scientific Excellence Combined with Open and Participatory Approach.** The national assessment is founded on the principles of scientific excellence and openness, and will be integrative and iterative.

Dr. Corell ended his talk by describing some results from regional workshops, already held (prior to the Upper Great Lakes Workshop):

In the Southeastern United States, the El Niño-Southern Oscillation (ENSO) signal is quite pronounced. Studies of the relationship between El Niño and agricultural production in the region are helping farmers adjust to changing climate conditions, providing an example of how a better understanding of these short-term, interannual climate variations may help those who will be affected in the future by climate change.

In the Central Great Plains, the agricultural sector faces a number of challenges. Farmers and ranchers must cope with extreme weather events—floods, droughts, blizzards, hail storms, tornadoes, and others—that might become more severe and frequent in the future. They also are working to reduce runoff of crop and animal wastes into water supplies and to slow the loss of soil to erosion.

But theirs' is not a message of despair. Already they are developing and implementing sustainable land practices, both because these practices increase their incomes and because they protect the environment. One example of such a win-win solution occurs when ranchers supplement their incomes by converting animal wastes into marketable biomass fuels, which simultaneously reduces the amount of the greenhouse gas methane released into the atmosphere. Likewise, by increasing the carbon content of the soils and thus pulling carbon dioxide from the atmosphere, farmers are adding to the resilience of their fields to drought, whether natural or enhanced by climate change.

In the Southwest, communities in arid and semi-arid environments are especially sensitive to impacts on water resources. They depend on access to adequate supplies for their people and their agriculture, but are at risk to the extremes of flood and drought cycles. Most water in the Southwest comes from melting snow in the Rocky Mountains or underground aquifers. As population in the region increases, overuse is depleting the aquifers and climate change is expected to affect the amount of water from snowmelt. At the same time, rising temperatures over land could intensify the strong convective storms that can occur in the Southwest. Understanding how all of these factors interrelate would provide the information needed by regional decisionmakers to consider options and develop plans for meeting societal needs.

In the Pacific Northwest, the Columbia River is the lifeblood of the region. Variations in climate already require management of competing water demands along the river system in order to protect fisheries while providing water for irrigation, hydroelectric power, and communities. Changes in the seasonal timing and amount of precipitation are expected to affect the timing of peak runoff and river discharge, creating a potential mismatch between water supplies and user needs. Understanding these changes would provide opportunities for the various sectors to adjust by improving irrigation efficiency, changing crops, and developing alternative energy sources.

The New England region is downwind from emissions from industrial, utility, and transportation sources in the rest of the United States and parts of Canada, the quality of life there is threatened by poor air quality. If CO_2 emissions were reduced, then the region would see benefits far beyond the prevention of climate change. Emission reductions would help abate the region's air pollution and acid rain, while improving visibility during summer months. Improving the gas mileage of automobiles, via new hybrid technologies and other innovative approaches, as well as conversion of Midwestern power production facilities to alternative energy sources, would result in lower levels of

nitrogen oxides, sulfur dioxide, organic compounds, and tropospheric ozone affecting the region. Human health would benefit immediately from emission reductions; the health of the region's ecosystems also could benefit, and healthier forests would take up more CO_2 from the atmosphere.

Alaska has warmed about 5 °F over the past 30 years and this warming is already having a significant influence. Warmer days could bring more personal comfort and longer farming seasons, but they would also affect fisheries and cause a thawing of the permafrost layer. This thawing is particularly significant because it would result in damage to buildings, roads, railroads, and other infrastructure, while also causing slumping in forests that leads to their transformation into wetlands. Drier summers have reduced forest health, leading to an increase in forest fires and in insect infestation. Alaska is faced with developing the means to cope with what may prove to be the most pronounced climate change in the United States.

In the Mid-Atlantic region, climate change could have profound effects on human health, ecosystems, and outdoor recreation because of the region's unique combination of geography, aging infrastructure, economic structure, population density, and mixed land use. One of the prime issues for the Chesapeake Bay is sea-level rise. Past rises have eroded coasts, threatened homes, narrowed recreational beaches, and eroded wetlands and bay beaches that are important habitats for birds and fish. Information is needed to evaluate new construction or rebuilding within areas of high risk from natural hazards (e.g., zones prone to flooding, coastal storms, or tidal surges), and to determine the best means of protecting ecosystems and infrastructure. One of the most important elements of a response strategy would be the communication of climate change projections to improve land-use and drought planning efforts and strategies for managing water across regional or local districts.

In the Northern Great Plains, the April 1997 flood of the Red River washed out homes and businesses that had been in Grand Forks, North Dakota, and East Grand Forks, Minnesota, for generations. The disaster was expected to occur, at least on the average, only once every 500 years. The Mayors at the time, Pat Owens of Grand Forks and Lynn Stauss of East Grand Forks, faced a new uncertainty as they began to rebuild their cities. Will floods of this magnitude occur more frequently in the future? If so, what level of protection must be provided? Can dikes or diversion channels be built to withstand even greater floods? No one is quite certain how severe or how frequent future floods—or their opposites, droughts—will be. But the climate change that is already underway is likely to change the pattern of storms and spring melts in this region. The historical pattern of seasonal river flows might change as well.

For Mayors Owens and Stauss, climate change is a current issue. Displaced people and businesses need decisions now on how close to the river they can build and what level of protection will need to be provided. These decisions will affect future generations as well. To protect lives, property, and livelihoods for residents both today and tomorrow, the two mayors need the best possible information about future climates.