Stakeholder Involvement in the First U.S. National Assessment of the Potential Consequences of Climate Variability and Change: An Evaluation, Finally.

Susanne C. Moser, Ph.D.
Institute for the Study of Society and Environment
National Center for Atmospheric Research
Boulder, CO

-- Draft of January 23, 2005 --
WORKING DRAFT - DO NOT CITE OR QUOTE

CONTENTS:

DISCLAIMER: This study rests on the information provided by many individuals. Their opinions reflect personal experiences and views and do not express the official positions of the institutions with which they may be affiliated. The conclusions drawn from these contributions are solely those of the author, and do not imply official endorsement by the National Center for Atmospheric Research or the National Research Council.

List of Abbreviations

CCRI	Climate Change Research Initiative
CCSP	Climate Change Science Program
CENR	Committee on Environment and Natural Resources
CEQ	Council on Environmental Quality
CMU	Carnegie Mellon University
DOE	Department of Energy
DOI	Department of Interior
EPA	Environmental Protection Agency
FAC(A)	Federal Advisory Committee (Act)
FEMA	Federal Emergency Management Administration
FQDA	Federal Data Quality Act
GEA	Global Environmental Assessment (Project)
GPRA	Government Performance and Results Act
IBR	Independent Review Board
IPCC	Intergovernmental Panel on Climate Change
IRF	Interregional Forum
NACO	National Assessment Coordinating Office
NASA	National Aeronautics and Space Administration
NAST	National Assessment Synthesis Team
NAWG	National Assessment Working Group
NCEDR	National Center for Environmental Decision-Making Research
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
NSF	National Science Foundation
NSTC	National Science and Technology Council
OSTP	Office of Science and Technology Policy
OTA	Office of Technology Assessment
PCAST	President's Committee of Advisors on Science and Technology
SGCR	Subcommittee on Global Change Research
TAR	(IPCC) Third Assessment Report
UNFCCC	United Nations Framework Convention on Climate Change
USGCRA	United States Global Change Research Act
USGCRP	United States Global Change Research Program
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USNA	(First) United States National Assessment (of the Potential Consequences of Climate Variability and Change)

List of Figures

List of Tables

1. Introduction

> *"The [...] focus on the role of science in informing decisions is emerging as one of the critical unmet needs of society at the end of the millennium."*
>
> Jane Lubchenco (1998)

> *"... reliable knowledge can only become socially robust if society sees the process of knowledge production as transparent and participative."*
>
> Michael Gibbons (1999)

In the mid to late 1990s, the idea of stakeholder involvement in the assessment of climate change risks was one whose time had come. It emerged against the backdrop of rising scientific, political, and societal attention to climate change over the last two decades of the 20th century; discussions about the changing "contract" between science and society (Gibbons 1999, Lubchenco 1998); a growing recognition of legitimate public participation in policy-making; and a deeper examination of the role of assessments of environmental and societal risks in informing public policy.

The First U.S. National Assessment of the Potential Consequences of Climate Variability and Change was an assessment – and maybe the first worldwide in its scale and scope – that grappled seriously with what stakeholder involvement in an assessment process would mean. This study tries to reconstruct the origin, evolution, and outcomes of this innovative effort. In doing so, it aims to evaluate the conduct and impacts of stakeholder involvement on the National Assessment and beyond.

1.1 Overview of the Study

This study was conducted in late 2004 and early 2005, more than four years after the official conclusion of the principal assessment period (1997-2000). In the eyes of many assessment participants – inside and outside of government and the assessment process – such an evaluation is long overdue. Given the delay, it is necessary to begin this evaluative study with a description and overview of the National Assessment, which also serves as the rationale for viewing the assessment effort as a case family (Section 1.2). Trying to understand the stakeholder involvement in the assessment, however, would by difficult if not impossible – as became clear over the course of this research (data and analysis described in Section 2) – without placing the assessment into its historical context, trying to trace its origin and evolution over time (Section 3). The core of the analysis (Sections 4 and 5) describes the outputs and outcomes of the assessment process and discusses pertinent explanatory factors hypothesized as relevant throughout this collection of papers. Section 5 also discusses the challenges and opportunities in continuing stakeholder involvement in a national assessment process. The Conclusion (Section 6) offers reflections on stakeholder involvement in assessments more broadly.

1.2 The National Assessment as a Case Family

The First U.S. National Assessment of the Potential Consequences of Climate Variability and Change was mandated by the Global Change Research Act of 1990 (P.L. 101-606) passed by Congress in November 1990. This act formally established the U.S. Global Change Research Program, which has since then coordinated all federally sponsored global change research activities. The conduct of periodic assessments (no less frequently than every four years) of the state of knowledge of global change risks was also written into the law (Sec. 106; see United States Congress 1990).

This first assessment (hereafter the National Assessment or USNA) was officially launched in 1997. It consisted not of a single, but of a collection of many assessments. These can be organized under three principal rubrics: (1) 19 scoping and assessment efforts at the regional level to identify vulnerabilities, potential impacts, adaptation options, and knowledge gaps; (2) five cross-cutting efforts at the national level that examined the same for selected sectors; and (3) a national synthesis of the state of knowledge from these regional and sectoral assessments.

Regional efforts typically began with scoping workshops (eight in 1997, ten more in 1998; see Figure 1a&b), which led to full assessments in 12 regions.

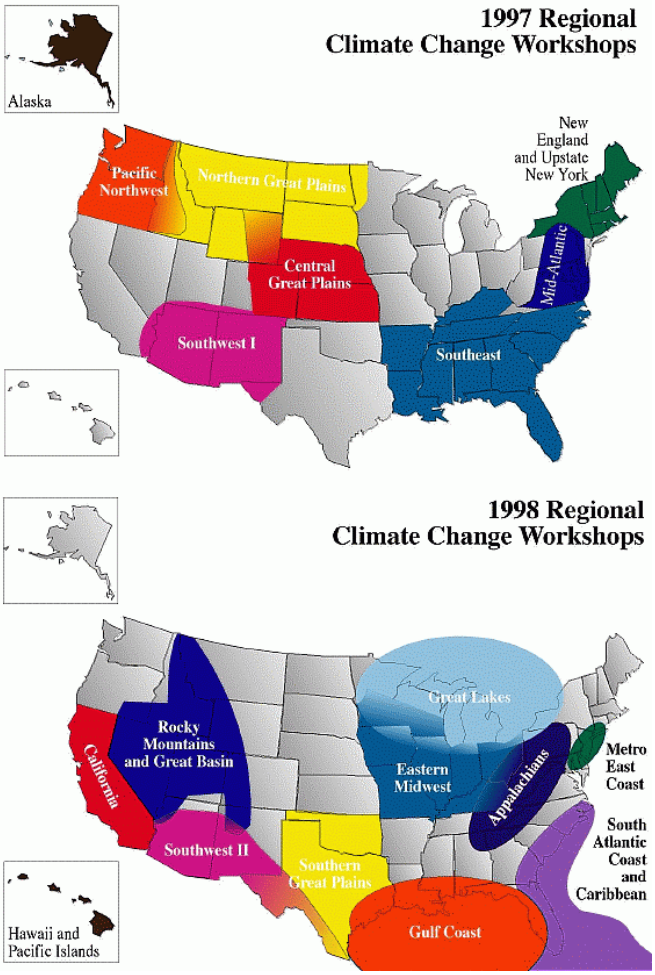

Figure 1: Regional assessments of the National Assessment kicked off by scoping workshops in (a) 1997 (top) and (b) 1998 (bottom)

(Source: USGCRP, available at:
http://www.usgcrp.gov/usgcrp/nacc/background/workshops.htm)

Out of some of the early regional workshops emerged the need for a special focus on Native Peoples and Homelands – neither region nor sector in a narrow sense, but instead place-specific and cross-cutting at the same time. Thus a 19th "regional" scoping workshop was conducted in 1998 to address concerns and insights of and about native peoples and their homelands.

The USNA further included five cross-cutting, nationwide assessments of five sectors or thematic areas: agriculture, forests, water, coastal areas and marine resources, and human health. Some, but not all, also included workshops.

These regional and sectoral assessments were begun and finished at different times, conducted by different teams in different ways. Whatever they had produced by mid-to-late 1999 was augmented with additional scientific and stakeholder input and summarized by a team of experts in a national synthesis – a shorter overview and a longer foundation report (National Assessment Synthesis Team 2000a, National Assessment Synthesis Team 2000b).

Underlying the range and diversity in these assessments (explored in detail in this study) were a number of common elements that unite these 19 regional assessments, five sectoral assessments and the national synthesis assessment, along with their respective workshops, into a coherent case family:

Legal mandate

As mentioned above, the USNA was mandated by the Global Change Research Act, which states that the federal interagency Subcommittee on Global Change Research (SGCR) – a subgroup of the Committee for Environment and Natural Resources (CENR), which in turn is part of the President's National Science and Technology Council (NSTC) – "shall prepare and submit to the President and the Congress an assessment which

- integrates, evaluates, and interprets the findings of the [U.S. Global Change Research] 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; and
- analyzes current trends in global change, both human-induced and natural, and projects major trends for the subsequent 25 to 100 years."

This charge suggests a timeframe of concern, key sectors of interest, and a broader focus than the first National Assessment ended up having (global change vs. climate change). It also specifies two clients for the assessment – the U.S. Congress and the President, but only elsewhere in the law demands relevance of the global change research program's outputs to a broader stakeholder community (e.g., resource managers). The law itself does *not* explicitly mandate the regional focus, nor the stakeholder emphasis that the First National Assessment ended up having.

Assessment timeframe

The many components of the assessment were conducted more or less in parallel over the core period between 1997 and 2000. Some regional assessments, however, were only fully completed and published after the publication of the synthesis documents in late 2000. (The implications of this timing will be discussed in more detail in Sections 3 and 5 below.)

Federal coordination

From the federal level, the assessments were coordinated and facilitated through one common organizational structure. Key elements of this organizational structure were

- an interagency working group (the National Assessment Working Group, NAWG) organized under the SGCR, responsible for assessment coordination within and across federal agencies, overall federal guidance and commitment to the process, financial planning, and guidance on the review process
- a small office of dedicated staff within the U.S. Global Change Research Program (USGCRP) logistically supporting regional, sectoral and national synthesis efforts and coordinated the external review process (the National Assessment Coordination Office, NACO)
- a federal advisory committee of experts responsible for overall intellectual assessment guidance and writing the national synthesis (the National Assessment Synthesis Team, NAST)
- a mechanism for the exchange of information among regions, initially called the Regional Council, and eventually formalized over the course of the assessment as the Interregional Forum (IRF) and
- an Independent Review Board (IRB) or "Blue Ribbon Review Panel" of renown scientific experts and non-scientific, non-governmental representatives, also put in place mid-way through the assessment period, which was responsible for overseeing the assessment and review process.[1]

The relationships among these organizational units, together with their links to the legislative and executive branches of government (and hence funding sources), and the links to the various assessment components are depicted in Figure 2 below.

[1] The charge of each of these organizational units is described in greater detail at: http://www.usgcrp.gov/usgcrp/nacc/background/organization/ [accessed 11/29/2004].

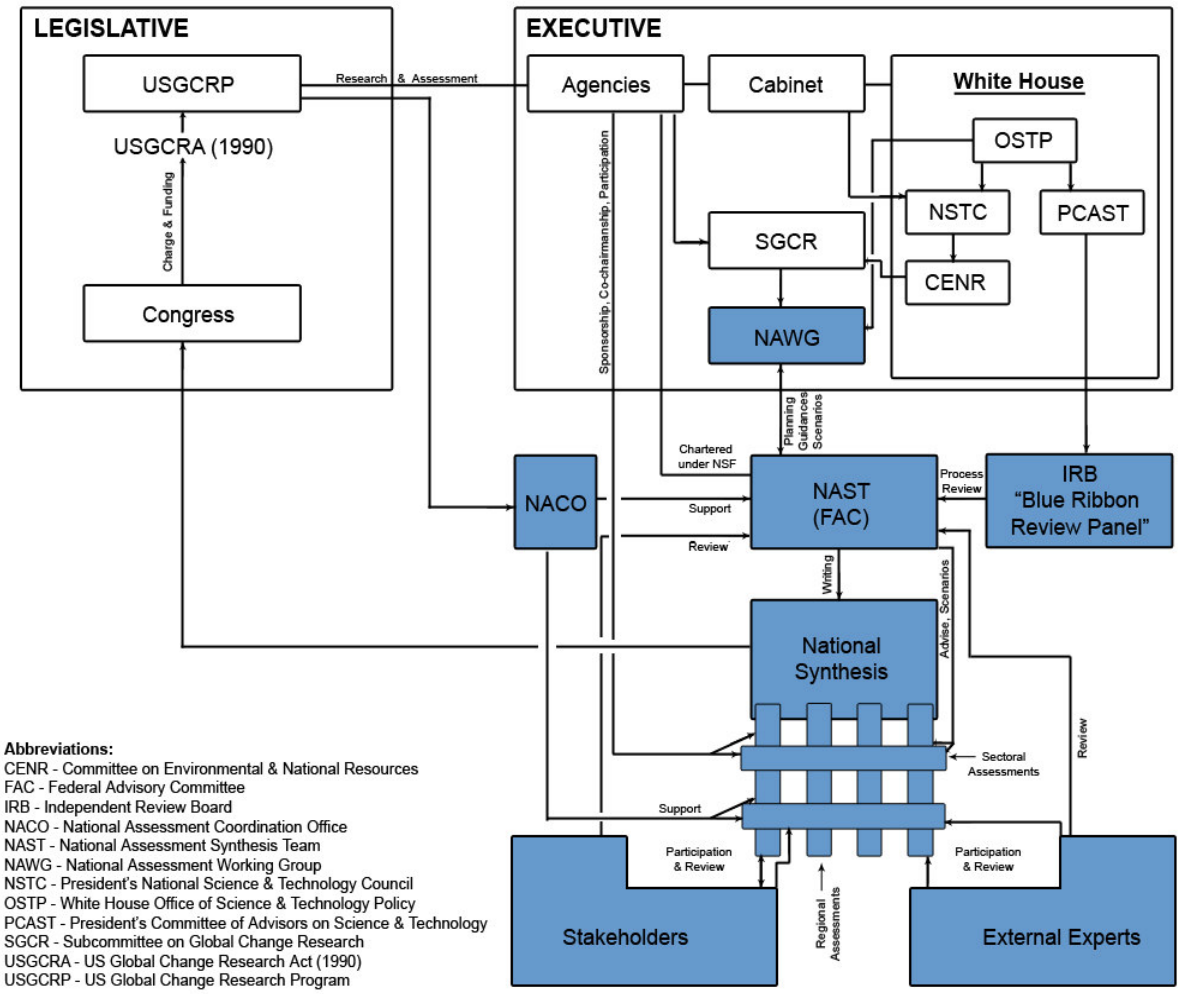

Figure 2: Organizational chart for the First U.S. National Assessment
(Source: Based on information on the USGCRP website and from interviewees)

Beneath the umbrella of this federal coordination apparatus, the conduct of individual assessments was designed and carried out – at the discretion of regional, sectoral and synthesis leaders – in a wide variety of ways and through various structural arrangements (discussed in more detail Section 4).

Guiding questions and principles

The National Assessment was formally initiated through a letter by then-Science Advisor to President Clinton, Dr. John Gibbons, to the chair of the interagency Subcommittee for Global Change Research, Dr. Robert Corell (Gibbons 1998). This charge letter included a list of questions the assessment was asked to answer. Through discussions with other assessment leaders at the federal level and from the regions and sectors, this initial list of questions was eventually reduced to a set of four:

- What are the *current environmental stresses* and issues that form the backdrop for potential additional impacts of climate change?
- How might climate variability and change *exacerbate or ameliorate existing problems*? What new problems and issues might arise?

- What are the *priority research and information needs* that can better prepare the public and policy makers for reaching informed decisions related to climate variability and change?
- What *coping options* exist that can build resilience to current environmental stresses, and also possibly lessen the impacts of climate change?

Besides these key questions to be addressed in each assessment, federal assessment leaders also emphasized three basic principles that should underlie the conduct of the assessment – scientific excellence, openness to participation, and relevance to resource managers and other information users. These found their practical implementation in an elaborate peer- and stakeholder review process and the strong overall emphasis on stakeholder involvement, especially at the regional level.

Purpose of stakeholder participation

The purpose of the stakeholder involvement in the National Assessment was varyingly and officially described as a "democratic information exchange and gathering process" or as "engaging in dialog" with the American public about the vulnerabilities, impacts and adaptation options to climate variability and change. Nonetheless, assessment leaders across regions, sectors, and at the federal level differed markedly in their personal understanding of the purpose of stakeholder involvement. What unifies the many assessment components in this regard, however, is the novelty of heavily emphasizing the bottom-up stakeholder involvement, a characteristic that almost uniformly created enthusiasm for the assessment among its regional and some national/federal leaders (discussed in greater detail in Section 3 and 4).

Stakeholder participation guidelines

Federal assessment leaders developed guidelines for stakeholder participation at various stages of the assessment process – early on a set of relatively broad and general guidelines; subsequently, an informal "lessons learned" document based on the experience gained in the first few regional workshops; and finally, a third set of guidelines that was much more detailed and theoretically and experientially founded. The degree of awareness and use of, as well as adherence to, these guidelines will be discussed in more detail in Section 3 and 4.

Numbers of stakeholders per assessment

The number of participating stakeholders in each component assessment varies considerably and is virtually impossible to reconstruct (the reasons are discussed in more detail in Section 2.2 and 4.1). Estimates provided by interviewees for this study suggest between 50-200 per regional assessment, fewer in the sectoral assessments, and again several hundred in the national synthesis. In total, assessment leaders estimate that more than 2000 people contributed to the USNA in one capacity or another.

Intended common analytic basis

The teams were expected to use – at a minimum – the outputs from two global climate models, historical climate information, and hypothetical but plausible "what-if" climate scenarios as well as a set of socio-economic projections as the basis for the assessment. While ultimately a highly contentious issue, the use of common scenarios was thought to

facilitate the comparison and integration of regional and sectoral assessment results for the national synthesis.[2] In the end, some teams used the three prescribed approaches to analyze climate impacts and vulnerabilities; others augmented with additional model projections; while yet others did not use climate model outputs at all. Only few groups used some modified version of the socio-economic baseline data.

Reporting template

Federal assessment leaders developed a common report template for presenting each team's assessment findings to facilitate comparisons and synthesis at the national level. Some groups complied closely; others had already published their findings in a format of their own design or chose to follow an alternative design deemed more appropriate for the intended audience. Yet others have either not yet published a report or sought publication of findings in the peer-reviewed literature. The most common element to the published set of reports (and summary brochures) to date, however, is the cover. It unifies diverse efforts into a suite of clearly recognizable sister reports. Each report's "identity" was created by the same designer, with elements common to all reports, yet also displaying regional or sectoral idiosyncracies (see Figure 3).

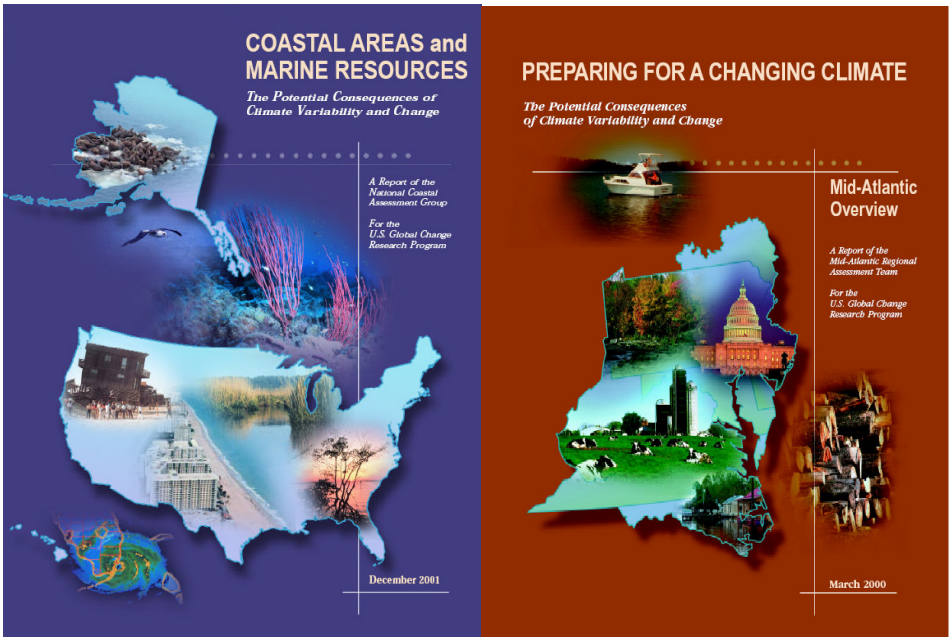

Figure 3: Two sample covers of a sectoral and a regional assessment report (Source: USGCRP, available at: http://www.usgcrp.gov/usgcrp/nacc/allreports.htm#Regional%20Workshops)

The National Assessment was never intended to directly inform a *particular* national policy decision, such as a set of climate change mitigation or adaptation policies. Nor were the regional assessments meant to do so at the local or state levels. At the same

[2] For a detailed discussion of the rationale, advantages and disadvantages, and discussion of the points of contention of using the climate model projections developed for the USNA, see (MacCracken et al. 2003, Parson and al. 2003). Except where this debate intersects with the stakeholder component of the assessment, the scenario issue is not further discussed in this study.

time, however, assessment leaders hoped that the stakeholder process would help identify particular decision-relevant information needs, and possibly begin to address them in order to increase the nation's preparedness for climate change. Envisioning the assessment process as an ongoing process beyond the first assessment, the early intent was that the USNA would also help build science–decision-maker relationships that could be sustained over time and lead to productive ongoing decision support.

The larger political context in the mid to late 1990s (discussed in more detail in Section 3) was also marked by the U.S. government's search for a position in the international Kyoto Protocol negotiations. Thus, while the assessment was not specifically geared toward supporting the international climate treaty deliberations, federal assessment leaders hoped that the results of the assessment would at least loosely inform this process as well.

In summary, a significant set of organizational, procedural, and philosophical factors unify the different components of the National Assessment into a single case family. Changes in these factors over time, funding differences, as well as sizeable latitude in implementing the assessments in each region and sector, however, created considerable unevenness in what actually happened "on the ground." This unevenness offers comparative advantages and valuable insights for this study, while – at the time – engendering some frustrations, jealousies, and also learning opportunities for everyone involved in the assessment process. Before exploring these further, it is important to understand the data basis on which this evaluation rests.

2. Study Methodology

From the beginning, federal assessment leaders were aware of the desirability, if not need, of an evaluation not only of the stakeholder component of the assessment, but of the entire effort.[3] Given the novelty and complexity of the undertaking, and the notion of an *ongoing* assessment component of the U.S. Global Change Research Program, it seemed incumbent on assessment leaders to extract the numerous important lessons likely to emerge from their novel approach. The need for reviews thus was discussed repeatedly and several informal and partial internal evaluations were begun or are still underway. A comprehensive evaluation of the USNA, however, has not yet been completed.

This section describes the sources of information underlying this analysis (Section 2.1), discusses the completeness and quality of available information (2.2) and briefly describes how they are analyzed, used, and integrated (2.3).

2.1 Data Sources

A. CMU Survey

The most ambitious formal evaluation effort to date was begun under the leadership of Granger Morgan (himself once a member of the NAST) at Carnegie Mellon University. This effort is funded by NSF and guided by an advisory planning committee, comprised of individuals who were directly involved in various components of the assessment and of external experts.[4] A major component of this evaluation was a lengthy mail survey conducted in November 2002, which elicited evaluative judgments from assessment participants. The results of this survey were graciously made available for this study and form the first of three important legs for this analysis.

The 22-page survey covered the following topics:

- educational background and experience of respondents
- forms and degrees of involvement in the USNA
- organization and administration of the USNA
- familiarity with the science on climate and climate change
- approaches to characterizing future climate
- approaches to assessing social and economic impacts
- approaches to characterizing and treating uncertainty
- overall grading of the USNA along numerous dimensions
- strengths and weaknesses of the USNA and
- suggestions for the future conduct of assessments

The survey questionnaire was pilot-tested with 10 respondents (not included in the numerical results), and after revisions, administered to 2,081 people on the contact

[3] A proposal for such a comprehensive evaluation of all aspects of the USNA is currently being discussed within the U.S. Climate Change Science Program (CCSP). If funding becomes available, this evaluation may be conducted under the auspices of the National Research Council's Board on Atmospheric Sciences and Climate.

[4] Members of the Planning Committee include: Robin Cantor, William Clark, Ann Fisher, Jake Jacoby, Anthony Janetos, Ann Kinzig, Jerry Melillo, Granger Morgan (chair), Roger Street, and Thomas Wilbanks.

mailing list compiled by the National Assessment Coordination Office. Many of these subjects had little or no direct involvement in the assessment. A total of 172 completed surveys (or: just over 8%) were returned. Survey respondents included almost all authors of the National Assessment Synthesis Report, 86 authors of regional or sectoral reports, and 28 people who had participated in one or more major workshops and also contributed to one or more of the reports. The remaining respondents represented people with varying roles and degrees of involvement in the assessment (e.g., workshop participants, reviewers of reports, process observers) from academia, government, the private/business sector, and non-governmental organizations.

After an initial analysis of survey results, a workshop was held in April 2004 for 40-50 USNA leaders and other interested parties to discuss lessons learned. Pre-workshop discussion notes were also made available for this study, but final write-ups of the CMU evaluation effort are still forthcoming.

The survey results were augmented with interview and documentary evidence for several reasons:

(1) Two or more years after people's involvement in the USNA, the response rate to the survey was low. In addition, several respondents repeatedly exclaimed (in write-in answers) that they could not recall details because their involvement dated back too far.

(2) The survey presented numerous interesting results which could not easily be explained by variables contained in the survey alone.

(3) The survey results combine opinions about the performance of any one of the assessment components (regions, sectors, national synthesis) into a big "mélange." As one survey respondent stated, "this survey speaks of the national assessment as if it were a monolithic structure," thus disguising differences among them and rendering understanding of causal patterns more difficult.

(4) The survey did not cover all aspects that the NRC project hopes to examine.

The additional information needs generated through the survey were thus sought to be answered through key informant interviews and careful reading of other documentation.

B. Interviews with Assessment Leaders

The second major source of information consists of 31 telephone or face-to-face interviews conducted by the author with ten federal, five sectoral, and 16 regional assessment leaders. Federal leaders represented all the major institutions centrally involved in organizing, guiding, and implementing the USNA, including the NAST, NAWG, NACO, SGCR, IRF, and the White House Office of Science and Technology Policy (OSTP) (see Figure 2 above). Of the co-chairs of each assessment[5], the majority of interviewees were academic co-chairs, and in a few cases the federal agency co-chair. The response rate to the request for an interview was extremely high (31 out of 33 contacted individuals, or >91%). Because of time constraints, three regions, which only

[5] For sectoral assessments, an effort was made to have them be chaired by one academic leader and one federal agency representative. In the regional assessments, typically both co-chairs were based at academic institutions. In few cases, there were more than two co-chairs or not the federal-academic pair.

held scoping workshops but neither completed a workshop report nor a full assessment, were not contacted.

The interviews were held in December 2004 and January 2005, lasted for an average of 90 minutes each, and in all but one case, interviewees readily consented to a taped conversation. The total number of assessment leaders is limited, thus identifiable as a group and not truly anonymous (i.e., everyone wishing to do so, can find out who the assessment leaders were). In order to create an atmosphere in which interviewees could speak freely about their assessment experience, a guarantee was given that specific statements would not be attributed, and the population of interviewees is large enough to disguise identity.

The interviews covered a wide range of topics and many questions built directly on the findings of the CMU survey, including questions about:

- the origin of the stakeholder emphasis in the USNA
- the selection of assessment chairs
- guidance for the stakeholder process
- composition of the core teams
- stakeholder involvement through workshops and other venues/means
- interpretation of "assessment" as product and process
- purpose of stakeholder involvement
- the experience with stakeholder involvement
- impact of stakeholders on the assessment
- impact of assessment on stakeholders
- discrepancy between hopes and reality
- dealing with different expectations about the nature of the assessment
- expectations about influencing the assessment
- perceptions of political bias or influence
- maintaining positive outcomes of the assessment
- credibility, legitimacy and relevance
- uniqueness of the USNA

The insights generated through the personal interviews with key informants helped give depth, detail, and region- and sector-specific experiential "flavor" to the understanding of stakeholder involvement in the USNA. Not surprisingly at this point in time, the greatest challenge for interviewees was to recall exact dates or the precise sequence and history of the assessment. Through triangulation of interviewee responses and documentary evidence (see below), the difficulty of reconstructing the assessment history and evolution was overcome. While this report will frequently quote interviewees directly, in order to guard their confidentiality their words will only be attributed to categories of individuals (e.g., federal assessment leaders, regional assessment leaders), but not to individual names.

Arguably, assessment leaders may be thought to be positively biased in their descriptions of and judgments about the assessments they personally led vis à vis those of others'. Cognizant of this potential bias, triangulation against survey and documentary evidence again becomes extremely important. It should be expressly noted, however, that assessment leaders were refreshingly candid, self-aware and self-critical, and freely approving of other assessments where stakeholder assessment was thought to have been

handled particularly well. They also felt free to criticize arrangements or processes which they viewed as having negatively affected the conduct or perception of the USNA. Moreover, it is reasonable to expect – in an interview explicitly about stakeholder involvement – that interviewees might (in an effort to "please" the interviewer) be biased toward being highly in favor of such involvement and greater breadth and intensity of involvement than they may have supported at the time. This bias is more difficult to detect or eliminate. However, in responding to mostly open-ended questions, interviewees revealed in what they emphasized and how they phrased their answers, remarkable differences in philosophy of stakeholder involvement – differences that could be corroborated at least through the perspectives of other interviewees and the reconstruction of the assessment history.

C. Documentary Evidence

The third source of information consists of a wide variety of documents, used to corroborate, cross-check, and augment the above two information sources. They include:

- publications from the peer-reviewed literature explicitly focusing on the stakeholder component of the first National Assessment
- unpublished documents and email exchanges among assessment leaders concerning stakeholder involvement in the USNA, provided by interviewees
- the internal and informal evaluations of any aspect of the USNA undertaken over the course of the assessment, also provided by interviewees
- all published, final and draft outputs (workshop reports, assessment reports, etc.) from the assessment, available on the USGCRP website or made available by interviewees
- background information on the USNA, available on the USGCRP website or provided by interviewees
- minutes and summaries of meetings of assessment leaders, available at the USGCRP website, other institutional websites, or provided by interviewees
- the archives of the National Assessment newsletter, *ACCLIMATIONS*, available on the USGCRP website
- discussions of the National Assessment and related budget information in the annual report of the USGCRP, *Our Changing Planet*, 1995-2004
- a wide variety (if not systematically compiled collection) of newspaper articles about the USNA
- legal documents and statements by climate contrarians[6] criticizing the USNA and
- some information on USGCRP web traffic as well as photographs illustrating outreach efforts and interactions with stakeholders, provided by interviewees and other informants.

[6] A climate contrarian is defined here as not simply a person skeptical of the reality or severity of human-induced climate change, but someone who – in addition – actively and deliberately tries to publicly deny and/or distort the state of the science, and/or denigrate the integrity of highly qualified or renown climate scientists, and/or misrepresent the role, conduct, intent or status of climate-related policy institutions and processes. Typically, climate contrarians have received funding from fossil fuel interests and few are active contributors to the peer-reviewed literature (see, e.g., (Beder 1999, Brown 1997, McCright and Dunlap 2001, McCright and Dunlap 2003, Miller and Edwards 2001).

D. Other Insights and Sources

In the interest of full disclosure and as a source of additional insight, it is important to point out my own direct involvement in the National Assessment. As a post-doctoral fellow in the Global Environmental Assessment (GEA) Project at Harvard University from 1997-1999, I was a direct witness and contributor to a much larger research effort to understand the design, conduct, and impact of environmental assessments on policy-making. One GEA research focus was the USNA. That study involved numerous direct interactions with National Assessment leaders in summer workshops and informal discussions. In addition I participated in the November 1997 U.S. Climate Forum (an assessment workshop) and in the scoping workshop of the Pacific Islands regional assessment in March 1998, gaining first-hand experience of the conduct of the assessment at two different levels. In 2000, I again worked closely with assessment leaders in an effort to publicize the findings of the USNA.

2.2 Evaluation of the Data Basis

The combination of survey, interview and documentary evidence presented here constitutes probably the most complete data basis obtainable at this point in time. Even so, interviewed assessment leaders recognized several missed opportunities in gathering additional information that would be necessary for a comprehensive and quantitative evaluation:

- tracking every single person (e.g., contact information) who was ever involved in the USNA was attempted but aborted mid-way, as it became increasingly evident that collecting that information, especially for stakeholders who were only once or passively or marginally involved, would be too cumbersome and time-consuming;
- despite the recommendation (and provision of an easy form to fill out) to assessment leaders to keep track of stakeholder involvement in their efforts, such information was not systematically collected;
- a formal evaluation of stakeholder experiences (from their own perspective) soon after the completion of the USNA was not undertaken.

With regard to the information that is available, several factors need to be taken into account to assess their quality and most appropriate use/interpretation. The high-quality survey data from CMU offer – at first glance – a quantitative assessment of opinions regarding a range of aspects of the assessment conduct and outcomes. The question must be asked, however, how representative they are of the larger population of assessment participants. Demographic information obtained in the survey suggests that the survey *qualitatively* represents the types of people who participated and the roles and degrees of involvement individuals displayed (Table 1a-c).

Table 1: CMU Survey Population

(a) Professional Affiliations

63 (37%)	university	12 (7%)	retired
44 (26%)	federal government	9 (5%)	self-employed
13 (8%)	NGO	8 (5%)	corporation

11 (6%)	state government	7 (4%)	think tank
2 (1%)	small business	0	home-maker
1 (<1%)	unemployed	0	student
(na = 2)			

(b) Expertise and Experience

68 (40%)	ecology	24 (14%)	integrated assessment
48 (28%)	economics	16 (9%)	social science other than economics
39 (23%)	ocean/marine	13 (8%)	risk analysis/management
31 (18%)	business	10 (6%)	climate science
31 (18%)	public health/medicine	9 (5%)	water
27 (16%)	forestry	4 (2%)	agriculture
26 (15%)	politics/public service		

(c) Involvement in USNA

80 (47%)	Served as a reviewer of one or more of the assessment's reports
55 (32%)	Worked on one of the regional reports
49 (28%)	Participated in one or more of the regional workshops
49 (28%)	Participated in the Forum in Washington, DC (November 1997)
31 (18%)	Worked on one of the sectoral reports
30 (17%)	Employee of one of the convening/supporting federal agencies
27 (16%)	Participated in the workshop in Atlanta, GA (April 1999)
18 (10%)	Worked with the National Assessment Working Group
17 (10%)	Worked on the national synthesis report
16 (9%)	Participated in the workshop in Monterey, CA (July 1998)
16 (9%)	Other (variety of liaisons and communication activities)
15 (8%)	Participated in the workshop in Aspen, CO (August 1997)

Because of the lack of information about the total participant population, however, it is not possible to conclusively confirm that the sample of survey respondents is also *quantitatively* representative of the entire USNA participant population. Thus, the most conservative (and therefore most defensible) interpretation of the survey findings is to view them as "categorically representative." This careful view is supported by interview findings, which reiterated and helped explain many of the opinions expressed in the survey, yet which also suggested that the balance of types of participants (e.g., scientists and non-academic stakeholders) and the different roles they played from start to finish differ from that reflected in the survey sample.

What the interviews clearly did not provide, however, are the first-hand, personal perspectives and experiences of the stakeholders who participated in the USNA. A small number of them is captured in the CMU survey, but given the already-low response rate to the CMU survey, some respondents' difficulty in recall, and only very few regions continuing their assessment and stakeholder involvement processes, a representative sample of stakeholders was not believed to be reachable anymore at this late stage of evaluating the USNA. This leaves the evaluation of the National Assessment irrevocably incomplete and underscores the importance of including an evaluation component of a stakeholder process by stakeholders in future assessments (e.g., InterAct 2001).

2.3 Data Analysis

The raw survey data were made available in tabulated form by CMU. In addition, Granger Morgan offered numerical summaries of quantitative information, where applicable. Because of the indeterminable quantitative representativeness of the survey results, the write-in survey answers were not further coded for quantitative analysis. Instead, categorical sorting of answers was used along with the qualitative information obtained from the interviews for a contextual analysis of the outputs, outcomes, and potential explanatory variables of stakeholder involvement in the assessment. In short, the available information does not lend itself to a meaningful quantitative multivariate analysis. While nominal correlations and qualitative causal patterns are discernible, a conclusive quantitative analysis cannot be performed.

The analysis undertaken here closely follows the conceptual framework of outcomes and explanatory variables that underlies the set of case families included in this NRC study (Figure 4), and is augmented by additional elements and factors – such as perceived credibility and relevance of the assessment – identified by other investigators (e.g., (Global Environmental Assessment Project 1997, Rowe and Frewer 2000, Rowe and Frewer 2004).

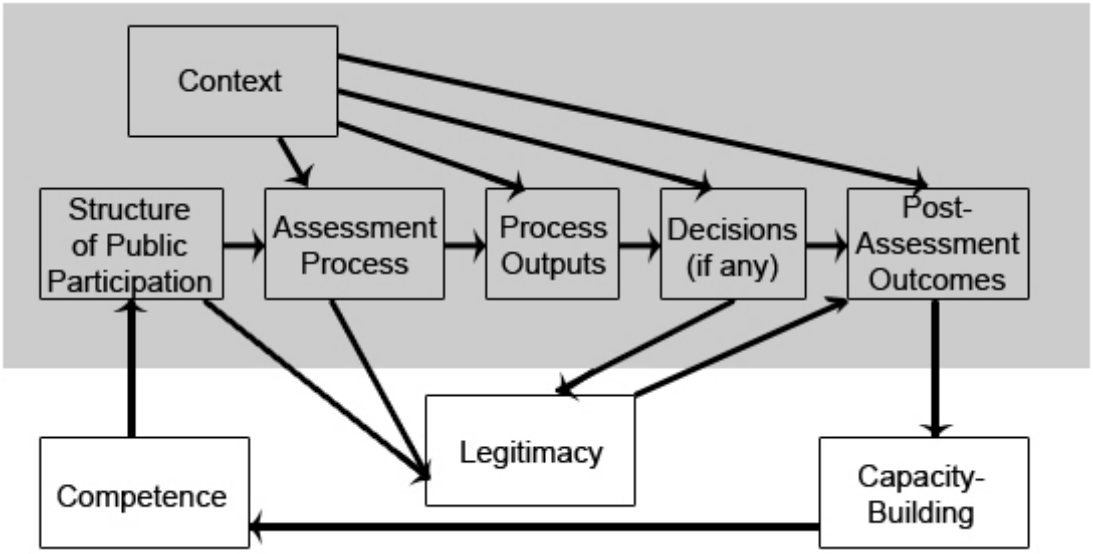

Figure 4: Schematic model of types of variables involved in the "success" of environmental public participation processes, adapted for assessment processes (Source: Adapted from Stern and Dietz, Study Guidance)

Figure 4 understates the fact that assessment processes – especially if they go on over an extended period of time – occur in changing contexts and – in themselves – evolve. This is to say that any one of the variables (structure, process, outcomes, capacity-building, legitimacy etc.) can change over time. As will be shown below, this change in itself is an important causal force. The next section thus attempts to describe the evolution of the First National Assessment within a changing political and societal context.

3. The History of the National Assessment (with particular emphasis on its stakeholder component)

The First U.S. National Assessment did not set out from a "grand plan" that experienced only minor adjustments over the course of its conduct. Rather, the idea for an assessment involving stakeholders was discussed for several years before it was actually initiated; ambitions and goals for such an assessment were not uniform among its leaders and changed over time; moreover, a USNA implementation plan was only developed and approved when parts of the assessment had already begun and acquired their own momentum. Meanwhile, the larger scientific, societal and political context changed as well and imposed its own marks on the assessment process.

These intertwined external and internal changes are critically important to the understanding of the First National Assessment, as they help explain the enthusiasm this undertaking generated as well as the frustrations participants and leaders experienced over time. As no other full historical accounting exists in the grey or published literature, the following sections try to reconstruct the origin and evolution of the USNA – with particular emphasis on its stakeholder component – in some detail. Short summaries of each period are included for those readers less interested in the finer details of the chronology.

3.1 Period prior to the First National Assessment (pre-1997)

Summary: The period before the core assessment period is marked by several important trends: (1) U.S. interest in climate change and assessments was growing over several decades, and capacity to conduct them was building. Government assessments prior to 1997, however, largely did not focus on potential impacts, were conducted inside federal agencies, and did not include an extensive bottom-up, participative stakeholder component. (2) Over the course of the 1980s and particularly 1990s, climate change became an increasingly partisan, hotly debated issue in the U.S. (3) The U.S. Global Change Research Act, passed in 1990, included an explicit mandate to conduct impacts assessment and started building the capacity for it since the early 1990s. More specific planning for such an effort, and the intention to include stakeholders more extensively, emerged in this period. Regional workshops were initiated in 1997, which eventually became part of the National Assessment. (4) The beginning organizational elements of the National Assessment were put in place.

United States *government-initiated and led* assessments of the greenhouse effect, climate change, and related matters (e.g., energy) go back several decades, at least to 1965.[7] U.S. interest in conducting such assessments became more serious against the backdrop of worldwide weather anomalies in the early 1970s; the "Limits of Growth" debate and

[7] For a complete listing of climate assessments initiated, led, and/or sponsored by government, scientific institutions, international institutions (in which U.S. scientists played key roles), or non-governmental organizations, see (Global Environmental Assessment Project 1997), pp.22-26).

energy crisis of the same decade; growing international concerns over climate change, most notably through the First World Climate Conference in 1979 and a National Academy of Sciences report on climate change in the same year; the Villach, Austria conferences on climate change in 1980 and 1985; the "ozone hole" crisis of the 1980s; and finally, the establishment of the Intergovernmental Panel on Climate Change by the World Meteorological Organization and the United Nations Environment Program in 1988 (Social Learning Group 2001). According to interviewees, together these international conferences and ways of organizing climate change science for policy-relevant assessments spawned discussions within U.S. governmental circles about enhancing the national climate change assessment capacity.[8]

In the same year that the IPCC was established (1988), U.S. interest in climate change became decidedly domestic. That summer, an international conference of scientists and policy-makers in Toronto called for 20% reductions in worldwide carbon dioxide emissions by 2005, generating intense political attention in Congress, the White House, and in industry, while vast regions of the country experienced one of the worst extended heat-waves and droughts in decades. Attention to "global warming" was further stoked – temporarily acquiring a place front and center on the radar screen of political leaders, the media, and thus the American public – when prominent climate scientists James Hansen and Stephen Schneider testified before Congress on "the greenhouse effect" and its potential implications for the nation.

By the late 1980s, numerous governmental climate assessments had already been produced over the course of the Reagan and first Bush administrations, e.g., by the Department of Energy (DOE) and the Environmental Protection Agency (EPA). Other agencies involved in these early assessment efforts included the U.S. Department of Agriculture (USDA), the National Oceanic and Atmospheric Administration (NOAA), the Council for Environmental Quality (CEQ), and the Office of Technology Assessment (OTA). Few of these and early Clinton administration assessments had focused on the potential impacts of climate change (e.g., Environmental Protection Agency 1989, Office of Technology Assessment 1993a, Office of Technology Assessment 1993b). None of them were designed with a bottom-up stakeholder component.

While this early history of assessments is maybe not surprising or unique among nations, it produced an important legacy for the development of the First USNA. First, after the formal creation of the U.S. Global Change Research Program in 1990, the mandate to periodically conduct impacts assessments was well established, but the federal research programs needed some time to reorient their scientific efforts and funding from a predominant focus on climate science toward environmental and societal impacts and adaptation. This reorientation was paralleled by the growing emphasis and sophistication in impact science internationally (see, for example, the progression from the First to the Second to the Third Assessment Reports by the IPCC). As one interviewee said, "it wasn't like we were goofing off [in the first few years of the USGCRP], but it seemed like we had to get a lot of ducks in order." The early and mid-1990s thus must be considered a period of building the necessary impacts science capacity to reasonably conduct a national impacts assessment and bringing various

[8] Congress had already established – in 1978 – the National Climate Program, housed within NOAA, which was to focus research and assessment attention on climate change, but the issue remained a fairly small one for years.

government leaders on board with the idea. Key players in the conceptualization of such an assessment (especially the degree of stakeholder engagement), however, involved people with a wide range of backgrounds and perspectives[9] – thus planting the seeds for philosophical differences that would accompany the National Assessment for the duration.

As these discussions went on and capacity for an assessment was building over the first half of the 1990s, federal agencies and OSTP felt growing pressure to conduct a national assessment to fulfill the mandate contained in the USGCRA. Interviewees involved at that time, however, called the timing of this "getting serious" in the mid-1990s as not exactly fortuitous. The particular constellation of trends and events surrounding the initiation of the USNA had a strong influence on its conduct and perception. First, the 1994 Congressional elections resulted in Republican majorities in both houses of Congress, and – with House Speaker Newt Gingrich's "Contract with America" (Gingrich 1994) – rang in a distinct conservative shift in the legislature. Not only did this shift imply control over Congressional hearings and Committee leadership; it also elevated politically-conservative values of small government, anti-regulation (especially anti-environmental regulation), and anti-internationalism (and therefore growing resistance to international climate negotiations leading up to the Kyoto Protocol). By that time, the growing discomfort within industry circles about climate change (i.e., about the specter of potentially expensive climate mitigation policies and emission reductions through various regulatory or market-based mechanisms) had already found concrete outlets through well organized opposition from fossil fuel interests (e.g., in the Global Climate Coalition; see, e.g., (Beder 1999, McCright and Dunlap 2001, McCright and Dunlap 2003). Elaborate media campaigns and newly gained access to Congressional leaders helped generate significant skepticism about the reality and potential severity of climate change (Brown 1997, McCright and Dunlap 2003) on Capitol Hill, reduced interest in climate change research, and resulted in little active support from Congress for the USNA (and, as will be shown later, in fact, some active efforts to undermine it).

These Congressional developments contrasted with a Democratic White House about to enter into its second term, in which climate change was not only of considerable intellectual interest, but which made climate change Vice President Al Gore's signature issue. In short, by the mid-1990s, climate change had become an entrenched partisan issue in Congress;[10] and as interviewees recalled, some then even called it a "Gore issue."

The increasingly contentious public debate about climate change as well as rather limited factual understanding of climate change pervasive in the 1990s among the American public form another important context to the First National Assessment (Dunlap 1998, Immerwahr 1999, Kempton 1991, O'Connor et al. 1999, Seacrest et al. 2000). Among those in the White House and the federal agencies who viewed climate change as a potentially serious issue for the world and the nation, the National

[9] Interestingly, interviewees were not certain about the origin of this idea, but credited various people with rather different philosophies regarding stakeholder engagement as the "fathers," "godfathers" (or "mothers" as it turns out) of the dialog orientation and stakeholder component of the assessment.

[10] These partisan positions were not evident in the unanimous Senate vote against ratification of the Kyoto Protocol at the end of the 1990s; and are softened in more recent years as bi-partisan policy initiatives illustrate.

Assessment – and especially one with considerable stakeholder involvement – could become an opportunity to educate the American public about climate change and to elicit a fuller, contextual understanding of what it might actually mean in different regions and sectors. Moreover, interviewees recalled the sentiment among executive-branch leaders that the better understanding emerging out of such an assessment process could usefully inform the American position toward the Kyoto Protocol. The treaty had been negotiated since 1995, the first conference of the parties (COP-1) in Berlin, Germany.

Out of all these strands was borne, first, an interagency working group (the NAWG) that was to develop guidance and ascertain agency commitment to the assessment, and second, the idea of generating "a dialog with the American people" about the potential vulnerabilities, impacts, adaptation options, and information needs regarding climate change. Thus, as the NAWG got underway with serious conceptualization and planning of the assessment and even *before* the effort was formally launched, first scoping workshops were held in several regions. By mid- to late-1997, these workshops were viewed as part and parcel of the First National Assessment and as models for other regions to kick-off their own assessments. At this time – and even with the already emerging notion of (as one interviewee put it) "an OTA-style (capstone) report" – these regional assessment efforts, undertaken in dialogue with stakeholders, were understood as the very bedrock of the entire National Assessment.

3.2 Core Assessment Period (1997-2000)

Summary: The core assessment period comprises the time during which all assessment components – regional, sectoral and national synthesis – were begun, and some completed. It ends with the completion and release of the national synthesis documents. Over this four-year period several important efforts and trends emerged: (1) The organizational apparatus for the assessment was fully established, including the National Assessment Synthesis Team. (2) A remarkable shift occurred in the emphasis underlying the national assessment effort from placing a high premium on intensive stakeholder engagement to prioritizing the completion of the national synthesis. This shift reflects internal philosophical differences and external political pressures. As a result tension in the leadership and challenges for the completion of the various assessment components emerged. (3) An extensive, multi-layered review process for the synthesis documents was initiated and completed in this period. (4) Planning for the post-First Assessment period got underway, still under the assumption that the assessment process was not a one-time, but an ongoing effort. (5) The larger public and political context was marked by increasing skepticism of the reality of climate change and active efforts within Congress and in conservative circles to stop, delay, or change climate change research and assessment efforts.

The First National Assessment was begun in earnest in 1997 with the support from the highest levels of government. In early 1997, Vice President Al Gore called a cabinet-level meeting of federal agencies, in which he laid out the basic foci (by sectors and regions) and rationale for conducting a national assessment. As several interviewees

recalled, the unambiguous message from the Vice President to the agency heads was "we're going to do this!"

What marked the formal initiation, however, was a letter from then-presidential Science Advisor and Chair of OSTP, John Gibbons, to the Chair of the SGCR, Robert Corell. This letter laid out basic oversight relationships, asked for an assessment implementation plan, encouraged scientific excellence and involvement of private sector representatives, further encouraged a solid independent review process, set (and recognized the challenge of) a very tight timeline for the assessment with expected delivery in 1999, and attached a list of guiding questions that the assessment should answer (Gibbons 1998). These guiding questions, of course, had already been discussed and were central to the early regional workshops held in 1997. In fact, what is important to note here is that the formal initiation *succeeded* the informal beginning, and as such simply placed a tag of presidential approval and expectation on an already moving train.

The train that had left the station was this: The SGCR, OSTP, and the interagency assessment working group (NAWG) had been discussing concrete assessment ideas and plans for more than a year (NAWG 1998). From these discussions crystallized several critical assessment elements, informed in part by the experience gained in the first few regional scoping workshops. For example, federal assessment leaders decided that each regional assessment should be sponsored by one or more agencies, and that agencies should pick those regions they thought would be most appropriate for them to fund. Several interviewees recalled that while some agencies "came on like gang busters," others required "some heavy arm-twisting" to get them to take on an average of three to four regions. The thorniest issue explaining this need for arm-twisting, of course, was funding. While the USGCRA explicitly called for assessments, no funding had been ear-marked for assessment activities for FY97. Interviewees suggested that assessment leaders also had little hope that – given widespread anti-climate change sentiments in Congress – such funding would be readily forthcoming, or that – in light of the tight assessment timetable – there was enough time to lobby Congress for such funds. This meant that money for the assessment activities had to be drawn away from already committed USGCRP or other agency activities ("robbing Peter to pay Paul" in the words of one assessment leader) – a highly unpopular proposition for any program manager.

Based on past experience with government-led assessments, which had lacked legitimacy and public awareness, federal assessment designers decided that in the USNA individual sectoral assessment components should be led by two co-chairs, one from the sponsoring federal agency and one from an academic institution. Regional assessments were to be led solely by academic chairs. Some agencies, according to interviewed assessment leaders, "felt uncomfortable with giving up control" to someone outside the agency leading the assessments. The money was to be given to the academic institution and administered by the academic co-chair of each assessment. This led to a variety of financial arrangements dictated by each agency's rules as to how to handle the money for this endeavor. For example, some regional assessment teams worked under cooperative agreements, while others had to write funding proposals, while yet others had existing grants supplemented. The range of financial agreements resulted in differences in the ease and freedom to allocate funds to different assessment-related activities. An overview of the institutional responsibility sharing is provided in Table 2.

Table 2: Shared responsibilities for the First National Assessment: Lead academic institutions and coordinating/sponsoring agencies for each region and sector

Region/Sector	Lead Academic Institution	Coordinating Agency(ies)
Great Plains - Central	Colorado State University and University of Nebraska/NIGEC	DOE
Alaska	University of Alaska	DOI
Southeast	University of Alabama, Huntsville and Florida State University	NASA, NOAA
Pacific Northwest	University of Washington	NOAA, NASA
Southwest - Colorado River Basin	University of Arizona	DOI, NOAA
New England	University of New Hampshire	NSF
Middle Atlantic	Pennsylvania State University	EPA
Northern Great Plains	University of North Dakota	NASA
Rocky Mountains & Great Basin	Utah State University	DOI
Gulf Coast	Southern University and A&M College	EPA
Southwest - Rio Grande River Basin	University of Texas at El Paso	NASA
Hawaii & Pacific Islands	CARE, University of Hawaii	DOI, NSF, NOAA, NASA, FEMA
California	University of California, Santa Barbara	NSF
Metropolitan East Coast	Columbia University	NSF
Great Plains - Southern	Texas A&M University	USDA
Great Lakes	University of Michigan	EPA
Appalachians	West Virginia University	USFS
Eastern Midwest	Indiana University	USDA
South Atlantic Coast & Caribbean	Florida International University	NOAA
Native Peoples/Native Homelands	Intertribal Council on Utility Policy	NASA
Agriculture	MIT	USDA
Water	Pacific Institute for Studies in Development	USGS
Health	Johns Hopkins University	EPA
Forests	University of New Hampshire	USDA/USFS
Coasts and Marine Resources	University of Maryland	NOAA
NA Synthesis	Ecosystems Center of the Marine Biological Laboratory in Woods Hole, NOAA, and World Resources Institute	NSF

(Source: USGCRP, available at: http://www.usgcrp.gov/usgcrp/nacc/background/)

Additional differences not just among agencies, but all interviewed federal assessment leaders emerged in this early stage of assessment planning. Some federal leaders were strongly in favor of a very bottom-up approach, i.e., of conducting a stakeholder-*driven* assessment. Several of those championing this type of approach attended, and thus may have been influenced, by a June 1997 workshop of the Harvard-based Global Environmental Assessment Project which defined assessments as interactive, iterative processes, not simply the production of products (e.g., a report). Others, more strongly influenced by the legacy of past government-sponsored and/or -led scientific assessments, shared a more limited view of stakeholder input (stakeholder-*oriented*) or only reluctantly consented to stakeholder involvement at all. Some of the

more skeptical agencies retained this reluctance over the course of the entire USNA, while others became strong "believers" in the stakeholder-driven, process-focused approach. An additional concern – and perpetual point of debate – was the definition, size and number of regions. At issue were matters of logistics, control, the ease with which stakeholders could be identified and come together, and the benefits and drawbacks of going by political versus ecological or other types of regional boundaries.

As the federal organizational apparatus was put in place (see Figure 2 above), funding and sponsorship arrangements were sorted out, experience from the early regional scoping workshops was being gained, and additional regional leaders were appointed, the recognition grew that cross-cutting sectoral assessments and experts to lead them were also needed. The complexity and number of people involved in the assessment grew significantly, prompting federal assessment leaders to convene a planning meeting of all federal, regional and sectoral assessment leaders in July 1997 in Aspen, Colorado. At this time, only four regional scoping workshops had taken place.

The Aspen Meeting is viewed by virtually all interviewed regional assessment leaders, and many from the sectors and the federal level, as a crucial one in defining, agreeing on, or at least consenting to, an innovative vision for an assessment that would take stakeholder involvement seriously. This vision (quoted here at length due to its critical importance) was articulated by Thomas Wilbanks (later the chair of the Interregional Forum) as follows:

> *"The context for this active, intensely participative meeting was the vision of a national assessment of consequences of climate change and variability articulated by Jerry Melillo* [then at OSTP, later one of the co-chairs of the NAST] *at the regional workshops and at the Aspen conference itself. His vision was of a strikingly new approach to environmental policy assessment in the United States, grounded in dialogues at the regional/local level between regional experts and regional stakeholders: farmers, ranchers, local business people, local government leaders, local interest groups, and citizens at large. Activated by the regional workshops, this consultation would raise the level of awareness of local citizens of climate change issues, invite them to consider vulnerabilities to possible impacts, and then identify the major issues at the regional scale from the point of view of citizens and voters. Out of this democratic process of information exchange would come a picture of vulnerabilities of our country to impacts of climate change and variability not as a function of scenarios or local climate change forecasts that could result simply in arguments about assumptions, but as a strong, robust set of views from the grassroots across the country.*
>
> *Moreover, this would not be a one-time process. The regional workshops and subsequent regional assessments would catalyze the development of stakeholder networks that would support a continuing process of information exchange, education, and outreach related to climate change issues. In fact, this approach might well serve as a model for addressing other thorny environmental policy issues in the United States in the future."* (Wilbanks 1998)

The goal of the meeting was to translate this innovative vision into an implementation plan that would henceforth guide the regional and sectoral assessments and eventually

lead to a national synthesis. After ten days of intense but constructive discussions, this goal was accomplished, yet even more was achieved. Again, Tom Wilbanks:

> *"In a very real sense, by the end of the Aspen meeting the attendees had come to share an 'Aspen spirit' that was forged through their participation in an intensive joint experience among a highly diverse group of people, gathered because of their commitment to the national assessment and (in most cases) their belief in the basic vision for that assessment. ...*
>
> *But the "Aspen spirit" was more than a philosophy about how best to produce an assessment product. It was partly the discovery of profound value in the interaction of people from diverse professional backgrounds in considering climate change issues. It was partly a sense that the participants were helping to break new ground in processes for environmental policy making in the U. S., pioneering a new kind of three-way engagement among scientists, policymakers, and stakeholders. And it was partly a drive to convert this one-time assessment (and that one-time meeting) into a continuing structure for analysis, assessment, stakeholder interaction, and outreach that will enable our country to do its very best in exploring the challenges and opportunities associated with global change."* (Wilbanks 1998)

Invigorated by the "Aspen spirit," 15 additional regional assessments were initiated over the remainder of 1997 and 1998, a national synthesis team was put together by federal leaders and functionally chartered as a Federal Advisory Committee under the NSF[11], and five sectoral assessments (selected from a wider range of options) began their work. In addition, a large workshop – the U.S. Climate Forum – was organized for November 1997 in Washington, DC. According to interviewed federal assessment leaders, this Forum was meant to help focus the assessment, but was probably also the most politically-motivated event in the assessment process. A key motivation for the meeting was to generate interest and buy-in for the assessment among groups and political leaders in Washington, especially Congress, by demonstrating how the effort would produce insights, as one interviewee put it, on "what might happen in their constituency's backyard." According to observers, only four months after the summer workshop, the "Aspen spirit" and vivid commitment to a bottom-up, stakeholder-*driven* assessment process seemed to have lessened already or become overshadowed by the DC meeting's implicit focus on the final synthesis report and its political significance to Washington insiders (Wolfe et al. 2001).

Over the course of 1998, all remaining components of the USNA got underway. Regions that had not yet held a scoping workshop did, and those that already had their workshops were trying to continue with an assessment that was informed by the results of their scoping events. However, the level of regional activities was quite uneven. In a small number of regions, scientific capacity to undertake a full assessment was lacking; in others, the scoping workshop pointed regional leaders toward specific projects to

[11] Organization of the NAST under the Federal Advisory Committee Act is significant in that it obligates such committees to a high degree of public accessibility and transparency. For example, meetings have to be attended by a federal agency representative; they have to be announced in the Federal Register and be open to the public; FAC reports also require extensive review and detailed response by the Committee to all review comments received (see United States Congress 1972).

develop decision support for specific stakeholders rather than a full regional assessment; in yet other regions, there were difficulties with ascertaining agency funding, i.e., sufficient or timely or continuous funding; in the majority of regions, however, agency funding was forthcoming, and together with high-caliber scientific capacity, full regional assessments were launched.

The National Assessment Synthesis Team, formally established in March 1998, began its own work toward a national synthesis. To facilitate this work, cross-cutting sectoral assessment teams were seen as critical. Again, due to significant differences in agency support, sectoral teams conducted their assessments with or without stakeholder workshops, and through a variety of mechanisms and venues to meet as assessment teams (further discussed in Section 4).

By late 1998, the NAST developed an officially sanctioned assessment plan which described the goals, process, key elements of the architecture and management, outputs, a template for these products, a review process of the assessment, a rudimentary outreach strategy, and also set a timetable for the work (Subcommittee on Global Change Research 1998). This plan and the discussions leading up to it cemented the important shift that was taking place in what was considered the central portion or driver of the National Assessment (previously, the regional assessments). For example, in setting out a schedule for completion of the National Assessment, the plan stated:

> *"[This schedule] is the key schedule which other components of the national assessment process must take into consideration, in order to determine which of their products and activities will be ready for incorporation at the national level by the end of 1999, and which will be available for future reports."* (Subcommittee on Global Change Research 1998)

In the interviews, regional assessment leaders expressed considerable lingering frustration with this shift. First, many viewed it as an indication that federal assessment leaders were turning their backs on the assessment philosophy expressed at Aspen, i.e., a shift away from the notion of creating a public dialog, engaging in a democratic process of information exchange, and (back) toward an overriding focus on the final product (report output). One interviewee added that some in the federal assessment leadership and the agencies also became increasingly aware of "GPRA pressures," i.e., the demand for measurable performance and greater accountability of federal agencies formalized in the 1993 Government Performance and Results Act (GPRA) (United States Congress 1993). As one federal leader recalled, "about half way through as the clock was ticking... we started thinking, wait a minute, this is really counter-productive to keep saying 'it's a process, it's a process'. We *need* a product!"

As a result, some regional assessment leaders felt growing pressure to produce a product on a timetable that was difficult to accomplish given the delays in funding they had experienced, exacerbated by delays in getting critical inputs (climate scenarios and socio-economic scenarios) from the NAST. But if it felt to regional assessment leaders like they were under rising pressure from the NAST to complete their assessments, federal assessment leaders acknowledged that the NAST probably felt increasing pressure to finish its synthesis report on a timetable pushed by the White House. By late 1998, Vice President Al Gore's election bid for president was a known intention, and

assessment leaders wanted to complete the assessment in 1999 to avoid having the document be seen as a political document. While White House officials may have liked to be able to use the assessment document to back up Gore's stance on global warming, NAST leaders were adamant about separating the assessment from any electoral politics. Additional time pressures emerged from the timetable of the IPCC's Third Assessment Report (TAR), written over the latter years of the 1990s and to be released in 2001. Assessment leaders wanted the results of the First USNA be available and find entry into the TAR.

Thus emerged a picture of regional and sectoral assessments at various stages of completion, undertaken in parallel (rather than prior to) a national synthesis, which was increasingly redefined from being a capstone effort to presenting an interim summary of whatever was ready for inclusion in late 1999 (see Figure 5, below).

The growing tension between the bottom-up, process-focused assessment leaders and the top-down, product-focused leaders – fueled by frustrations over funding delays, jealousies over funding unevenness, and persistent debates over climate models and socio-economic scenarios – found its outlet at the second annual assessment leaders' meeting in Monterey, CA in the summer of 1998. As one interviewee put it, "The open acrimony at the Monterey meeting was an expression of the growing gap between the bottom-up oriented Aspen spirit folks, mainly from the regions, and the top-down synthesis team folks, who were pushing some kind of standardization without consultation with the grassroots." This rift, however, was not a simple opposition of regional vs. federal leaders as numerous agency representatives – long-time and emerging "believers" – defended the benefits of the bottom-up approach. The issue was also not simply one over reasonable timetables for completing the First National Assessment. Rather, it reflected an emerging serious debate over whether assessment leaders had made a commitment to stakeholders for just a one-time or an ongoing, long-term assessment effort. Just one year prior, at the Aspen meeting, the common vision had been of such a longer-term engagement, and regional assessment leaders had made that promise to the stakeholders attending their workshops.

Importantly, attendees of the Monterey meeting talked about more than just the time horizon for stakeholder engagement. Intensive discussions focused on the financial resources it would take and on procedural guidelines to "do it right." Up until then – fully two years into the assessment – guidelines for stakeholder involvement had been relatively loose and informal. A first set had been produced early on by the NAWG (NAWG 1997); a second set of suggestions for stakeholder engagement procedures came in the form of a "lessons learned" document that emerged from the 1997 Central Great Plains scoping workshop. After the Monterey meeting, a more formal set of guidelines was commissioned from the National Center for Environmental Decision-Making Research (NCEDR), which incorporated findings from the research literature, results from the Global Environmental Assessment Project at Harvard and its specific deliberations about participation in assessments at a May 1998 workshop, as well as regional assessment workshop experiences (NCEDR 1998).

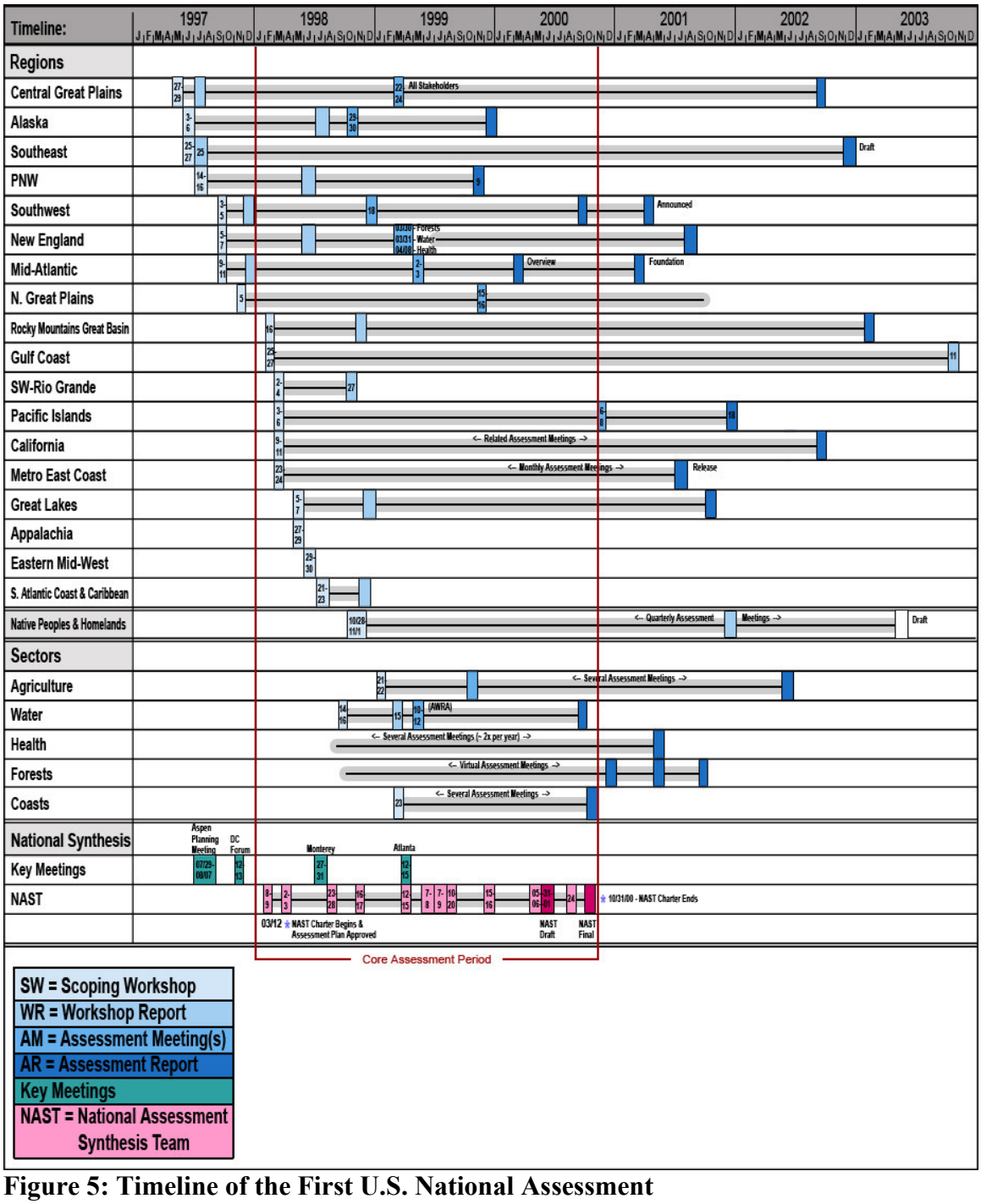

Figure 5: Timeline of the First U.S. National Assessment
(Source: Based on data provided in assessment reports, the USGCRP website and newsletter ACCLIMATIONS, and interviewees)

Over the remainder of 1998 and 1999, assessment teams at all levels continued their work. Informal consultations among regional and sectoral assessment leaders, participation in each others workshops and assessment meetings, and other email and face-to-face interactions produced a limited degree of cross-fertilization, but not seamless integration. Each regional and sectoral team also had a point person on the NAST to facilitate inclusion of findings in the national synthesis documents. The yeoman's work of national integration, however, was left to the NAST. Whatever findings had emerged from the regional and sectoral assessments by mid-1999 were included in these summary documents.

Against the backdrop of continuing entrenched public debate about climate change – only magnified by the Kyoto Protocol negotiations (Krosnick et al. 2000) and ongoing advocacy from both environmental NGOs and climate contrarians – and the upcoming election campaign into which the synthesis report would fall, federal leaders began preparations for a multi-layered, elaborate and transparent review process of the synthesis documents (see Box). As part of this review, the environmental subcommittee of the President's Committee of Advisors on Science and Technology (PCAST), chaired by highly respected scientists, established an independent review board (IRB) of highly respected scientists and industry and non-governmental leaders. This "Blue Ribbon Panel" oversaw the review process and the

The Review of the National Synthesis Documents

The National Assessment synthesis documents went through extensive expert, agency, and public review over a period of 11 months. The first phase (November 1999 to January 2000) was a technical review, in which topical experts reviewed individual chapters of the synthesis foundation and overview documents. These technical reviewers included scientists from the regional and sectoral assessments, from federal agencies, from the wider field of experts not directly involved in the assessment, and attendees of the DC Climate Forum as well as experts who had been suggested by the NAST or who had expressed an interest in reviewing assessment outputs.

After extensive revisions, the reports were submitted to a second round of expert review (April 2000), comparable to an NRC review, in which expert reviewers were nominated by federal agencies, NACO, and the IRB. The responsiveness of the NAST to these review comments was overseen by the IRB.

A third review phase (June through August 2000) was a 60-day public comment period, announced in the Federal Register and through active efforts by NACO and via the USGCRP website inviting comments from anyone interested. FACA regulations required that all comments, and the NAST's responses to them, be made public.

Finally, the revised reports were then submitted for final review to the IRB. After additional revisions by the NAST, the Overview and Foundation synthesis documents were approved by PCAST and forwarded to NSF (the federal agency under which the NAST was chartered), and to SGCR, where the reports were accepted by the agencies as meeting their expectations and criteria. Upon agency approval in late October 2000, the synthesis reports were forwarded to the CENR, and then delivered by then Director of OSTP, Neal Lane, to Congress and the President on November 11, 2000.

responsiveness of the NAST to review comments obtained in four review phases. Guidelines were also prepared for the peer review of regional and sectoral reports (NAWG 1999). Yet as great strides were made to finalize the (nearly one year delayed) national synthesis documents, and to advance the regional and sectoral work, the struggle also continued to rescue the *process*-orientation of the USNA.

Discussions among federal assessment leaders about post-2000 assessments plans had actually begun in early 1999. By April 1999, at the third annual meeting of assessment leaders in Atlanta, GA, participants provided input into this federal process (USGCRP 1999). It was augmented by the responses to an informal questionnaire distributed by the NAWG to all regional and sectoral assessment leaders (see compilation by Malone (1999)). The 31 responses obtained revealed that assessment leaders strongly favored maintaining assessments as an ongoing part of the USGCRP. Nearly three out of four supported that future assessments should maintain their regional and sectoral focus, and more than half viewed the stakeholder participation as the leading strength of the First National Assessment (no other strength was selected by more than a third of the respondents). Responses further revealed the strong desire to make stakeholder involvement an ongoing process, i.e., to continue established stakeholder networks and further build relationships through assessment-related activities, and to give that process adequate time. Respondents expressed their conviction that stakeholder involvement was not something that could be "turned on or off like a faucet."

Again, the by-then-familiar tensions between champions of the bottom-up, process-oriented approach and those of a more closely controlled, top-down approach resurfaced in these federal-level post-2000 assessment planning efforts. Eventually, recommendations for the conduct of post-2000 assessment activities (including an understated, yet explicit mention of continued involvement with stakeholders) were prepared by the NAWG (NAWG 1999) and continued to be discussed throughout 1999 and 2000. As federal support for an ongoing, stakeholder-driven assessment component of the USGCRP seemed ever further from assured, some regional assessment leaders took a strong stand in its support. Spear-headed by the leaders of the Metro East Coast assessment, Cynthia Rosenzweig and Bill Solecki, a sign-on letter circulated in February 2000 among regional leaders to advocate for additional agency funding and commitment to ongoing assessment and stakeholder processes.

As to what came of all these efforts, as one federal assessment leader put it bluntly, "well, not much." The reasons, offered by various interviewees, were complex and manifold. First, federal assessment leaders nearly exhausted their energies with the review process and completion of the synthesis documents while regional and sectoral teams spent considerable energies in the completion of their assessment efforts. Second, several key champions at the federal level moved on to different jobs and/or out of leadership roles and were replaced by less committed or otherwise over-committed successors. Agency dedication was further undermined by several developments in Congress: several Congressional leaders became outspoken antagonists of any climate-related government efforts; a couple of them wrote letters to the White House science advisor, actively attempting to stop, slow down, or change the ongoing assessment;[12]

[12] According to one interviewee, in an even more serious instance, Congress subpoenaed the White House and the agencies for all documents related to the Kyoto Protocol negotiations, in which National Assessment-related documents and emails got swept up, creating significant anxiety in the agencies.

moreover, Congress was reluctant with appropriations for continuing assessment activities. These factors combined with the agencies desire to return to their more traditional efforts. This retreat was probably also influenced by the public response to the release of the draft synthesis report in June 2000 for public review. It caused a major stir in the media and in political circles.[13] As media coverage from that time attests, climate contrarians used the occasion of the release of the draft report as an opportunity to ramp up their attacks on climate change science in general, and on the assessment in particular (e.g., Competitive Enterprise Institute 2000, Global Climate Coalition 2000, Green 2000, Greening Earth Society 2000, Wojick 2000). Through elaborate media campaigns and testifying at Congressional hearings, the lead contrarian actor in this instance – the Competitive Enterprise Institute – eventually convinced several members of the Senate and the House of Representatives to join in a lawsuit (filed on October 3, 2000) alleging that the synthesis report had been prepared in an unlawful manner (2000)[14] According to one interviewee, as the November 2000 elections drew near and the lawsuit got filed, "agencies likely saw the handwriting on the wall … and ducked for cover." The fate of post-2000 assessment plans, however, is not just the result of political pressures, but rather of the confluence of external and internal factors. As one interviewee put it, at the end of the Clinton administration, "a lot of the infrastructure, a lot of the horsepower, a lot of the conviction" was gone; this was reiterated by another interviewee who concluded that "the one real lesson here is that it takes the right people in the right place at the right time to make things happen."

3.3 Period since the First National Assessment (post-2000)

Summary: After release of the First National Assessment's synthesis documents, significant attacks were launched against it, culminating in a lawsuit against the president and his science advisor. This, together with a conservative Congress, the change in administration in 2000, and the resulting distinct shift in the level of interest in climate change matters and assessments, essentially buried the National Assessment at the federal level. Regional activities continued to complete the efforts still underway and/or until the funding ran out. Few regions were able to maintain assessment and outreach activities. Post-2000 assessment plans, communication and outreach, as well as plans to evaluate this first-time effort largely could not be carried out. Some agencies and the scientific community maintain a strong interest in keeping the work begun in the First National Assessment alive and ongoing.

After the completion and release of the national synthesis documents in October 2000 (with a presidential statement – post-election – in November 2000), the combined effort that constituted the USNA did *not* end (see Figure 5 above). While the NAST charter expired upon delivery of its reports, several sectors and regions still had their products to

[13] News articles appeared across the country in the prestige press and smaller papers as well as in international news outlets, announcing the draft report, followed by a wave of editorials, op-eds, and heated letters-to-the-editor in numerous papers.

[14] The lawsuit specified three counts: (1) violations of the Federal Advisory Committee Act (United States Congress 1972), including absence of the required accountable federal official and a meeting closed to the public; (2) violations of the USGCRA of 1990, including failure to report to Congress on issue areas specified in the law, and work on areas outside the NAST's scope of authority; and (3) violation of P.L. 106-74, an FY00 appropriations bill for the Departments of Veterans Affairs and Housing and Urban Development, which specified conditions that had to be met in order to release the NAST documents.

complete. Moreover, many hoped – and had made plans and suggestions over the course of the entire assessment period – for two critical follow-up efforts: outreach and evaluation.

Both went largely the same way as the post-2000 assessment plans, and for some of the same reasons. While every member of Congress received a copy of the synthesis and the respective regional reports as they became available, the legislature remained uninterested in funding continuing assessments efforts. Moreover, the incoming Bush administration made it clear quickly that it had no intention to maintain assessment efforts of the sort undertaken under the Clinton administration. In fact, the initial lawsuit filed against the National Assessment, listed President Clinton and OSTP Director Neal Lane as defendants (2000). After the election, the lawsuit was renewed and curiously listed President Bush and his science advisor as defendants.[15] As a result of the legal deliberations and the eventual out-of-court settlement between the parties, the lawsuit was dismissed with prejudice, clearly determining that every one of the allegations against the National Assessments were unfounded. Subsequently, however, all assessment documents and web pages associated with the assessment had to display a disclaimer[16] suggesting that the synthesis documents came out of a Clinton administration effort and do not adhere to the strict information quality standards of government documents prepared under the Federal Data Quality Act (United States Congress 2001)[17]. Moreover, the National Assessment logo on all USGCRP web pages had to be removed, thus making it more difficult for casual website visitors to find assessment-related documents.

With little money left, and the tense ongoing legal battle over the National Assessment, communication of the assessment findings to the wider public was extremely limited.[18] Assessment reports were distributed to interested parties and government depository libraries. In addition, minor efforts were undertaken to prepare some educational materials that built on the regional findings of the National Assessment (USGCRP 2003), and interviewees reported giving "countless talks" – at all levels and in all regions. But a full communication and outreach strategy was never developed or implemented.

The necessity of an evaluation – both internal and external – had been discussed and recognized throughout the USNA process and was included in the post-2000 assessment plans. As those stranded, so did the plans for a formal evaluation. Informal assessment

---

[15] In this transition period from the Clinton to the Bush administration, Science Advisor to President Clinton, Neal Lane, had departed shortly after the election. Thus, when the lawsuit was re-filed against newly elected President Bush, the senior responsible official in lieu of the science advisor had to be a Senate-confirmed assistant of Lane – at the time, Rosina Bierbaum.

[16] The disclaimer reads: *"The National Assessment Overview and Foundation Reports were produced by the National Assessment Synthesis Team, an advisory committee chartered under the Federal Advisory Committee Act, and were not subjected to OSTP's Information Quality Act Guidelines. The National Assessment was forwarded to the President and Congress in November 2000 for their consideration."*

[17] The insinuation that they should have, but did not, adhere to FDQA standards is not only difficult to maintain in light of the extensive peer review, but it is also fraudulent in that the law had not been passed at the time of the completion of the synthesis documents, and guidelines for how to implement the FDQA had not yet been prepared by federal agencies.

[18] For some time and to a limited extent this gap was filled by communication and outreach efforts spear-headed by environmental NGOs, which was undertaken in close collaboration with regional and sectoral assessment leaders (see, for example, http://www.climatehotmap.org/impacts/index.html).

evaluations did occur, however. To these belong the "lessons learned" discussions at the Atlanta meeting and the informal elicitation of opinions initiated by the NAWG in 1999 mentioned above. Additional internal dialogs between federal, regional and sectoral assessment leaders (mostly by email) led to an informal "lessons learned" document drafted by NACO Executive Director, Michael MacCracken (October 2000) for further discussion at a meeting of the Committee on Global Change Research of the National Research Council. Another effort – organized by the Environmental Protection Agency in November 2001 – brought together leaders of the three regions and the health sector (which the agency had sponsored) for an "assessment of the assessment" discussion in Washington, DC. Inputs and preliminary summaries of that discussion were made available for this study and will be forthcoming in the peer-reviewed literature. Among the external review efforts were the informal discussions begun within the GEA Project (1997-1999), the CMU survey in 2002, followed by a workshop in April 2004 (see Section 2 above), and – closing the loop to the present time – this study.

To complete the reconstruction of the USNA's evolution *after* its formal conclusion, it is necessary to return once more to the federal level, the agencies, and the regions. At the end of 2000, the 10-year strategic research plan that had guided the USGCRP since 1990 had to be updated. The development of this plan had been going on during the latter years of the 1990s and was clearly influenced by the assessment process, its findings, and the identified research gaps. According to interviewees, at least some elements of the post-2000 assessment recommendations entered into the drafting of the new strategic plan. Upon arrival of the Bush administration, however, this draft research plan was put on hold. In June 2001, President Bush formally announced the Climate Change Research Initiative (CCRI), placing renewed emphasis on the scientific study of the climate system and the uncertainties therein, while de-emphasizing impacts and response science. With this announcement came a complete reorganization of all federal climate and global change-related research activities (United States Climate Change Science Program 2003). The CCRI along with the USGCRP subsequently were combined under the umbrella of the U.S. Climate Change Science Program (CCSP) (United States Climate Change Science Program 2002) and a new strategic research plan was developed with wide external input and repeated review from the National Research Council (United States Climate Change Science Program 2004).

One major critique of the CCSP draft strategic research plan – by attendees of an open forum in Washington in December 2002, other expert reviewers of the document, and subsequently the NRC – was a complete lack of recognition of the First National Assessment.[19] To the great dismay of these reviewers (including former assessment leaders), the draft plan did not mention the 4+-year endeavor at all, nor did it build on its findings, accomplishments, much less the philosophy of assessments as interactive, iterative processes involving experts and stakeholders. One interviewee expressed this

[19] A compilation of written review comments on the draft plan are available at: http://www.climatescience.gov/Library/stratplan2003/comments/default.htm. Note that despite the out-of-court settlement with the Competitive Enterprise Institute and other plaintiffs mentioned above, the CEI and the Center for Regulatory Effectiveness continue to misrepresent the terms of the legal settlement, makes public claims that the National Assessment "is fatally flawed" – for example in the context of offering review comments on the CCSP draft strategic research plan – and that the assessment synthesis documents should be prohibited from being further disseminated (see Horner 2002, Horner 2003, Tozzi 2002).

dismay by saying, "An effort that had so many fingerprints on it … to be ignored, is a mockery of science." This critique was captured in the NRC review of the draft plan, where it stated,

> *"The draft plan deals with many issues that were addressed in the U.S. National Assessment, but the document is not referenced, nor is it used fully in the human dimensions and decision support sections of the draft plan (e.g., scenario development). No matter what the evaluation of the U.S. National Assessment, there were many valuable lessons from it in terms of regional impact studies and interactions with stakeholders. These lessons should not be ignored in the CCSP strategic plan."* (National Research Council 2003, p.27)

The revised research plan acknowledges the USNA only reluctantly and in barely noticeable terms. Reiterating the importance of the First National Assessment, and the importance of learning from that endeavor, the NRC made even stronger statements about the First National Assessment in its review of the final research plan:

> *"The only previous centralized assessment effort by the CCSP agencies, the U.S. National Assessment on the Potential Consequences of Climate Variability and Change …, followed [the same] credibility assurance guidelines [as given for future CCSP outputs]. The National Assessment's Overview and Foundation reports are important contributions to understanding the possible consequences of climate variability and change. The processes of stakeholder engagement and transparent review of the National Assessment reports were exemplary (see Box 2-2)."* (National Research Council 2004, p.13)

In the textbox that this passage points to the Council goes on to say:

> *"The revised plan still generally overlooks the insights into the assessment process and the networks of researchers and stakeholders that were developed during the U.S. National Assessment."* (ibid.)[20]

Struggling for acknowledgment and visibility at the national level, the First National Assessment experienced an uneven fate after 2000 at the regional level. Five regions completed their regional reports and after limited, funding-constrained distribution and outreach efforts, the assessment and related interactions with stakeholders came to an end. In three regions, workshop and/or assessment reports were not completed at all, and in four others only the first report after the scoping workshop. In some of these regions, interaction with stakeholders ceased completely or was continued on a much smaller scale on specific projects or for only a short time longer. In the remaining seven regions, stakeholder networks and interactions could be maintained and further solidified through different mechanisms and with additional funding. Typically in those regions, assessment teams have institutionalized their research, assessment and related activities – such as

[20] While the plan makes an explicit commitment to meeting information and decision-support needs to help stakeholders adapt to climate variability and change, it also seems to return – in the eyes of interviewees for this study – to the assessment model of the 1980s and early 90s, i.e., to preparing an ambitious number (21) of government-authored assessment reports.

through NOAA-funded Regional Integrated Sciences and Assessment (RISA) centers (e.g., in the Southeast, Southwest[21], Pacific Northwest, and Pacific Islands), EPA-funded regional assessment activities (e.g., Great Lakes, Mid-Atlantic) or other-funded "shoe-string" efforts to keep regional networks and research going (e.g., Metro East Coast). As will be discussed further in Section 4.2, these institutional arrangements either pre-dated the USNA or sprang up afterwards.

The sectoral teams were dissolved after completion of their reports and outreach was limited to the production of sectoral assessment brochures and to public or professional presentations which team members gave thereafter. What some of the interviewed sector team leaders considered a useful mechanism for identifying research needs – a U.S.-focused assessment process in expert teams – was thus not maintained any further.

At the time of this study, four years after the official end of the First National Assessment, interviewees were quick to relive the enthusiasm and frustrations that the long and varied history of this unique endeavor in U.S. assessment history engendered. The following section examines the outputs and outcomes of the effort as well as the structural and procedural underpinnings that may explain these results.

[21] In the Southwest, the team that conducted the regional assessment worked independently from that which now runs the RISA center (CLIMAS), although some overlap and continuity of these efforts exists.

4. Findings: Output and Outcomes

Viewing assessments as both products and processes that emerged in the late 1990s found its explicit expression – and not accidentally due to collegial interactions between assessment researchers and USNA designers – in the goals set out for the First National Assessment. What is here labeled the overarching ***product-oriented goal*** was quite directly derived from the mandate to conduct periodic assessments contained in the USGCRA of 1990:

> *"To 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."* (Subcommittee on Global Change Research 1998)[22]

To facilitate the achievement of this goal, the NAST specified several sub-objectives:

- use of four guiding questions, which were to be answered by each assessment component ("assess")[23]; the questions concerned current stresses, how climate change may aggravate or alleviate these pressures, coping options and research needs
- synthesis and evaluation of existing science and – where necessary and possible – the production of new research findings, adhering in all efforts to the principle of scientific excellence
- use of a common set of scenarios for climatic and socio-economic changes
- management of the assessment as a public-private partnership

Noticeably, no explicit objectives were set to develop decision-support tools or advance the state-of-the-art of assessment science per se.

Other official documents of the USNA specified what is labeled here as the ***process-oriented goal*** of the assessment, namely that "the assessment was to be designed to initiate an active dialogue with those who would be affected by the potential consequences in order to help prepare them to more effectively deal with climate variability and change and to sharpen the research focus concerning coping options" (MacCracken 2000). This passage holds two process-oriented sub-objectives which one may view as elements of capacity building:

- the beginning of an ongoing stakeholder dialog
- an increased level of preparedness for the impacts from climate variability and change and

[22] It is important to recall that the document that specifies this overall goal was developed at a time when several components of the assessment were already underway, and in fact, the goals – firmly documented midway – had themselves already been influenced and transformed by the early efforts.

[23] The short-hand in parentheses and quotes in this and subsequent bullets were identified in the CMU survey as the three goals or pillars of the assessment, and while they certainly were highlighted in various official USNA documents as important elements, they were never declared as the three overriding objectives in any public assessment document identified during the course of this study.

To realize these goals, assessment leaders specified that participants of the assessment should be educated about climate change and its potential impacts ("teach"), and that the assessment should be open and inviting to a broad range of participants ("involve"). As a result of this broad stakeholder engagement, assessment designers hoped that the outputs would reflect the concerns of, and be relevant to, stakeholders in the public and private sectors.

The sections below will judge the outputs and outcomes of the National Assessment against these assessment goals and internal quality criteria set by assessment designers. They will also reveal the extent to which these goals and objectives were articulated to assessment participants.

4.1 Quality of Output of the Process: Achievement of Intended Goals and Objectives

The Assessment Products: Reports

Considering merely the final outputs and their contents – i.e., the publication of the USNA products, including the two national synthesis documents and sectoral and regional reports – one can conclude that the effort in a general sense achieved its product-oriented goal (to analyze and evaluate what is known about the potential consequences of climate variability and change for the nation etc.). This overall conclusion has to be qualified by a number of considerations.

First, while sectoral assessments were completed in the core assessment period (see Figure 2 above), full assessments and/or assessment reports were prepared for only 11 out of 19 regions[24]; two regions prepared no documentation of regional concerns at all; four prepared workshop reports but no final assessment reports; and two assessment reports remain (indefinitely) in draft stage.[25] Ten of the regional reports were only finalized and published after the National Assessment synthesis documents. This does not mean that those regional concerns did not enter into the synthesis document; synthesis and regional teams were in some modicum of communication throughout the writing process. However, the synthesis document cannot be considered the ultimate cap-stone product of the assessment, but as an interim summary, prepared at a certain time in the process.

A second qualification, building directly on the first, is that the basis on which vulnerabilities and impacts identified in the NAST Overview and Foundation reports rest is therefore somewhat uneven. To the extent that sectoral reports managed to cut across regions and the NAST supplemented the information passed up from the regional assessment teams with scientific literature available to them, this unevenness is somewhat remedied.[26]

[24] Regions here include the workshop and report on Native Peoples and Homelands.

[25] One is the Report from the Southeast team, whose leader, Ron Ritschard, died in the early stage of that assessment; the other is the full assessment report of the Native Peoples/Homelands group, whose funding ran out before all levels of review, revision, and report production could be completed.

[26] Note that regional assessment leaders did not necessarily approve of this process of supplementing their findings with other scientific literature. Interviewees spoke of a certain level of competition over ownership, i.e. over "who gets to say what" about a particular region.

Third, opinions among assessment participants differ as to how well different aspects of the overarching assessment goal were achieved. Table 3 summarizes responses to the CMU survey, which asked respondents to grade the assessment on various counts.

Table 3: Survey respondents' opinions about achieving content-related assessment goals

Achievement	Absolute Frequency of Grade						Avg. Grade	Avg. InIn	Avg. NAST	Avg. Reg.	Avg. Sec.
	F	D	C	B	A	d/k					
Characterizing future climate	10	13	49	55	15	15	2.4/C+	2.4/C+	2.2/C	2.5/B-	2.6/B-
Assessing ecological impacts	5	10	41	60	13	29	2.5/B-	2.6/B-	2.4/C+	2.6/B-	2.9/B
Assessing social and economic impacts	9	17	49	36	6	38	2.1/C	2.1/C	1.8/C	2.0/C	2.0/C
Assessing regional impacts	12	7	45	54	18	19	2.4/C+	2.8/B-	2.5/B-	2.5/B-	2.8/B
Assessing impacts on agriculture	6	11	30	58	13	38	2.5/B-	2.1/C	2.5/B-	2.6/B-	2.8/B
Assessing impacts on water	8	8	28	68	20	24	2.6/B-	3.1/B	2.5/B-	2.8/B	2.9/B
Assessing impacts on infrastructure	9	17	39	34	6	49	2.1/C	2.9/B	1.8/C	2.2/C	2.3/C+
Assessing impacts on health	5	16	41	39	10	44	2.3/C+	2.8/B	2.4/C+	2.3/C+	2.7/B-
Assessing impacts on coasts and marine resources	3	11	31	40	17	52	2.6/B-	3.1/B	2.2/C	2.1/C	2.4/C+
Assessing impacts on forests	4	7	35	54	14	43	2.6/B-	3.3/B+	2.6/B-	2.7/B-	3.0/B
Communicating costs and risks	8	30	38	34	10	35	2.1/C	2.8/B	1.7/C-	2.5/B-	2.0/C
Communicating benefits	14	30	41	28	5	36	1.8/C-	2.7/B-	1.8/C-	1.8/C-	2.2/C

Abbreviations:
d/k – don't know
Avg. InIn – Average grade given by survey respondents who were intensively involved in the USNA (in one or more workshops and assessments)
Avg. NAST – Average grade given by survey respondents who wrote or reviewed the synthesis documents
Avg. Reg. – Average grade given by survey respondents who were involved in regional assessments
Avg. Sec. – Average grade given by survey respondents who were involved in sectoral assessments

These absolute frequencies of grades are difficult to interpret and are probably most safely viewed as an indication of the preponderance and spread of opinions, with a significant number of people lacking the ability to judge the quality of one or several USNA components (note that the "don't know" category ranks among the top

frequencies). Moreover, respondents grading, for example, "assessment of ecological impacts" had to integrate across all regions and the national synthesis documents. Respondents grading "assessment of infrastructure impacts" had no sectoral report as their basis but had to integrate across various regions and sectors, e.g. those with a heavy urban, transportation, coastal or water emphasis. Few respondents, however, can be expected to have had adequate insight into the depth of all of these analyses. Finally, those respondents who graded sector-focused assessments (e.g., water or forests), may have based their evaluations on the sectoral report alone or also on regional reports that addressed those sectoral issues. The unevenness in reporting up to the synthesis team and the incomplete horizontal integration across regions and sectors may thus result in an unfair reflection of what actually was or was not accomplished on a particular aspect of the assessment.

What may be of greater interpretive value is the overall picture that emerges from these ratings. Based on average scores, respondents did give the assessment a far better than passing grade (2.3 or C+), and for no single aspect did the assessment fare worse than a C-. However, it also did not achieve stellar performance, which would constitute a rather unreasonable expectation for a first-time endeavor: average grades are no higher than B for any aspect listed in Table 3. In terms of preponderance of opinion, the grades for nine out of 12 aspects lean more heavily toward the positive end of the scale and only three (socio-economics, infrastructure and communication of benefits associated with climate change) were more frequently judged as inadequate.[27]

Another interesting analysis of these data illuminates the differences in opinion from people who had rather different foci and levels of involvement. For example, the judgment of people contributing in one way or another to the synthesis documents (NAST, contributors or reviewers) is almost consistently lower than that of people contributing to sectoral or regional efforts. People with the most intense level of involvement display the most varied patterns (sometimes more positive, other times more negative, yet other times similar) compared to other participants, giving maybe the most reliable indication of the variability in quality of individual assessment components.

When asked to evaluate the technical credibility of National Assessment products, CMU survey respondents responded as shown in Table 4.

Table 4: Survey respondents' opinions of the technical credibility of National Assessment products

Strong No	No	Intermediate	Yes	Strong Yes
9	15	27	58	40
5%	9%	16%	34%	23%

(13% n/a)

These data have to be interpreted with great care. First of all, virtually all interviewees expressed great pride in their own products, yet also volunteered opinions that regional and sectoral reports differ in scientific quality, reflecting both the caliber of

[27] Note again, a more traditional analysis of means, medians and standard deviations was not believed to be particularly meaningful, given the indeterminable representativeness of the data. More qualitative interpretation of the data as offered here, however, was believed to be defensible, especially when corroborated by interviewee information.

scientists leading or contributing to the effort and the extensiveness of peer review (e.g., see the textbox in Section 3 above, for a description of the extensive peer review and oversight of the peer review process for the synthesis documents). Thus, they confirm the spread of opinions emerging from Table 4. From the interviews, it is apparent that sectoral and regional reports varied greatly in the extensiveness of scientific peer review. For example, those sectors and regions that put a premium on publishing not just an assessment report, but also in the scientific literature (e.g., water, forest and health sectors; the Mid-Atlantic, Pacific Northwest, and Great Lakes regions) subjected their various products to several layers of expert review. Some sectors and regions had a completely open expert review (i.e., anyone who was interested could review), while others took a more targeted approach (i.e., requesting review from known experts in the field). The published report on Native Peoples and Homelands not only went through scientific peer review but also extensive review by Native elders. Some chose to make their review process entirely transparent (unlike the NAST, which as a federal advisory committee was obligated to do so, regions and sectors were not legally required, but it had been recommended to them as well) by posting all received review comments along with their responses on public websites (e.g., health sector, Mid-Atlantic region). A few CMU survey respondents wished all reports had been subjected to a final review by the National Academy of Sciences, but this did not occur. Overall, however, the peer review that did take place is one measure of the openness assessment leaders wanted to achieve.

Further caution should be taken in interpreting the views expressed in Table 4 because of survey respondents' quite varied familiarity of all the products. When asked what assessment products they had used, seen, or were aware of (but had not seen), 12 respondents had seen none at all. The regional reports were generally better known than the sectoral reports. As for the synthesis documents, 89 (52%) had used, 57 (33%) had seen, and 3(2%) were aware of, but had not seen the (shorter) Overview document, and 60 (35%) had used, 48 (28%) had seen, and 14 (8%) were aware of, but had not seen the (longer) Foundation document. Of the respondents, 68 (39%) had downloaded assessment products from (one of) the assessment websites, 96 (56%) had not, but almost 3 out of 4 respondents had at least visited assessment websites (no = 39 or 23%; yes = 126 or 73%). Given these differences in familiarity and the integration of survey results across all products, the judgment of technical credibility must not be applied to any one single product and should be judged very carefully as a reflection of the technical credibility of the endeavor as a whole.

A final point regarding the assessment products concerns the format, i.e., the presentation of results. Based on the write-in comments provided by CMU survey respondents, probably the most frequent comment regarding the strength of the products was the high quality of the presentation. Adjectives such as "clear", "highly readable", "well written", "nicely illustrated", "beautiful", and "professionally done" were common. Respondents considered them well organized, straightforward, comprehensive, a good broad brush summary, a good benchmark for future assessments, and a "nice 'one-stop-shopping' reference on potential climate change impacts" for a range of audiences, including journalists, the broader public, decision-makers, and educators.

While a smaller number of respondents differed from these positive endorsements with comments such as the products are "too long", "too dense", "not timely", "of inconsistent quality", "high on gloss, low on serious discussion", and "overwhelming",

only two respondents saw no value in them at all. Probably the single most frequently mentioned "weakness of the product" – based on write-in comments – is not a product short-coming at all, namely the lack of a comprehensive outreach and communication strategy for distributing the products and making them more accessible through other formats (e.g., short summary brochures, speaker packages, more education materials, "semi-popular" summaries for the media).

Overall, the survey respondents' comments as well as the interviews reflect various notions of what assessment participants wanted from these reports and the varying degrees to which these hopes were fulfilled. For example, some wanted the USNA reports to be like IPCC reports; others wanted them to persuade or silence climate contrarians; yet others wanted these reports to put to rest any skepticism or resistance within the Bush administration or Congress; some simply wanted them to provide a baseline for future assessments, more detailed understanding of climate change, better data/model runs, and answer a wider set of questions than was asked; some wanted the reports to make policy recommendations, others explicitly did not. These comments are more than a reflection of differing opinions. They may suggest that assessment leaders did not clearly enough specify expectations, goals, and constraints, or that different leaders specified them differently. Maybe more fundamentally, however, they express an unavoidable consequence of conducting an assessment that involves as many people as this one did: namely that a conversation did get started among a much wider population than previously involved about what an assessment is or should be and what its products ought to be. In this light, the diversity of opinions may be viewed more positively, rather than as an indication of shortfall.

In a global sense then, the data suggest that the overarching product-oriented assessment goal was achieved, albeit perceptions of the quality of different aspects vary. What is not reflected in these survey data, however, is the impact stakeholders and the regional focus had on the formulation of the overarching goal. For example, one of the regional assessment leaders stated that "the fact that we worked in the regions helped reframe the entire assessment's focus from being just about climate change to being about climate variability and change." Numerous interviewees confirmed this claim. This reframing got absorbed into the goal statement, put in stone about mid-way through the core assessment period.

The Assessment Products: Achievement of Sub-objectives

Interviewees confirmed that the four guiding questions were used in virtually all cases. As one put it, "I don't think anyone threw them out; they liked them actually." Another praised the four questions as "an artful way of framing the problem." Practically all available assessment documents prominently introduced the assessment's goals through these four questions. In fact, they seemed to have taken on a "mantra-like" quality for assessment leaders – for many interviewees the most memorable guidance they could recall having received for the assessment.

With regard to the research-related assessment objectives (synthesize and evaluate existing science, produce new science). Table 5 summarizes the grades CMU survey respondents gave to those aspects of the assessment.

Table 5: Survey respondents' opinions about achieving research-related assessment goals

Achievement	Absolute Frequency of Grade						Avg. Grade	Avg. InIn	Avg. NAST	Avg. Reg.	Avg. Sec.
	F	D	C	B	A	d/k					
Advancing the state of the art in climate impact assessment	11	15	37	46	17	31	2.3/C+	2.8/B	2.5/B-	2.4/C+	2.6/B-
Identifying research needs	5	11	30	61	25	23	2.7/B-	2.7/B-	2.7/B-	2.8/B	2.9/B

The patterns of responses are again more interesting, and probably more reliable, than the absolute numbers; moreover, they are confirmed by interviewees' expressed viewpoints. Most assessment leaders of the regions and sectors, when asked how the regional focus and the involvement of stakeholders affected their assessment, mentioned that the particular insights and interests of regional or sectoral stakeholders led to a refinement or reframing of research questions, and typically raised questions current science cannot yet answer. As a result, numerous areas for future research were identified. Several interviewees – seasoned scientists typically – stated even more strongly that they would have never thought about certain problems in the ways stakeholders did, thus generating researchable problems that were of considerable interest to them as scientists. As one put it, "when it worked the best, the stakeholders were able to identify environmental problems that probably no one scientists would have ever actually been able to identify."

Judgments in Table 5 about the progress in the art of impacts assessment per se are more varied, and also more difficult to interpret. Several interviewees expressed the view that doing impact assessments *with* stakeholders in and of itself was an advancement ("it's the process, stupid' – we wouldn't have come to that realization without doing the National Assessment as we did"); others felt that due to the limited spatial and temporal resolution of GCM-based climate projections (even more limited then than they are now) for impacts assessment purposes, they could not push the impacts analysis forward very much or made little progress in the areas of greatest interest to many stakeholders (e.g., impacts at the watershed scale, of extreme events). Some interviewees deplored – even while acknowledging other positive outcomes – that some sectoral and some regional analyses accomplished little in pushing the state of science forward.

There was considerable variation in the extent to which individual assessment efforts conducted new research. Many understood their efforts to simply be about summarizing and evaluating the state of existing science (similar to IPCC assessments, augmented by stakeholder insights), i.e., as one put it, about "establishing a baseline." Others – in both sectors and regions – obtained enough funding to conduct or commission new research and accomplish that within the core assessment timeframe. Several interviewees expressed the regret that they had wished but were not able to do more research in the context of the assessment (or under the assumption of an ongoing process, to continue working on identified research and information needs after the First USNA).

While regional and sectoral assessments, as well as the national synthesis, were asked to identify and document future research and information needs (one of the four guiding questions), little progress was made in prioritizing among the many things one might

want to know more about. As one interviewee put it, "I wish the stakeholders would have helped to prioritize research needs more, we still only have a laundry list." Another added that if the assessment had been successful in prioritizing research needs "that would probably elevate stakeholder needs even more, because the science community isn't competent on its own to say what's most important." In fact, some interviewees especially at the federal level, still believe little prioritization has occurred since then[28], and consider it a failure of the USNA to clearly differentiate highest (in the next 1-5 years) from lower (over the next 5-10 years) research priorities.

The NAST strongly suggested the use of key approaches to characterizing future climate (two model runs, historical climate records, and qualitative "what-if" scenarios) and of socio-economic baseline data and projections, in order to facilitate comparability and integration across regions and sectors. This requirement was unevenly implemented across the country. Respondents to the CMU survey reported the following use of approaches to identifying potential climate futures: 99 (57%) used GCM runs; 78 (45%) employed data on past climates; 76 (44%) explored impacts through "what-if" analyses and 15 (7%) marked other (typically some variation on these other three). Write-in comments on the survey echoed interviewees' reflections on the use of climate scenarios: Some felt the combination of three different approaches yielded the best, most robust, and most convincing results; frequently, considerable education of stakeholders had to be done first, however, to increase the comfort level with models. Others felt highly critical of the GCMs (especially if they did not perform well in replicating historical climate in their region), and felt imposed upon by the decision "made up high" that they had to be used ("we were told to"). One interviewee felt "there was an obsession" with the climate models, and felt that they at some point became drivers of the whole assessment process. Finally, some teams decided not to use the model outputs at all. Frequently, that decision was done in response to not just scientific considerations, but in response to experts and stakeholders who were highly skeptical of the models. Teams that only held scoping workshops and did not complete a full assessment, relied more heavily on the qualitative methods ("what-if" scenarios).

The majority of CMU survey respondents did not know about the use of socio-economic scenarios and approaches. Of those who had insight, 26 (15%) mentioned the use of dynamic social and/or economic models, 36 (21%) used projections from census and other data, 42 (24%) used socio-economic "what-if" analyses, and 13 (8%) listed other approaches (e.g., historical data or analysis, traditional knowledge, static assumptions about socio-economic futures, i.e., future-as-now). Survey respondents (and some interviewees) viewed the use of socio-economic projections provided by the NAST as essentially inapplicable or useless to the regional analyses; they added layers of uncertainty to their analysis, they only provided some elements of the socio-economic future, but not others (e.g., policy changes, world market shifts), or demanded a level of sophistication of the analysis that was not doable under the time constraints or not defensible given the baseline knowledge, so they decided not to use them. Several interviewees also complained that these data were provided too late in the game.

[28] See, e.g., the long list of researchable items discussed in (Parson et al. 2003), the suggestions made in (Pielke Sr. 2002), or the challenge the CCSP faced in prioritizing its research agenda (National Research Council 2003).

The Assessment Process: Stakeholder Engagement

With respect to the achievement of participation-related assessment goals, the grades given to the USNA by CMU survey respondents provide a first cut (Table 6).

Table 6: Survey respondents' opinions about achieving participation-related assessment goals

Achievement	Absolute Frequency of Grade						Avg. Grade	Avg. InIn	Avg. NAST	Avg. Reg.	Avg. Sec.
	F	D	C	B	A	d/k					
Involving experts	5	5	26	56	48	17	3.0/B	3.4/B+	2.9/B	3.2/B	3.2/B
Involving large number of people in considering the issue of climate change	4	7	24	49	54	18	3.0/B	3.3/B+	3.4/B+	3.2/B	3.2/B

While the pattern of responses to this set of objectives is quite even, it is again not easy to interpret: apparently, a majority of survey respondents view the First National Assessment as remarkably successful in involving both many kinds of experts and "a large number of people" – thus achieving another of its objectives. Of all aspects graded in this survey (see Tables 3-6) participation-related assessment goals received the highest marks. Regarding the involvement of experts, CMU survey respondents and even more explicitly interviewees frequently highlighted and appreciated the remarkable degree – and value – of involving experts from many disciplines, thus allowing for interdisciplinary exchange and integration. While not an easy process, many felt that learning how to do interdisciplinary work, how to "work more synthetically" was a big part of the learning that went on during the assessments. Such comments came particularly out of the regional efforts where teams of experts with various backgrounds brought together their expertise to construct a picture of potential climate futures, regional vulnerabilities, impacts, and adaptation options, and at least a first cut at cross-sectoral interaction of impacted areas.

Regarding the involvement of "many people" – an effort was made previously and again in this study to estimate the number of involved people, but a definitive number could not be determined. Interviewees estimated that each assessment team averaged around a dozen members. In addition, 50-200 people were estimated to have attended each regional scoping workshop; subsequent workshops – if they occurred – typically drew fewer participants (some repeat attendees, others new); both prior participants and additional individuals took part in the reviews. Sectoral efforts typically involved fewer people if workshops were held at all. The list of attendees of the National Forum comprised some 400 people. In addition, countless more people were involved in the various review stages of the different assessment products; an estimated 300 alone submitted comments on the synthesis documents in the public review phase. Finally, there are numerous people in the federal leadership who were instrumental in shaping, planning, funding, implementing, and reviewing the assessment. In total, interviewees estimated that more than 2,000 people were involved at some point in the assessment.

While the goal of involving many people was thus achieved, it is worth asking what the term "a large number of people" actually meant. Presumably it reflects those

participants who do not fall into the "expert" category (the other survey option), i.e., anyone potentially impacted by climate change, such as farmers, ranchers, forest managers, fishermen, emergency preparedness officials, refuge and park staff, business people, utility managers, national, regional and local government leaders, tribal leaders, representatives of interest groups, citizens at large, and so on. The rather broad labels for these two categories (experts and people), of course, are problematic because they are ambiguous. For example, a water resource manager while probably not academically active is still an expert in his or her field. It is not apparent how respondents defined the terms for themselves. Moreover, several assessment leaders (especially at the regional level, but also some sectors), objected to what they considered a simplistic distinction of experts from stakeholders, and rather preferred a view where "experts in one field speak to experts in another."

The Assessment Process: Achievement of Sub-objectives

While stakeholders were involved in various ways during the core assessment period (see also Section 5 below on representation, intensity and quality of deliberations), a virtually unanimous disappointment was the fact that the promise of an ongoing dialog was not kept.[29] In fact, several interviewees' frustration and anger peaked on this issue still – several years after the fact. For several, it was an issue over which they felt they lost some of their professional integrity, having promised stakeholders something that they then were unable to deliver on. "We looked like we lied to them." Another added, "if you do it, you better follow through," and yet others stated, "some [stakeholders] feel used" and "many feel abandoned now." For other interviewees, the source of their frustration was the amount of time and energy they had spent carefully building relationships with people not easily brought into collaboration (e.g., industry representatives who began to trust the researchers enough to share proprietary information) and then disappointing those collaborators and not being able to continue the relationship. Several explained how the assessment had "opened communication channels" that previously did not exist and which they could not take advantage of. "We got all dressed up, and then had no place to go." A federal assessment leader further acknowledged, "exactly the worst thing happened: we sort of spun up a bunch of groups … and then they got dropped." Another conceded "the reason there is unhappiness out there, is that it was a very positive experience, it was a two-way conversation," but one that was not maintained.

The notion of an ongoing dialog had several components: building on the initial assessment and the identified research and information needs to help regional and local decision-makers to become better prepared for climate variability and change (i.e., working toward ongoing decision support and building capacity for future assessments); and using the findings of the First National Assessment for public communication and education. Regarding the assessment's performance on education and informing various

[29] The record of documents suggests that the early guidance on regional-level activities was actually quite up-front about funding and time constraints, at least in the near-term, and therefore could not commit to an ongoing assessment effort (NAWG 1997). There was also no promise made (in writing) by agency representatives that each region would or could be supported at equal levels. It appears, however, that over time the commitment from federal leaders became more explicit, giving regional leaders a unanimous sense that agencies were on board for long-term engagement.

types of stakeholders, respondents to the CMU survey suggest a fairly clear message (Table 7 below).

Table 7: Survey respondents' opinions about achieving education- and outreach-related assessment goals

Achievement	Absolute Frequency of Grade						Avg. Grade	Avg. InIn	Avg. NAST	Avg. Reg.	Avg. Sec.
	F	D	C	B	A	d/k					
Educating participants about climate change (CC)	5	7	29	55	37	23	2.8/B-	3.3/B+	3.1/B	3.2/B	3.2/B
Educating the U.S. public about CC	17	40	44	24	6	26	1.7/C-	2.2/C	2.2/C	1.7/C-	2.2/C
Informing local and regional decision-makers about CC	6	29	37	35	10	40	2.1/C	2.3/C+	2.2/C	2.1/C	2.4/C+
Informing national decision-makers about CC	9	20	35	50	8	34	2.2/C	2.3/C+	2.6/B-	2.1/C	2.5/B-

The further removed from the assessment, the less successful the education and outreach effort seems to have been (see also the discussion in Section 3.3 regarding the lack of communication and outreach at the end of the core assessment period). Respondents and interviewees believe that assessment participants with little climate expertise were quite well educated through the process but the larger public much less so. As one interviewee put it, "there is now a cadre of people out there who have a hell of a lot more insight about the climate issue" [than they did before]. Less confidence exists among survey respondents about the adequacy of informing decision-makers at the national, regional and local levels. Again, the question is ambiguous enough that the spread of responses is not surprising; the number of people unable to judge is also considerable. Those respondents who did grade the assessment on this count may have considered attendance by decision-makers in workshops; others might have reflected on the level of communication and outreach effort after completion of the assessment; yet others – an assumption frequently observed among scientists – may have judged the degree of informing decision-makers by whatever changes in decision-making behavior they may have observed.

These perceptions should be viewed in light of what USGCRP and the regional and sectoral teams actually tried to do in terms of communication and outreach. Numerous interviewees spoke of printing as many reports as their financial resources allowed – typically several thousand. Several had to look for additional funding after their government support for the assessment was exhausted. To name just one example, the New England regional assessment team printed 4,000 copies of their report, and "gave away every single one, except for the one in my office." According to team leaders, if they could print another 4,000, those, too, would be gone "in a heartbeat" – an indication from just one region of the level of interest in climate impacts information. Several interviewees told similar stories about the interest in the information in their regions.

National overview reports were sent to those on the mailing list of NACO, members of Congress, government depository libraries, and to anyone expressing interest. The overview and foundation documents can also be purchased from Cambridge University Press. In addition, all assessment related products are available at various web pages, and at government-independent web pages developed and/or maintained by assessment teams. Due to the lawsuits against the assessment, however, governmental outreach efforts essentially came to a halt upon closure of the core assessment period. For the same reason, and the change in administration, congressional funds after 2000 could not be obtained to continue outreach efforts. The only active communication efforts that continued after the release of the synthesis documents were countless presentations given by all assessment leaders to professional and public audiences. One survey respondent thus concluded, the "lack of continuity makes this assessment look like the flavor of the month rather than a viable product."

While less active and engaging, interested parties can still find the reports and assessment information at the USGCRP and GCRIO websites. The original synthesis document draft and other USNA materials were posted at www.gcrio.org/nationalassessment/, nacc.usgcrp.gov and sedac.ciesin.org/NationalAssessment/ during the latter half of 2000. Some of these websites later were taken down and new ones created. Archival information is not available for all sites to reconstruct a complete picture of their use, but as an indication of use, some information was compiled in Figure 6a-b.

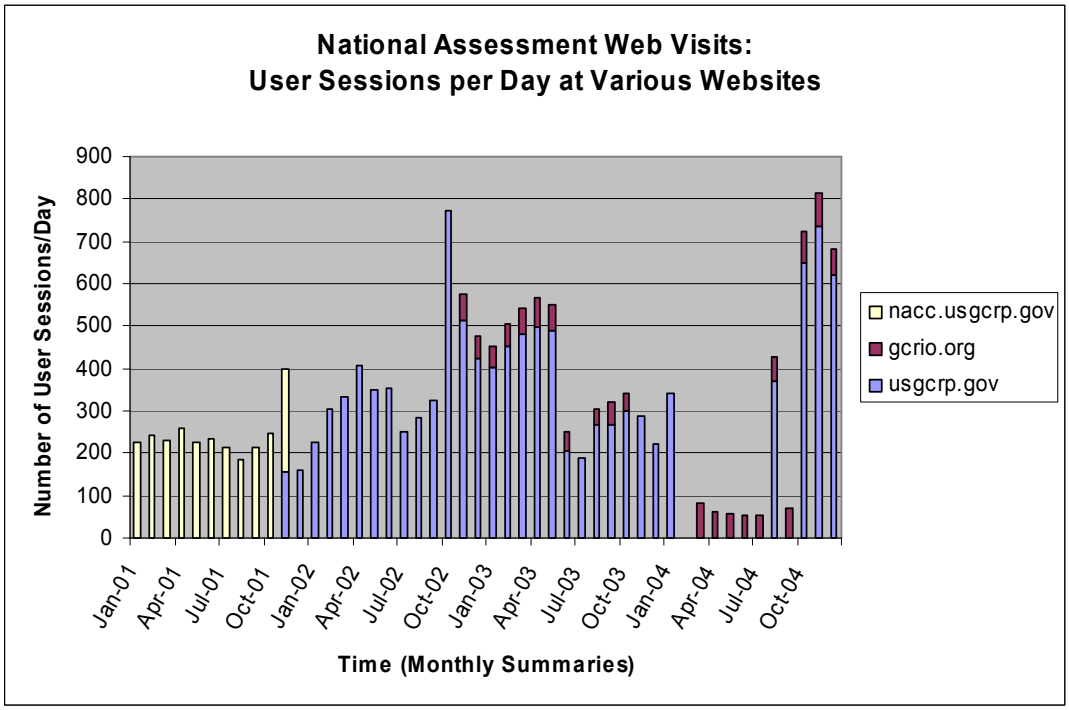

Figure 6-a: Indicators of Web Traffic at Key National Assessment Websites: User Sessions per Day. For some months, data are only available for nacc.usgcrp.gov (yellow), and/or only for assessment-related web directories at usgcrp.gov (blue) and gcrio.org (red); for one month no data are available at all (02/04)

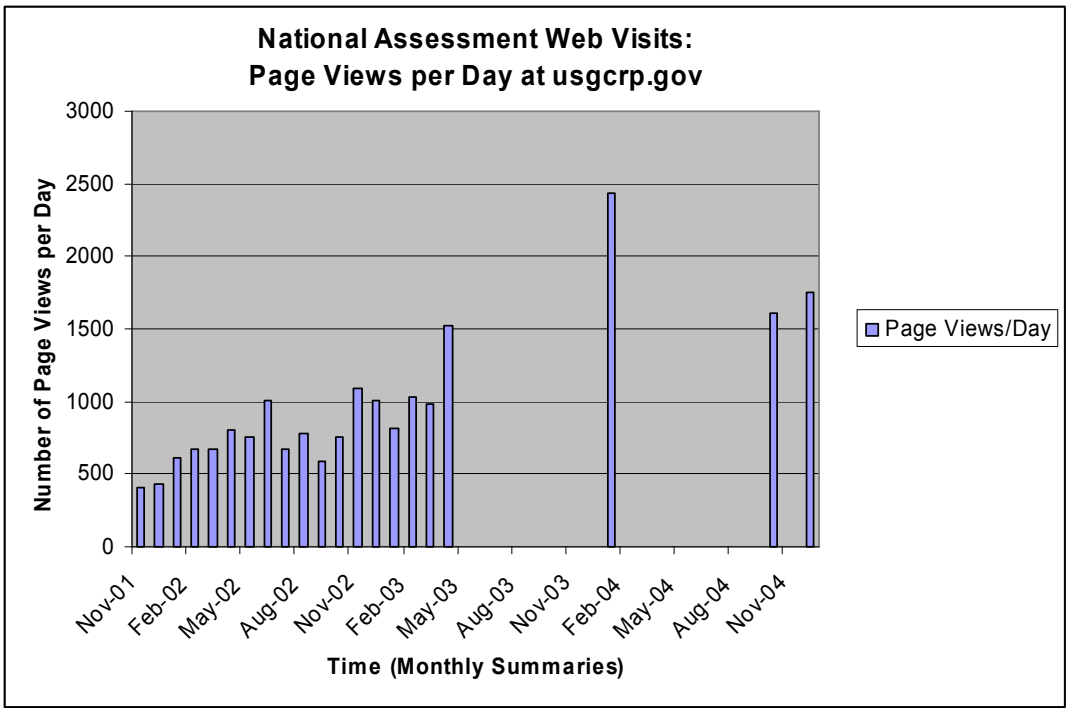

Figure 6-b: Indicators of Web Traffic at Key National Assessment Websites: Page Views per Day. For several months during 2003 and 2004, data were no longer retrievable. (Source: Based on data provided by N. Sundt, USGCRP, January 2005)

The available data for USNA-specific pages go back to January 2001 only, i.e., seven months after the release of the draft synthesis report, and three months after the release of the final reports. According to CCSP staff, traffic at usgcrp.gov on June 12, 2000 (the release date of the draft report) jumped from a few hundred to nearly 3,200 visits. By the end of the month, the peak had subsided and web traffic at the site was back to normal. Even with this USNA-related peak, the monthly average for the entire site (usgcrp.gov) for that month was only 442 user sessions/day. Since that time, the material has been reorganized, the site overhauled, and despite the fact that all logos and advertisements for the assessment had to be taken down as part of the legal settlement, web traffic trends upward. The average number of user sessions/day for all usgcrp.gov pages has increased to 1,098 in June 2004.

To place the use data for assessment-related pages into context, it is important to note that the National Assessment directories on the usgcrp.gov web site are consistently the most frequently accessed directories on the site. For the period from November 2001 until April 2003 – the only time for which such data are available – the assessment directory on usgcrp.gov received between 28 and 42% of all usgcrp.gov site visits. Given the amount of available information, that may be expected. However, it also suggests that people looking for climate change information are specifically interested in impacts and adaptation. According to CCSP staff, the National Assessment constitutes "the most popular product because it offers information at a scale that people care about." Between the two major access sites (usgcrp.gov and gcrio.org) it is safe to assume that National Assessment material now sees 400-800 visits every day, with the lower end of the range being typical of the summer months.

At the same time, web use analysis suggests that much of this traffic comes in to the sites via search engines (such as Google and Google Image Search) and often people are not specifically looking for information on climate change. Thus, using a conservative estimate of only 20% of visitors coming to the site specifically to find the kind of information offered, the number of visits is 80-160 visits/day or – picking a mid-value of 120 visits/day – amounts to nearly 44,000 visits/year. Between 70 and 80% of the visitors typically come from North America (mainly U.S.), followed by Western Europe and Asia. It can thus be safely concluded that the online materials of the USNA have a far larger reach than the hardcopies, and that USNA materials continue to be of great interest long after the publication of the Overview and Foundation reports.[30]

In summary, survey respondents and interviewees consistently named as one of the biggest weaknesses or disappointments of the assessment process the lack of communication and outreach post-release. "It should have been in every Sunday Parade magazine!" The "virtual absence (or under-funding) of a well-supported public education and outreach effort" is practically certain to have undercut the impact this national effort could have had in terms of raising awareness of climate change risks in the American public. It merges in the minds of many USNA participants with the lack of commitment to maintain and foster assessment as a continuous process or activity. The fact that survey respondents and interviewees so fervently complained about this shortfall is a direct reflection of the enormous hopes and expectations that the undertaking's foremost strength had raised: the broad stakeholder and expert involvement, the openness and diligence of the process, and what seemed at the time to be an enormous commitment by everyone involved, in all regions and at all levels – by assessment leaders, teams, agencies, and stakeholders. As a result, a successful, legitimate process became inextricably linked in the minds of many to the development of a credible and relevant product. As one interviewee put it, "in order to have a product that really has legs, you have to have a good process." Some argued that the reverse was also true, especially over time as relationships became more firmly established and information needs better known: in order to keep stakeholders interested and involved, specific products responsive to their expressed needs become tantamount.

When asked specifically, what difference stakeholders made with regard to the products, almost all interviewees saw a significant impact. One stated that stakeholders gave the assessment a "much fuller flavor of how people were wrestling with [environmental problems] and what their concerns would be." Several argued that even if the assessment "reinforced the concerns that we already had," it helped get them "newly emphasized." Numerous people told stories of how stakeholders enriched and fine-tuned the scientific understanding with their personal knowledge, insights, expertise and perceptions. "Organizers may have had a pretty good idea what the issues were, but the stakeholders brought them alive, picked up on the fine points." A few interviewees pointed to specific examples of analyses that would not have occurred without stakeholder input (e.g., essentially leading to a "doubling of the workload" in the Mid-Atlantic region, where stakeholders identified issue areas deemed less relevant initially

[30] Analysis of downloads reveals that all portions of the synthesis documents, sectoral reports and regional reports are downloaded at a rate of several hundred per month. In addition, these figures can be safely assumed to be conservative estimates as numerous assessment teams have built their own websites and provide government-independent access to assessment products at their sites.

by the scientific team; the launch of a Native Peoples and Homelands effort after identification of Natives' specific concerns at an earlier workshop). A more subtle, but also more powerful, impact on the documents was the fact that several groups made a strong effort to create consensus documents, thus developing a baseline to which stakeholders from various backgrounds could agree. In summary, "the best thing you can say is, the stakeholder involvement broadens the perspective, deepens the insight, and gives you a much richer document and process when you're done."

4.2 Quality of Broader Environmental and Social Outcomes

As stated earlier, the National Assessment was not designed to produce information in support of or relevant to a *specific* national, regional, or local set of decisions or policies. Contrary to the accusation in the CEI lawsuit, the National Assessment was never designed and never used as a policy document. It does not contain policy recommendations (Backlund 2001, Bierbaum 2001). At the same time, it was prepared in a larger political and societal context, and assessment leaders hoped that it would produce useful information, which – along with other inputs – could inform policy positions (e.g., vis à vis the Kyoto negotiations), increase Americans' preparedness for the impacts of climate variability and change, and in fact support local planning efforts and decisions various stakeholder might face. It is only appropriate then to ask whether the assessment achieved any broader outcomes of societal value.

The CMU survey did not investigate this question specifically (although some respondents offered relevant write-in answers), and federal, regional and sectoral assessment leaders never systematically inventoried or tracked such impacts. While anecdotal evidence was collected and shared among assessment teams, it is actually rather difficult not only to track such impacts, but to conclusively attribute them solely or primarily to the assessment. Reports of such impacts were collected during the interviews and should be viewed as a set of surely incomplete, yet suggestive and in many cases encouraging examples

Environmental Decisions, Policies and Policy-Relevant Institutions
Is there any evidence that decisions or policies were affected by the outputs from the National Assessment? Is there any evidence that institutions were put in place specifically designed to consider climate change, in order to insert those considerations into future decision-making? The anecdotal evidence suggests a cautiously affirmative answer, at least in a few locales.

- Corps of Engineer staff included in the Metro East Coast assessment are believed to consider climate change and sea-level rise now in their sand replenishment planning ("I think that's built into their psyche now"). In the same region a new Task Force for Climate Change was created in the regional water utility [check], institutionalizing a forum in which concern raised through participation in that regional assessment could be continually addressed. Maybe more subtly, interviewees observed that state agencies didn't feel "so out on a limb" getting involved in climate change because they did it together with other agencies.

- In New England, leaders feel confident that they can trace an impact on the development of the New England Governors-Easter Canadian Premiers regional Climate Change Action Plan as well as on New Hampshire's Four Pollutant Bill and the climate change mitigation efforts in New York and Massachusetts due to the many briefings offered to gubernatorial staff.
- In the Central Great Plains, one participant from Montana – initially skeptical of the reality of climate change – became convinced of the seriousness of climate change, and felt strongly enough about it that he wrote a letter to the insurance commissioner of his state asking for changes in crop insurance (with unknown impact).
- One interviewee said that he had heard from some people in California, that that regional assessment contributed to the state's efforts to address climate change.
- In the Pacific Northwest, the assessment initiated some relationships to stakeholders in public policy circles [add more].
- One interviewee reported a surprising interest from water managers in the findings of the health sector, as they became aware of the linkages between water resource/quality management and human health.
- While not an environmental policy or decision, one interviewee believed that the assessment affected how the federal government chose to developed its strategic research plan in 2002, i.e., the "elaborate … process we went through to produce the CCSP strategic research plan."

Several interviewees also spoke of their wishes to have been more helpful to or influential on state or federal agencies. For example, little impact was apparently achieved among the stakeholders involved in the health sector assessment (mostly representatives of the Centers for Disease Control and Prevention). One regional assessment leader saw opportunities to be of greater help to state health agencies, but due to funding running out, support to those agencies ("strapped for time and personnel; they can't keep an eye on climate until the crisis is upon them") was not possible. Interviewees expressed the conviction, however, that the work of scientists, private sector and public sector stakeholders created a more subtle impact. In the Great Lakes region, for example, leaders can trace interest in climate change among regional decision-makers back to their regional assessment and see a greater awareness among them now of how climate change could affect them. Maybe more importantly regional decision-makers came to "the realization that there are scientists out there that care about that." Gaining a "greater appreciation of the available human resources and institutions available to tackle global change issues," several other interviewees said their groups had an experience through the First National Assessment that "told them they can influence, and they can learn, they can bring to their own region insider knowledge that is important to their own future."

Impacts on Participating Stakeholders

Stories of the assessment's impacts on stakeholders include both general and specific instances. A number of interviewees reported that workshop and assessment participants learned a good deal about climate change, which – in some instances for the first time – raised their personal concern about this global issue. One observed, "I think their eyes became opened." Another stated that through ongoing involvement in the assessment,

"climate change became more meaningful to them; it changed their perspective on it." Especially for the fact that the climate issue was – through the four key questions – "get it linked to other things" and "resulted in the wish to focus more on sustainability." Some stakeholders began "appreciating the complexity of potential impacts." In addition, some of those who may have already been convinced of the reality of climate change, became more so. As one interviewee put it, "it reinforced the concerns that we already had. Not a soul came away from those meetings saying, well, it's not as bad as I thought."

Interviewees were able to recount a number of very specific instances of impacts on stakeholders as well:

- In the Southwest, scientists were able to show mining industry representatives involved in the assessment how rainfall patterns in the region relate to ENSO[31]. Knowing where to find climate forecasts and data, mine operators can use this information to adjust their investment strategies and operations ("they now know where to get that information before it's in the newspaper; they liked working with us"). As a result, assessment leaders were confident that the industry now saves considerable money. Because the assessment team built considerable trust with private sector participants, they gained access to proprietary information, improving the first round of analysis. Moreover, because they tried hard to produce a consensus statement with buy-in and support "up through the chain of command … now these guys in industry will read that thing."[32]
- In the Northern Great Plains, work between scientists and stakeholders, helped crop farmers to better time the application of fertilizers (precision farming) and helped ranchers identify the best plots for grazing by use of satellite imagery and estimation of biomass.
- In the Great Lakes region, assessment leaders found industry to now have a greater interest in looking for ways to become more resilient. Moreover, through modest continuation of funding, their expressed interest in climate change impacts on tart cherries, and on winter/ski/recreation allows them to continue engagement.
- Even after only a scoping workshop, interviewees could identify impacts in the South Atlantic Coastal and Caribbean regional assessment. For example, a man from agribusiness "began believing the message" and started to make changes to his practice. A hospital whose representatives had attended the workshop began to reevaluate its emergency plans and now puts sustained attention to emergency mitigation planning.
- In the relatively conservative Central Great Plains region, interviewees observed both subtle and remarkable impacts. One participant said to the assessment leaders, "this is the first time I've come to these workshops where I as the rancher am not pointed to as the problem. I can see myself as part of the solution." Stakeholders also learned a lot about climate variability and change ("By 1999, I could see the 'lights go on'"). Further appreciating the respectful interactions, where they did not have to believe the scientists, another participant stated "I still

[31] Rainfall, the amount of runoff, and the availability of water are critical for mining operations. For example, if much rain falls – as is typical during El Niño's – mine operators may violate EPA regulations.
[32] Note, in another assessment group such consensus was obtained, but participating industry groups felt that going publicly on record would hurt them economically and so withdrew near the end, even though their input into the reports remained integral to the final product.

don't think climate change is happening, but the exercise was useful." Maybe it was useful, because the farmers and ranchers obtained useable information, e.g., they learned about the benefits of carbon sequestration. Assessment leaders observed at an unrelated workshop in 2004, where some of the same farmers and ranchers attended that "they clearly have a better understanding of the climate issue now than when we started."

- The Native Peoples and Homelands workshop stimulated "an awful lot of interest in surveillance technologies like remote sensing", as a result of which training in the use of these technologies were begun.
- In the Pacific Northwest, pre-existing and continuing relationships with public and private sector decision-makers in the water and forest sectors has led to a better or deeper understanding of stakeholder information needs but also of what science can deliver. The slow and persistent building of working relationships between scientists and stakeholders has led to more effective decision support.
- In the Pacific Islands region, among the most important concrete outcomes of the assessment is a now well established network of researchers and stakeholders in public and private institutions interested in climate variability and change. This regional network did not exist prior to the assessment.
- In the Mid-Atlantic region, one stakeholder got so excited about the topic of climate change in the context of multiple stresses that he funded a crucial follow-up study on quality of life attributes
- Participants in the water sector (the Groundwater Foundation) reported that the assessment gave them the "opportunity to conduct some research with our own constituents about the issue which proved quite helpful."

Some interviewees also reported that they felt little impact was achieved on stakeholders in their regions. Especially in politically conservative regions, they observed still a "fair climate of skepticism" and little discernible change in either private or public sectors.

Impacts on Participating Scientists

As most interviewees were academic assessment leaders, information on the assessment's impact on scientist may be most apparent. In addition, because these scientists themselves may know most about the impact on their colleagues, it is not surprising that several interviewees believed that "the science community may have learned more than the stakeholders." And again, the reported impacts are both general and highly individualistic.

One believed that the National Assessment was a "watershed event in pushing the scientific community toward doing decision- and policy-relevant science" and acknowledged that "some researchers may see that as a bad thing." Another put it as, the assessment "pulled the research community into the 21st century." Another interviewee made the related observation that "lots of scientists can now give coherent lectures on climate change to lay publics," concluding that the assessment process "enhanced their skill of communicating technical knowledge in understandable terms."

Several commented on the specific impact that the stakeholders had on them. One said the stakeholder engagement "put a face on the issue" of climate change; another found, it "broadened my views of the needs and opportunities for collaborative

assessment processes;" for another, the assessment process "raised awareness of the need for climate services;" one now found to have a "better appreciation of local complexities; a better understanding of decision-needs." A regional leader explained how at the workshop, "scientists [participated], expecting they're going to save the world, expecting [to be dealing with] unsophisticated stakeholders, the notorious 'dumb farmers', and then learned [sitting in front of farmers with laptops] that they had gone out of business years ago." One found the work with stakeholders "tremendously stimulating." Another interviewee felt the assessment pushed the team to work across disciplines (but "becoming interdisciplinary is just not an overnight effort; it doesn't happen in a one-year scramble"). An academic CMU survey respondent acknowledged a surprising level of learning, claiming "some additional insights not previously gained in …15 years of involvement in global climate change issues."

Others found direct benefits for their research: stakeholders "give me some ideas I had not thought about, they give me a factual basis on which to build hypotheses, so what they do is move the science along more rapidly." One acknowledged that the stakeholder perspective "colors his perspective on current research. You can't get at certain aspects without stakeholder involvement." Another interviewee – now graduated from the "school of hard knocks" – mentioned having "learned a lot of things about cultural requirements for working in Indian country, not so much about climate change."

Several interviewees mentioned specific new research directions that emerged from the assessment: new research on maple syrup flow; changes in phenology/leaf-out; research on regional air quality; regional climate modeling; or urban impacts of climate change. One added that the questions raised through the assessment have also opened up new funding sources from federal agencies.

Numerous interviewees emphasized as one of their most rewarding gains new colleagues and new relationships – both to other scientists and to stakeholders. Several appreciated that through the assessment, new and/or young scientists got entrained – a form of capacity building not just for research but for future assessments.

For several interviewees, however, involvement in the assessment had more intimate, personal impacts. Several stated that the assessment "did influence the lives of the people involved," that "some of these people were so moved by this," and that "there are people who changed their job as a result of it." One of those people – a CMU survey respondent – said, "The assessment changed my life in major ways, including the development of an alternate career path. It was probably the most important learning experience in my career." For another assessment leader, that career impact was not beneficial, "it hurt tenure prospects." Several (and only partially in jest) acknowledged the amount of frustration they experienced and what a time sink the assessment was ("Well, it's taken all these years out of my life!"). Even so, the majority of interviewees expressed an overwhelming sense of appreciation and personal benefit from the assessment experience. "I loved it, and I'd do it again; people were enthusiastic, grateful." A few mentioned getting publications out of it, but, more profoundly, a personal "sense of contribution." One claimed that the assessment "heighten my own concern of climate change." Finally, one regional leader, whose previous work had been mostly focused on the global, continental and national scales, felt the regional assessment work was "transformative for my research. I'm so much more a part of where I live now."

Impacts on the General Public

Due to the lack of concerted and active communication and outreach effort, few interviewees believed that the assessment had much of any impact on the general public. If anything, the brief flurry of newspaper articles upon the release of the national synthesis documents contributed – along with the many other articles that occurred over the years – to a slowly changing perception and acceptance of the issue of climate change in the American public.

A few specific, demonstrable impacts, however, can be documented:

- In the Rocky Mountain-Great Basin region, which released its report in 2003, there is now greater interest from the media in climate change issues. Leaders there also observed that the media more frequently voice concern over the lack of regional political response.
- In a few regions, assessment leaders made specific efforts to involve educators. In Florida, for example, very well received teacher workshops were held as a follow-up to identified information needs at the scoping workshop. In New England, too, teachers were extremely interested in participating in the workshop and in climate change educational materials ("they were hungry"). In that region, the assessment report is known to be used in several college-level courses (e.g., at University of Vermont, Brown University, University of New Hampshire, and Dartmouth College). While federal assessment leaders also produced some educational materials, they seem to be less well known (generally not in the top 20 most frequently accessed or downloaded pages).
- The Native Peoples and Homeland workshop – while starting out from considerable reluctance to participation by some Native Americans – eventually garnered substantial interest in the climate change issue and mobilized attendees sufficiently to produce the first Native American statement on climate change (see Albuquerque Declaration, pp. 69-74 in \Maynard, 2002 #5517}. One interviewee, in reflecting on that particular workshop, acknowledged that the workshops sometimes took on a momentum that made some uncomfortable. "You get people started and they take over – that's great, but hard for bureaucrats."

As discussed above, several interviewees deplored the lack of wider impact of the assessment, and believed it was due to the lack of concerted communication and outreach.

4.3 Legitimacy of the Output and the Process

Legitimacy is fundamentally about people's perception of the fairness of a process: are all the right people involved in a process, are their concerns, values, and positions heard, respected, and duly addressed or included in whatever the final endpoint of the process may be. Typically, the positions observers hold vis à vis the process, outcomes, and other participating parties, change over the course of the deliberations. Both CMU survey data and interviews indicate a diversity of opinions on the topic of legitimacy of the process.

Inclusiveness

One element of fairness is whether participants felt an integral part of the range of decisions made throughout the assessment process: for example, decisions over who gets to participate, what issues to address in the assessment, how to approach or conduct an analysis, how to run the process, and so on. Clearly, one's sense of being included is shaped in large measure by the design of a process, the ground rules set out at the beginning, and the expectations raised by assessment leaders.

Interviewees spoke extensively about their efforts to bring in as many stakeholders and experts as their facilities and funds allowed, and about how they did not make the decisions of who to invite on their own, but typically in collaboration with others, frequently with other stakeholders. While CMU survey respondents named a variety of stakeholders they would have liked to have seen participate (see Section 5), not one complained about a lack of involvement in deciding over participation.

As for opinions about inclusiveness in decisions about assessment foci or analytic approaches, responses in the CMU survey vary considerably, and importantly, they vary by the respondent's position within the complex organizational structure of the entire assessment (see Figure 2 above). Maybe the single most frequently mentioned concern was that the assessment was "meant to be bottom-up" but ended up "too top-down," with respondents differing on whether their dissatisfaction concerned the NAST or the White House. Among those who criticized the relationship between regions and the NAST, for example, one respondent stated, "Some groups were disenfranchised due to misunderstandings, lack of financial support, or inadequate leadership." Another felt there was too much "'Speaking down' to regional and local levels…'Experts know best'." Yet another suggested there was a "closed way in which climate models and research objectives were chosen and then handed to various groups." One respondent seemed more understanding on this particular issue and explained, "Key scientific strategy decisions should not have been dumped on a small group of Wash. D.C. insiders. It was unfair to them, and to the viability of the Assessment in key places." Several interviewees echoed these concerns. A couple of respondents also regretted that the important role of the NAWG in the overall assessment effort was not adequately appreciated even though the group had been central all along. Other respondents spoke favorably about the issue of inclusiveness. "So many minds came together to take a serious, hard look at this issue." And "strong efforts [were made] to include many groups."

Another respondent focusing on the decision-making within one particular assessment said, "One senses there is an 'in' crowd." Others observed that "Stakeholders were not involved at all phases of the work. They were mostly engaged at the beginning." Interviewees indeed revealed considerable diversity in how they began and conducted their regional or sectoral efforts (see Section 5 for more details). Where groups engaged stakeholders only in the scoping phase and in the review process, little sense of inclusiveness and ownership could be created for the assessment as a whole. Other groups involved stakeholders far more intensively, thus producing a far bigger sense of inclusiveness and control over the process and product.

When CMU survey respondents were asked to what extent they felt they could participate in the choice of the questions addressed, the vast majority (111 or 64%) stated they had little or no influence at all, while 39 (23%) said they had some or a great deal of

influence – presumably reflecting the fact that the four key questions posed by federal assessment leaders were to be used by all assessment teams. In itself, this is not a fair reflection on stakeholders' role in shaping the assessment, however, as the guiding questions were completely open ended, allowing people to shape the foci and answers.

Similarly, when asked about the extent to which CMU survey respondents could participate in the choice of the procedures used, 63% felt they had little to no influence at all, while 40 (24%) felt they had some or a great deal of influence. Again, this probably reflects the guidance teams had received to use certain climate and socio-economic scenario, and the freedom or pressure they might have felt to adopt, modify, or comply. Together the feelings expressed in the responses to these two questions underscore the comments made above about the process being "too top-down."

Several scientists responding to the CMU survey actually had trouble with including stakeholders as extensively as apparently occurred. These respondents felt that too many stakeholders were not qualified, not up to speed on climate change, and too much time had to be spent educating them ("an inordinate amount of time was spent educating stakeholders and what did we get? Regurgitation" or "Most people have not thought very deeply or critically about these issues").

Also in the CMU survey, a few respondents – presumably non-academic stakeholders – commented that they felt "talked down to" – a sentiment likely to contribute to a sense of not being fully included. When interviewees were asked about such sentiments, they accepted that some may have felt that way and spoke of challenges with communication and differences in the conversation format. For example, several assessment leaders said they laid a few ground rules, among them that people could not use acronyms until everyone knew what they meant. One explained "we wanted to avoid sounding like a club where people have secret handshakes and a certain language." Others spoke of their efforts to "get everyone to speak plain English" or to install a norm where "listening is as important as talking." Some chose to have the stakeholders speak before the academics, rather than the other way around. Other efforts followed much more conventional and science-centric approaches. In general, however, assessment leaders were quite pleased with the inclusiveness they achieved. One – capturing the experiences of many – stated "we all learned a lot from each other" and another added "they liked getting together."

Responsiveness to Stakeholder Concerns and Interests

Given the directives and guidelines provided by federal assessment leaders, was it still possible for regional and sectoral assessment leaders to be responsive to stakeholder concerns and interests within these parameters? When asked whether the assessment products fairly reflected the range of relevant views and addressed relevant questions[33], CMU survey respondents answered as follows (Table 8).

Table 8: Survey respondents' opinions on the assessment's legitimacy and relevance

	Strong "no"	"No"	Intermediate	"Yes"	Strong "yes"	n/a
Was the process legitimate?	8 (5%)	18 (10%)	35 (20%)	58 (34%)	29 (17%)	24 (14%)

[33] The issue of relevance is included here, as it gives an indication of all participants' (scientists' and non-academic stakeholders') views on whether their concerns were heard and responded to.

Do the products answer relevant questions	10 (6%)	17 (10%)	42 (24%)	52 (30%)	26 (15%)	26 (15%)

The preponderance of opinions suggests positive views with regard to legitimacy and relevance, giving a first insight into how CMU survey respondents felt the assessment responded to participants' concerns and interests. Again, interpretation needs to be careful not to view these numbers as representative of any one assessment component, as they integrate across all components. Moreover, the majority of respondents served as reviewers of assessment products and is thus not necessarily deeply familiar with individual assessment processes, and how stakeholder concerns were handled. This may explain at least in part, why a large number of CMU survey respondents (68), when asked, what, if anything, was done differently in different parts of the assessment because of stakeholder involvement, answered "nothing."

Indeed, few respondents, in write-in answers, expressed a dissatisfaction with the responsiveness to their or others' concerns. For example, one wrote "They were expected to listen and/or occasionally answer predetermined questions." Far more common were answers like "I wanted to make a difference and I felt that my voice was heard"; or the report "reflected the views of participants"; or people "feeling heard, taken seriously" and appreciating the "openness of dialogue"; the fact that organizers sought "balance" and a "consensus where possible"; and that the report had "regional relevance." In fact, several felt their specific ideas were included, they could affect the framing of the issues, direct the focus of the assessment, and help shape the interpretation of findings and the resulting conclusions.

Virtually all interviewees shared these views, and emphatically so. By now in the National Assessment community a notorious example came from the Mid-Atlantic: "We wanted to focus on certain sectors [ag, forests, and water]. But people were worried about health impacts, so we decided that they weren't going to think that what we were doing was credible if we didn't go ahead and assess health impacts. Similarly, initially we had no intention to focus on coastal impacts, but people cared about what was going on along the coast. Third, we didn't have much of an intention to do much about ecosystem impacts because the science was less strong there, but people cared about it as a cross-cutting issue, and so we decided to that one as well. We essentially doubled our workload as a result of that first workshop."

Another crucial difference stakeholders made was in the Native Peoples – Native Homelands workshop and assessment. Interviewees reported that there "would *never* have been any buy-in if it was *just* run by universities; we needed people who could effectively bridge the two worlds and traditions," and while some Native participants resisted, "it generally worked." Other examples like this – if less dramatic – were reported from virtually all regions. One interviewee added, that in a post-assessment questionnaire of stakeholders, they kept hearing how much stakeholders "appreciated being asked to participate and felt they had a genuine role in the process."

Several interviewees also spoke of issues they were unable to be responsive to, among them first and foremost people's desire to address energy issues and climate mitigation. As one put it, "I wish we would have been able to be more responsive to their

concerns about mitigation; I understand the reasons why we couldn't, but that turned some of them off." The decision not to deal with emission reductions and mitigation questions had been made at the highest level of federal leadership[34]. Interviewees mentioned other issues that they could not address due to funding or time constraints, but reported little dissatisfaction among stakeholders at the time as long as the decision what to include and not to include in the analysis was made transparent. Moreover, many at the time were confident (believing this would be an ongoing dialog) that not or insufficiently addressed issues could become more central in subsequent research and assessment efforts.

Change in Relationship among Participants

The CMU survey does not explicitly address the question of changing relationships over time, nor did many interviewees speak about such changes. Those who did generally observed positive developments. Maybe the first and most important change is that relationships that previously did not exist got formed at all. This included relationships among scientists from different disciplines, between academics and non-academic stakeholders, and also among stakeholders.

The most frequently observed and most fundamental shift that occurred in these relationships was the improving communication among participants, which lead to greater understanding of the issues and of people's concerns and, as a result, to yet-better communication among assessment participants. Along with improved communication came a laying-to-rest of unease or skepticism of people with unfamiliar backgrounds.

Among the most highly valued changes mentioned by several interviewees was the trust that grew between people who had not previously known each other or worked together. Some groups seem to have been more successful in this regard than others (e.g., interviewees reporting varying success with getting industry representatives to share proprietary information). In a few instances, the assessment process also helped groups of people who tend to be rather suspicious of each other (e.g., regulatory agencies, environmental groups and certain extractive industries) at least talk to each other in a civil manner. Where these interactions lead to consensus documents, interviewees reported significant satisfaction with the process.

A few assessment leaders also acknowledged that they could not maintain some participants' interest over time or help resolve frustrations they may have had, e.g., because the assessment did not produce information that filled a more immediate information need. Often those participants dropped out of the process.

4.3 Capacity of Agencies and Other Parties for Conducting Future Assessments

The question whether the First U.S. National Assessment built lasting capacity to conduct future assessments requires answering "what or whose capacity." While it is probably true for any group of participants in this endeavor – federal agencies, scientists, and private and public sector stakeholders – that (as one interviewee put it), "a one-shot deal

[34] The reasons offered by interviewees included attempts to contain the scope of the assessment and to avoid the appearance of the USNA being too political, too directly linked to the Kyoto Protocol.

is not good for capacity-building," the experience gained through this first attempt was judged by many interviewees (and CMU survey respondents) as invaluable.

With regard to federal agencies, interviewees specifically mentioned that the shift from how assessments used to be done (until the early 1990s) to the participative manner in which the USNA was conducted as particularly significant. Several mentioned that some agencies, which used to be resistant to stakeholder engagement, now are "big believers" or at least were "building more comfort and experience" with this new way of doing assessments. Moreover, the experience also taught agencies many valuable lessons about the logistics and management of an ambitious endeavor, and it gave them a better idea how much time and money it would take, if they were to do it again. As one put it, some agencies had hoped to be "at the dawn of doing things differently" and, in fact, one regional assessment leader found that prospect particularly exciting: "from our point of view that was really exciting, because it was "a different way of the government doing business …to have stakeholders be partners in assessing the importance and implications of a social issue… it happened to be climate change, but it could have been something else."

With regard to capacity building among scientists, several issues have already been mentioned before: at least among those who participated a greater ability to work in interdisciplinary teams, and to work in an integrative fashion; to conduct "science in the service of society" and more effectively communicate technical information in "plain English;" the entrainment of some new or young researchers in doing assessments; and many participating scientists' continued interest in working in collaboration with stakeholders. For example, interviewees were convicted that the conduct of the USNA already directly impacted the conduct of the recently completed Arctic Climate Impacts Assessment, which was also heavy on stakeholder engagement.

Many assessment leaders have sought ways to continue this type of work even in the face of discontinued federal support. In a few regions, scientists were able to work through pre-existing institutions (e.g., Regional Integrated Science and Assessment or RISA centers) to continue at least some aspects of the assessment work (e.g., in the Pacific Northwest, the Southwest). Others have tried to obtain more stable institutional and funding mechanisms to build on the National Assessment (e.g., the Pacific Islands, the Southeast, both of which now have RISA's, and in the Mid-Atlantic, which established the Consortium of Atlantic Regional Assessments). In the Great Lakes region and in the Metro East region assessment leaders and participants try to continue research and communication efforts that build on the National Assessment. In that sense, some modest institution building for enhanced assessment capacity has occurred and the dialog begun in the USNA continues in those regions. But as one regional assessment leader exclaimed in frustration, "we need RISA's everywhere – it's not fair" and argued that having such centers just in some regions of the country but not in others leads to "uneven national preparedness" for the impacts from climate variability and change.

An outside observer of the National Assessment, IPCC Working Group 2 co-chair for the Third Assessment Report Jim McCarthy in recognizing the need for ongoing financial and institutional support for the conduct of assessments stated at a GEA workshop in 1999, "Organizers and sponsors of climate assessments must recognize that they cannot be done as a hobby." In fact, several interviewees acknowledged that certain parts of the assessment were not completed because of support running out. "You can't ask people to

do this for *nothing."* Several of them also believed that an investment in ongoing assessment activities that involve stakeholders is an essential ingredient, and probably not the most expensive one, in building adaptive capacity for climate change in the country. As one put it, "assessments [offer] a mechanism and [have] a mission to cross [sectoral, regional, disciplinary, and societal] divides. They are a nationwide think-tank to figure out what the issues are."

One CMU survey respondent recognized – and several interviewees reiterated the same concern – that stop-and-go efforts, especially if they involve broken promises and trust, actually can undermine capacity building among scientists and stakeholders. "It is harder to start over than it is to make an initial effort (because people will remember that the ball was dropped earlier)." To convince people to reengage after they felt disappointed, used, or "left hanging" was deemed distinctly harder than to engage them the first time around. And while interviewees believed that they might be able to restart their efforts if there was a second National Assessment, they felt strongly that this would only be possible if certain guarantees could be obtained from federal leaders, among them a reasonable timeframe, logical sequence of efforts, and agency commitment for adequate funding.

Several CMU survey respondents also pointed to the need of educating stakeholders about climate change prior to, or outside of, an assessment process to ensure that their contributions within it are more effective. "You cannot assess – derive informed opinion – from people who are not yet knowledgeable." In other words, an assessment, even if it has educational goals, should not be used as the sole placeholder for informing people about this important issue, and it will yield greater impact on society, if participants enter it with greater knowledge at the start. Others felt that the educational process going on within the assessment was actually useful to assessment leaders in framing issues, answering questions, and packaging information. To them assessment was the vehicle, education the means, and the resulting greater understanding on all sides produced enhanced capacity for conducting science, assessments, and decisions beyond.

Finally, one interviewee suggested why the stakeholder process is so central to nationwide capacity building: "In the long run, the climate issue is going to be addressed because the public – writ large – understands that this is an issue that's got to be addressed, and it's got to become organic to our lives. And I think the stakeholder process provides the nucleus to that process. The stakeholders provide the tool by which that [realization] penetrates the every-day lives of the regions. That would *never* happen with a national assessment run out of Washington, not in a million years! You can produce documents forever, you can produce fact sheets forever, but you got to have a personal experience and that's what the stakeholder process does."

5. Findings: Possible Explanatory Variables

The historical reconstruction of the First National Assessment in Section 3 as well as the detailed discussion of outcomes in Section 4 have already pointed to the range of explanatory factors that have played significant roles in both the successes and the shortfalls of the USNA. The discussion offered here tries to summarize what is known on each, relate them to specific outcomes, and weigh them where possible.

Representation of interested and affected parties

Questions about which and how many stakeholders were involved were answered above. Maybe the more critical question to ask, however, is whether assessment participants felt that all the people were involved that they wanted to see or that wanted to be involved. Among the write-in answers to the CMU survey, some suggested that the selection of participants was too arbitrary; the public could have been more involved; and they wished for greater involvement from legislators and industry/the business sector. Information obtained from regional and sectoral assessment leaders suggests – overall – that efforts to bring in a wide variety of potential stakeholders were extensive, labor-intensive, and deliberate. The disconnect between those more critical responses and what assessment leaders actually tried to accomplish may suggest one of several things, and maybe a bit of each: (1) leaders did not make sufficiently clear what they attempted and why they invited certain participants; (2) survey respondents who were dissatisfied with the range of participants had little detailed knowledge on this particular issue; or (3) in some instances, the breadth and depth of stakeholders in certain assessment components was indeed wanting.

Based on interview evidence, it is clear that assessment leaders relied on a broad and creative range of methods to identify potential participants: existing research and stakeholder networks and contacts, extension agency contacts, community leaders, the newspaper, attendees of dinner circles, people who through their own lives or careers bridged different worlds and disciplines, "go-getters", and "snowball" techniques starting from assessment team members into communities, they themselves had little familiarity with yet. Moreover, leaders frequently made very conscious choices about who to invite: assessment teams were varyingly interested in involving the public at large, some simply viewing this process as an opportunity to bring together representatives of sectors they believed had most at stake from climate change. Teams also differed in how successful they were in attracting and/or maintaining participation from industry and the business community, but all made efforts to ensure private sector participation. Some made conscious choices not to bring in elected officials to avoid politicization or because they didn't believe politicians could donate sufficient time, while others very much attempted to get political buy-in and made specific overtures to policy-makers. Only a couple of teams made a choice to bring in outspoken climate contrarians, but several made strong overtures to groups known to be highly skeptical of climate change (e.g., fossil fuel industry representatives). Some attempted to attract representation from labor unions but were unsuccessful. A few interviewees felt, "not all the right people" were present, or that the workshops "drew people who had nothing better to do or an axe to grind." For example, in the workshops or efforts these interviewees were familiar with, they hoped

for greater involvement of key information providers such as extension agents ("key bridge builders"), but in other assessments those types of information brokers were actually included. All interviewees accepted participation from people – even if not originally invited – if they expressed interest in participation – another measure of the openness that was to guide the entire assessment.

When asked what assessment leaders wanted to achieve with the particular set of participants they tried to bring into their assessments, answers varied, but typically reflected significant thoughtfulness on the part of interviewees. Frequently, leaders tried to achieve several objectives through the same participants as the number of participants was constrained by money, availability, and manageability:

- *geographic representation*, especially where regions were comprised of multiple states; in some of the sectors this attempt was also made because issues differ significantly across the country (e.g., water, coastal, or forestry issues)
- *disciplinary coverage*, with experts for all the issues the regions and sectors wanted to address
- *sectoral representation* from private and public institutions
- *balance of academic, public and private sector voices*, attempting to truly implement the notion of a public-private partnership
- *balance of viewpoints*, including from people convinced about the seriousness of climate change and others more skeptical
- *legitimacy and buy-in* through two opposing strategies: either including policy-makers and elected officials or not inviting them to avoid politicizing the assessment process

Interviewees acknowledged that they were not always successful in achieving these objectives; some seemed to pay less attention to some of these objectives and more to others. Some were more successful than others in attracting the people they wished to include. While a region-by-region, sector-by-sector analysis relating intentions, actual outcomes, and participants' perceived successes is impossible to accomplish (especially quantitatively), there seems to be a clear correlation between the variability in what assessment leaders tried to do, the lists of participants included in regional and sectoral reports, and the perceived range of opinion captured in the CMU survey. In short, the First National Assessment was remarkably successful in including representatives of interested and affected parties, thereby gaining a high degree of legitimacy, but individual components may have done better than others. Interviewees most frequently cited "underrepresented" group were private sector, industry and business representatives.

Preexisting Relationships

Preexisting relationships between assessment participants can be of two fundamentally different natures: *preexisting personal relationships* between individuals and *preconceived notions of people* one does not know personally, but who are prejudged by certain criteria (e.g., affiliation with a particular institution, knowledge of past public statements).

Several assessment leaders spoke of making conscious choices of who to invite onto their assessment teams because they knew they "could play well together in a sandbox." In this regard, assessment leaders took full advantage of preexisting personal or professional relationships. In most cases, these choices led to highly productive

assessment teams. Viewed from the outside, however, they may have been viewed by some observers – as the comment cited above suggested – as there being an "in" crowd or a "club" which they wished to see broadened. It should be noted, however, that numerous assessment teams were comprised of people with whom the leaders did not already have preexisting collegial relationships. In this respect, the assessment was a mechanism to foster the new relationships and the interdisciplinary integration several scientific leaders reported as a beneficial outcome of the assessment. Further, one sectoral team leader reported having had no choice over the assessment team members. "I was handed the team" and apparently, team dynamics were challenging at times. In a few cases, where the objective of finding team members who could "play well together" was superseded by other objectives (e.g., balance of viewpoints, see above), team dynamics were sometimes more strained. In these few cases, assessment leaders spoke of frustrating deliberations and/or significant time delays in completing their respective documents.

Typically assessment leaders did not have the same kind of foreknowledge of the wider group of participants of their assessments. While several interviewees acknowledged the influence of pre-existing relationships – both good and bad – on the interpersonal dynamics, most of them were very pleased with the way the interactions unfolded. Examples mentioned include: scientists and stakeholders became "real people" – individuals with names, not just rather anonymous representatives of certain professional groups or institutions; skeptical industry representatives became engaged, allowing prejudices be broken down and suspicious or even antagonistic relationships to be improved.

A small number of interviewees also recalled instances were preconceived notions or prejudices could not be reduced and effective communication could not be established. In some of these cases, assessment leaders felt they were being publicly embarrassed and their effectiveness thereby undermined – typically, however, so blatantly and transparently that other participants saw through these attacks and the assessment process was not undercut as a whole. In a few regions, interviewees also reported challenges inside their workshops that reflected the pre-existing (and ongoing) debate over the reality and seriousness of climate change in the public at large (e.g., clashes between environmental groups and fossil fuel interests; see also Section 3 above). As one CMU survey respondent put it, "The whole assessment was chock-full of stakeholders - some helpful and some purposefully disruptive." Most interviewees, however, did not experience these debates as lastingly problematic, but rather reflected on discussions as productive and pleasant. Certainly, several felt that having these discussions openly and coming to some sort of consensus enhanced the perceived credibility and legitimacy of their final reports.

Intensiveness of Deliberations

The how and the how often of stakeholders involvement describe the intensity of deliberations. Forms, venues, and frequency of stakeholder engagement, again, differed widely from region to region, sector to sector, and at the national level. Figure 7 differentiates three basic models of stakeholder engagement that were observed throughout the entire assessment effort. It should be noted, however, that this simple classification does not do full justice to the variations that evolved over time in different regions and sectors. For example, sometimes one or the other models emerged only after

and out of the scoping workshop; sometimes an assessment began with one model (e.g., an academic assessment team working with an advisory committee that included stakeholders) and over time evolved into another (e.g., the assessment team including stakeholders as collaborating analysts).

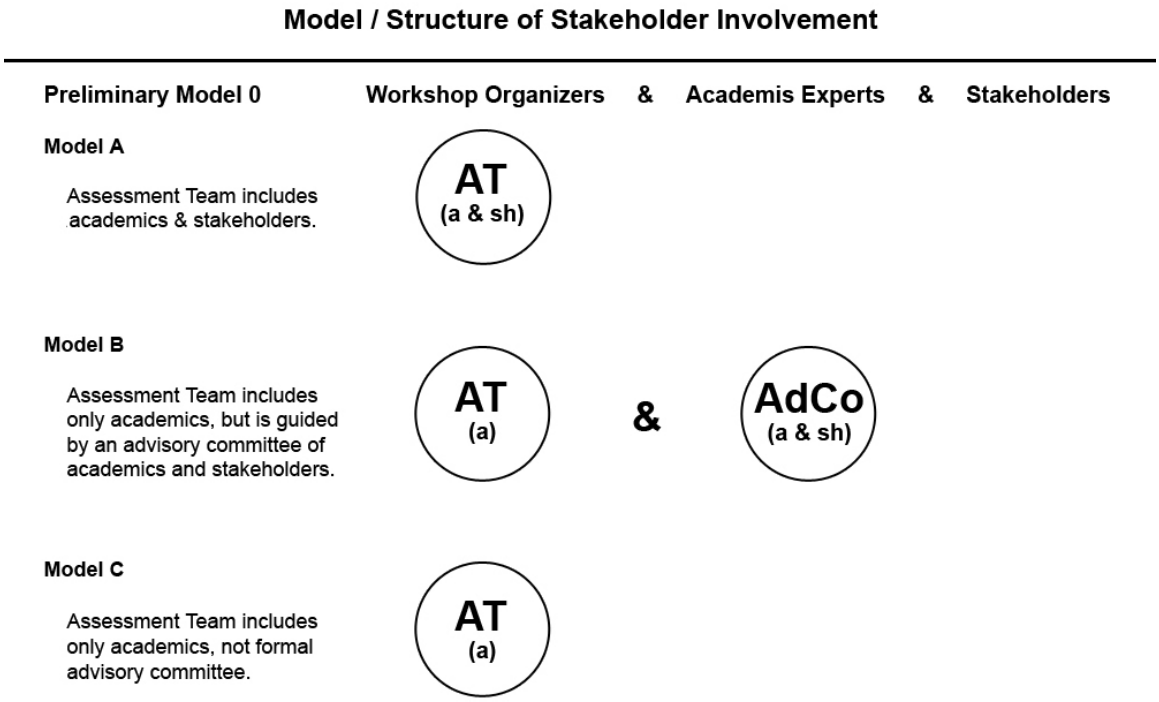

Figure 7: Models of stakeholder engagement in the First U.S. National Assessment

Beyond the basic structural model of stakeholder involvement, assessment teams then made different decisions as to how frequently to interact with stakeholders, at what stages of the assessment process, and through what channels. For example, while all regions and some sectors held workshops in which stakeholders were asked to help scope out the most important issues for their area (sometimes on the basis of presentations by climate change experts and/or background papers discussing likely impact areas), some teams involved stakeholders in the workshop organization and agenda setting. A few involved stakeholders in the analysis, relying on their data, models and other capabilities. Some teams involved stakeholders in the discussion of preliminary results or in the write up of the reports. All regions and all sectors involved both experts and stakeholders in at least one, but typically more rounds of review of the results and reports. Some involved stakeholders – formally or informally, upon request or ad hoc – in the packaging and dissemination of the findings and reports. The venues included workshops of varying sizes, face-to-face small-group working meetings, email, fax, and mail exchanges of information, and uncounted phone calls and personal conversations. [will insert Table listing regions and sectors, their stakeholder involvement models, and respective instances of stakeholder consultation]

The varying degrees of intensiveness with which stakeholders were involved over the course of an entire assessment clearly go a long way in explaining the variation in people feeling included and having their voices, concerns, and interests heard and reflected in

the assessment. These differences may also be causally related to the broader outcomes discussed in Section 4.2. For example, stakeholders who became part of the analytical team or who contributed to report writing, packaging and dissemination are more likely to have gotten buy-in and initiated changes in decision-making in their home institutions than if they were only asked to scope and review assessment reports. Intensive involvement is more likely to build lasting and trustful relationships or spawn new collaborations than more casual encounters. Deeper involvement is more likely to foster a sense of legitimacy, i.e., more intimate insight into how a product was produced, and also a greater stake in making that product as good as it possibly can be. By the same token, greater involvement can also set people up for far greater disappointment if the assessment believed to be ongoing is not maintained. The best evidence for that is the disappointment over exactly that fact vocalized by assessment leaders.

Procedural Quality of Deliberations

As to the quality of interactions among stakeholders, sponsors, and assessment teams, federal assessment leaders who observed many regional efforts, recognized considerable differences. One stated, "I saw a pretty big diversity in the ways in which people interacted with stakeholders, some more successful than others. Some realized more than others how big a job stakeholder involvement was. …You had to adapt to the needs of stakeholders and spend a great deal of time going to *their* meetings and interacting in *their* fora as opposed to the somewhat naive view that you could just have a workshop and they'd come to *us*."

Several CMU survey respondents – in write-in answers – suggested that they wished for more interaction; others complained about the amount of time it took to participate; a few respondents mentioned that the process and timetable was not very clear; and several spoke to their surprise over how open and willing many scientists were in listening to stakeholders and how much effort they put into the assessment ("The incredible dedication of the many scientists who volunteered their time to work on the assessment"). When asked to define or describe the purpose of stakeholder involvement, every conceivable definition was given by survey respondents and interviewees[35], including "I don't know" – suggesting that expectations and realities differed widely among regions, sectors, and participants within them. Several responses also suggested that at least some assessment leaders did not (clearly enough) specify the purpose or process of stakeholder involvement. For example, when asked whether the efforts they were involved with had specific goals related to "stakeholder involvement" more than half answered "no." Several survey respondents suggested, as one put it, the "process was not clearly articulated in advance - it often felt like the process was being determined on the fly" – something most interviewees confirmed and believed that this was to be expected, given that this type of assessment was a first-time attempt.

[35] Responses varied widely: Soliciting opinions, thoughts, perceptions of those affected by climate variability; Participation in workshops & some collaboration on "climate impacts" research projects; legitimizing the effort; ground-truthing the research; shaping assessment questions and major foci, active participation in public fora and discussions, report reviews; listening to opinions, values; defining information needs and interpretation of potential impacts; sharing model outputs and data; a wide range of people … were present.

Interviewees recognized that the interaction between scientists and non-academic stakeholders was a learning process for everyone and quite a divergence – especially for academics and federal agencies – from business as usual. For example, one regional assessment leader acknowledged that there was "nervousness" among scientists that the public input would "soften up their results." Another recalled debates in the assessment team over stakeholder input because it "takes a lot of the resources away from what the natural scientists think is the real work." Yet others recalled that the interactions sometimes began with some tension: private sector representatives sometimes being nervous about the presence of regulatory agencies; some Native Americans feeling reluctant to get involved with academics, being "tired of anthropologists being out to study them" once again; ranchers expecting to be pointed to as the problem, but later emerging from the effort feeling "part of the solution." One sectoral assessment leader thought it was "painful" to listen for hours to other scientists and stakeholders discovering "their same old concerns again," something people – if they had just picked up the phone and talked to the right person – could have found out about in other, presumably more efficient ways. Another who had never been involved in anything as stakeholder-intensive as this effort felt the entire assessment got "consulted on to death."

These and other frustrations and anxieties seem not unusual to observers of participative processes, especially if they are first-time processes and involve a wide variety of expertise and interests. In fact, several interviewees emphasized that these feelings are a necessary part of beginning an ongoing dialog and building relationships. Among interviewed assessment leaders, however, the predominant opinion expressed was that for them (and many of their team members), the experience of working with experts from other fields and with stakeholders was highly rewarding. One reflected, "it pulled them out of their tiny little area of science, and at least for a short moment, they did what Neal Lane called civic science, communicating science to society."

Of course, not only was the process invented along the way, and significant learning had to occur to succeed, the "rules of engagement" so to speak also changed. As described in Section 3, somewhere midway through the core assessment period, a marked shift occurred from the original more bottom-up vision of a stakeholder-driven assessment to a more top-down, still stakeholder-oriented, but also more product-focused assessment. This produced time pressures and constraints that clearly curtailed the intensiveness and may well have affected the quality of stakeholder involvement. Thus, while lack of clarity on some aspects of the process and start-up problems explain some frustrations expressed by participants, the fact that the basic approach changed midway appears to account for the larger number of deeper-running disgruntlements. Clearly, teams differed in the intensity and quality of stakeholder engagement, but a great many of them – especially at the regional level – fully embodied the vision developed at the 1997 Aspen meeting and took it quite seriously. In the words of one survey respondent, "This was a pioneering effort. Weaknesses could be listed, but mean little when one is doing groundbreaking work." And one interviewee added, stakeholder involvement was not simply "checking the stakeholder engagement box on a Clinton/Gore initiative," but a genuine attempt to form networks, build capacity, and begin a sustained dialog.

Quality of Deliberations about the Scientific Analysis

The perceived quality of scientific analysis was discussed already above as an outcome of the assessment, in part because it is intimately tied to the achievement of the content goals of the assessment, but also because federal leaders set out to produce "scientifically excellent" reports. The focus here then is on the perceived quality of deliberations on the science per se, not on all the issues that emerged in the assessment or engagement with stakeholders. The CMU survey offers some insight in the divergence of opinions on several aspects considered here: general comments on the deliberation process within groups, comments on the treatment of uncertainty (as one indication for the quality of scientific discussions), comments on the strengths or weaknesses of certain aspects of the analysis, and comments on the peer review process. The latter in particular can be corroborated with information from interviews. Together these opinions offer insights into why people differ in their judgments over the scientific quality of different assessment products.

With regard to the deliberations about the science themselves, survey respondents repeatedly commented on the people involved: on the one hand "excellent experts," on the other hand "not the right people leading it" – statements that referred both to the qualifications and to the right expertise involved. For example, several respondents regretted that not enough climatologists were involved, others complained about the lack of social scientists in their assessments. Some respondents explicitly commented on the high quality of ongoing dialogue, others wished there had been more. Another aspect – presumably of greater relevance in those groups which got a later start – was the time pressures to complete the assessment. One comment relates the impact on quality of deliberations by saying, "Parts of our work had ongoing momentum, other parts had to be "tacked -on" at the last minute. Results uneven." Especially the aforementioned late delivery of socio-economic scenarios created pressures for groups. "Socio-economics: Lacked time to do this thoroughly and consistently across the several sectors we assessed. Much more careful and extensive analysis needed." Several respondents also mentioned that too little analysis occurred with regard to ecosystem impacts.

With regard to the carefulness with which groups deliberated on the climate projections, respondents' comments suggested that due to the contentiousness of particularly the model outputs, great attention was placed on avoiding over-reliance or overly firm interpretations of the scenarios. "We made it very clear to the stakeholder groups of the weaknesses and flaws of using these GCMs, especially trying to scale them down to a regional level - yet they were the best estimate we had to work with." Or "The particular GCMs chosen were probably unfortunate choices but so long as one didn't over-interpret them they helped illuminate some issues."

Among the issues both survey respondents and interviewees felt they had accomplished the least on was integration. One survey respondent stated that there was "inadequate time and effort to do more cross-region/cross-sector integration and evaluation of possible thresholds, nonlinearities, etc." Others criticized the "highly limited and ad hoc treatment of multiple stresses, uncertainty, linkages across impact sectors and locations, including international, adaptation responses, vulnerability, surpluses, thresholds, socio-economic impacts." Some interviewees readily concurred with these critiques, but none viewed these as fatal shortfalls as long as assessment teams made it clear in their reports that the findings were a first-cut baseline, bound to be

updated by improved science, included appropriate caveats and acknowledged uncertainties.

The CMU survey specifically asked respondents to comment on the treatment of uncertainty in those components of the assessment they were familiar with. Results indicate that uncertainty was analyzed and discussed in a wide variety of ways, despite the fact that the NAST had provided guidance on how best to articulate levels of uncertainty and confidence. In short, according to survey respondents, individual assessment groups ranged widely in the emphasis they placed on uncertainty from "None!", "not enough" and "it needs to be done much, much better in any future assessment" to "it was a constant concern"; "discussed it candidly " or "sustained discussions." Most groups used qualitative ways to assess uncertainty, some felt it was done unevenly or inconsistently across different sections of their assessment, and some, but by far not all, used the guidance on consistent terminology developed by the NAST on how to use likelihood terms.[36] While caution again should be used in interpreting the absolute numbers, the range of opinions is suggestive of what occurred in different assessments.

A final aspect of deliberations over the science concerns the peer review. Sections 3 and 4 discussed the extensiveness of peer review of the national synthesis documents, the guidance given to regions and sectors for conducting their own peer review processes, and the differences in transparency and extent regions and sectors exhibited in implementing them. Survey respondents varied in their opinions regarding scientific credibility, but none complained that the peer review per se was unhelpful, inadequately conducted, or lacking all together. As one interviewee put it, "peer review … we certainly had in spades." Survey comments confirmed how beneficial the peer review was: "The extensive peer review process (for at least portions of the effort) paid off." Among the critical voices, the concern was raised that the reports "may convey a sense of more certainty than we really have." The fact that opinions of some inadequate reports prevail even after the peer review attests, however, to the fact that the peer review did not catch all short-comings and/or that comments were not adequately addressed. As for the credibility of the synthesis documents, several survey respondents and some interviewees felt that the longer "Foundation document was "technically credible," [whereas] the Overview was not," but opinions varied widely on this. A more detailed comment elaborated, saying "The overview [report] did not accurately reflect the result reported in the underlying foundation documents. As a reviewer for the regional sections of the report, I was stunned and offended by the selective bias shown in the overview

[36] CMU results reveal that 31 respondents (24%) felt the assessment group they were familiar with was not systematic; individual authors used the words they thought were best. Another 25 (19%) thought the group was somewhat systematic and the group typically had a qualitative discussion of which word to use as the text was edited. Six respondents (5%) believed the group was somewhat quantitative and assigned numerical probabilities to likelihood words which then were used based on the experts' best judgment. Finally, 10 respondents (8%) thought that their group was systematically quantitative, i.e., the group assigned numerical probabilities to words and then in most cases discussed which word to use as the text was edited. Thirty five respondents (52%) claimed, however, that the documents they were familiar with did not document how uncertainty was handled in those particular assessments. Overall, survey respondents judged the success of the NAST's guidance on systematic use of likelihood terminology as: 4 (3%) very successful, 36 (26%) somewhat successful, 19 (14%) not successful and 65 (46%) did not know about this effort and had no opinion.

document." In fact, several assessment leaders felt that in the process of combining the results from regional scoping and assessments efforts into mega-regional summaries, much detail was lost, and a few didn't find their input reflected at all.

Based on all these aspects then concerning the quality of scientific deliberations, the range of opinions over scientific credibility of the output and the range of grades given to different aspects of the assessment reports are all not surprising. Different degrees of frustrations as well as satisfaction with the scientific process can be plausibly linked also to perceptions of legitimacy. According to survey respondents and interviewees, scientific excellence was not achieved in all aspects of the assessment, and some would argue that scientific capacity has to be built in some cases or higher quality capacity tapped into, in order to improve on this score.

Organizational Factors

CMU survey results on evaluating the organizational aspects of the assessment – while instructive – integrate over all components respondents listed as the first or most important one they were familiar with, thus obscuring a clear determination of causal influences. Some evaluated additional parts they were familiar with, and although they are not listed here, the pattern of opinions is very similar. Respondents judged the following aspects of overall organization and administration (Table 9):

Table 9: Survey respondents' opinions on various organizational and administrative aspects of the assessment

Aspect	Poor	Lacking	Adequate	Good	Excellent
Over-all organization	4	4	29	38	25
Objectives well defined	6	11	26	42	15
Leadership provided	4	10	28	30	25
Administrative support	4	10	23	37	21

A clear majority of respondents felt quite positive about the overall organization and administration of the assessment. In write-in comments, several appreciated the enormity and complexity of the organizational task of the entire endeavor, some explicitly welcoming the "distributed nature and leadership." These comment we heavily underscored by several interviewees. A good number of them – direct and frequent recipients of administrative support – particularly highlighted the helpfulness and responsiveness of both NACO and the NAST. "Every time I called or emailed, I got an answer." Others appreciated how especially NACO staff helped with all manner of questions and requests, for example regarding stakeholder engagement, the use of scenarios, finding needed experts, and so on. "They did many good things like that."

One curious element of the administrative support uncovered through the interviews concerns the guidance on stakeholder involvement given, received or translated into action. When federal leaders were asked whether they had provided assessment leaders with guidance on stakeholder involvement, the answer was in the affirmative. When regional and sectoral assessment leaders were asked whether they had received any such

guidance, the vast majority of them claimed they had not. In exploring this apparent discrepancy more deeply, several revealing explanations emerged:

- one possibility is that the guidance was passed down from the NAWG (which had developed the first piece of such guidance in 1997) to the federal agency co-chair of teams (who did not share it with the academic co-chair interviewed for this study
- another possibility is that only those teams which got an early start (before mid-1997) received this early guidance
- quite likely is yet another possibility, namely that interviewees simply did not remember.

The surprising consistency among groups of interviewees, however, suggests that a deeper explanation is needed. The fact that in mid- to late-1997 an additional "lessons learned" document from an earlier regional workshop was passed on to all assessment leaders, and that in 1998 a specific stakeholder-engagement guidance document was commissioned from NCEDR and distributed to every assessment team – and that neither of those two documents was remembered by more than two or three regional or sectoral interviewees only confirms this contention. In exploring this issue more deeply with interviewees, revealing answers emerged. One stated simply, "that guidance wouldn't have worked out here anyway." And another explained that even if he had received such a guidance document, and even if he had read it, he would have "not found it the most useful way to get information on the 'how-to'." Other interviewees suggested that they most heavily relied on their own instincts, maybe on informal exchanges with colleagues and other assessment leaders perceived as particularly skilled in this regard, on the regional liaison in NACO, Lynn Carter, or simply on whatever intuition told them a situation called for at the moment. A few stated that they would have liked to have an "expert on stakeholder involvement" and/or on communication on their teams. In short, it appears that assessment leaders first of all wanted considerable freedom in guiding their process and adapting it to local needs and culture, and secondly, that in order to build capacity and know-how on how to effectively "do stakeholder involvement" a document is far less helpful than personal, face to face help.

Those in the survey or in the interviews voicing critique of the organizational or administrative aspects of the assessment had their biggest bones of contention with matters related to coordination (of agencies providing funding support in a timely fashion, of different assessment components) and time (or the lack thereof), directly feeding into the conflicts over bottom-up versus top-down management of the assessment and critiques of "superficial integration." Several –in the survey and in the interviews – found the structural link to the White House problematic and suggested that "a firewall between the political level in the Feds and the analysis" be established. Not only was there concern over greater independence from politics and election-cycle timetables, but also respondents valuing the greater independence from agencies. For example, one found it a strength of the organization that agencies did not direct the process from Washington, that the assessments were not run out of government laboratories, and that agencies did not have to approve every report line by line, but simply could offer their input from their perspectives like any other stakeholder.

With regard to leadership, a majority of survey respondents evaluated it as positive, and some offered write-in comments on this topic. Those ranged – similarly – from excellent to wanting. Some appreciated "energetic leadership", "the strong commitment" and the "hard work" those involved in leading positions exhibited. Others wished for clearer or more direction on goals, timetables, process and so on. Interviewees – precisely the group of people evaluated on this score – in reporting on what they did and how they did it, indirectly confirmed these observations. Several interviewees were extremely appreciative of the enormous effort and dedication put in by many of their colleagues leading other components of the assessment. As one put it, "there was an incredible amount of good will on the part of scientists; they put in a lot more hours, energy and professional prestige into this effort than they got compensated for throughout this. The NAST, for example, did not get paid at all, so their organizations had to free up their time so that they could devote countless hours to the NAST." In fact, several interviewees stressed that the assessment could not have been completed if the home institutions of many participants had not "subsidized" the endeavor through all the time (and thus staff salaries), space, and phone bills they inadvertently paid. The predominant comment on leadership, however, was about dedication, maybe best captured in the words of one survey respondent: "It needs to be recognized that the successes were, in large part, due to dedication and personal commitment and not just a process. Even the most flawed process will work if people want to make it work and the best process won't if people don't want it to work."

For those concurring with this interplay between individual leadership and dedication, procedural dynamics, and organizational framework it becomes apparent that the relative weight of one or the other can make all the difference in the outputs and larger outcomes of an assessment. Nearly every success of this assessment has at least some markings that go back to those aspects of organization, administrative support and leadership that went well, and every shortfall of the assessment bears witness to some aspect working out inadequately.

Resource Constraints

When asked about the shortcomings of the assessment process, one of the persistent issues mentioned was inadequate funding (too little, too late, too intermittently). Many called it "Stop & go funding." Some recognized that the assessment was undertaken as an "unfunded Congressional mandate." Closely related, and feeding substantial jealousies among regions and sectors, was the fact that federal agencies provided uneven funding to different components, allowing some to conduct new research and do all they wanted to accomplish, while others could undertake only much smaller efforts.

When interviewees were asked whether they felt they were adequately funded and thus enabled to do what they had wanted to accomplish, several felt satisfied while others felt the limited amount of money had truly constrained their effort. Interestingly, absolute dollar amounts (while not obtained from all interviewees) did not directly correlate with the interviewees' sense of freedom or constraint. For example, one of the sectors – while funded probably least lavishly of all assessment components – accommodated its procedures (e.g., only meetings by conference call and plenty of email exchanges) and confined itself solely to an assessment of the available literature. While its leaders had wished to have more resources, the accommodation left no hard feelings or regrets. Some

regional leaders reported funding at levels far higher than some others, but found the amount constraining, while less extensively funded regions accomplished what they had expected and expressed full satisfaction. Of course, regions varied substantially in size, rendering travel and travel support for meetings a greatly varying importance. Some regions needed to provide financial support to participating stakeholders if they had any hope of bringing them into the process (e.g., Natives, travel reimbursement and payment of substitutes for educators), while others had few such expenses.

Interviewees chose to use their resources for different line items, including workshop and meeting expenses, travel support, buying teaching load reductions or summer support for some of their team members, parts of the salaries of academic assessment leaders, support for students involved in data gathering and analysis, report design, printing and dissemination, as well as administrative costs. At the federal level, NACO staff received dedicated funding, while NAST and NAWG members were not paid for their time. Federal assessment leaders interviewed did not make a complete financial break-down available for this study, but estimated that a total of $16-20 million was spent overall on the assessment. Several emphasized, however, that whatever the exact figure may be, it would underestimate the actual expense due to the uncounted in-kind contributions federal agencies and other public and private sector institutions made throughout the process. While impressive, the price tag on the assessment (even if the in-kind contributions could be translated into dollar amounts) seems surprisingly small for a 4+-year effort, distributed over 19 regions, five sectors, a national synthesis, and more than 2,000 individuals who donated their time and expertise (of course, only a few of them paid). In this light, it is not surprising that the money issue was a repeated challenge, and while it is difficult to conclude with any certainty (given the many other influential factors) that more funding would have made the products better, it quite clearly would have reduced substantial frustration. Some interviewees stated that they could not conduct or complete certain aspects without additional funds, while others maintained that people should not be expected to do so without adequate compensation. What was accomplished thus links back to the leadership and dedication them: "I mean it worked amazingly well given that that's what they tried …As I said, I was continually impressed by the dedication of the people who were working on the National Assessment in one way or another."

Timing and Sequence of the Process

The dynamics of the National Assessment in terms of chronology and the confluence of external and internal trends have been extensively discussed in Section 3, and throughout previous subsections of Section 5. The predominant features include:

- the launch and conduct of individual assessment components over two years
- the launch of the assessment without having secured commitment and funding from Congress
- the funding related delays for some groups ("often 'hurry up' and then 'wait'")
- the pressures exerted from the White House on the NAST (not <u>what</u> to write, but <u>when to finish</u>), and in turn, time pressures from the NAST on regional and sectoral assessments
- the preparation of the national synthesis before or during the full completion of some regional and sectoral reports

- the timing of the completion of the national synthesis documents too close to the presidential elections in 2000 ("Hijacking by politics at end"; "the rush to complete the assessment on the eve of a change in government helped set the results up for a write-off by the new administration")
- the concurrence of the assessment with an increasingly skeptical Congress and an increasingly contentious public debate
- the election of a new administration in 2000, which had no intention to continue the effort begun.

The influence of these dynamic factors on the overall assessment process, some of the assessment products, the communication and outreach efforts, the basic notion of an ongoing process, the lasting impacts beyond the assessment itself, as well as on the experience of assessment participants cannot be overstated. Based on the sum of evidence included in this study, this factor must be considered among the most important in shaping the stakeholder engagement process as well as the outcomes of the assessment.

6. Conclusions

The purpose of this paper was to reconstruct from all available information sources the story of stakeholder engagement in the First U.S. National Assessment and to evaluate that process in and of itself as well as its impacts on the assessment products, the participants, and broader societal outcomes. The intention throughout was to do justice to the USNA – its champions as well as its critics. In fact, the underlying assumption was that by doing justice to all perspectives, appropriate critique and praise would arise where they are due, and thus highlight those elements that contributed to the assessment's success and those that would require rethinking, tweaking or letting go if another national assessment were attempted in the future. It goes beyond the purview of this current analysis to make recommendations on the future organization and conduct of an assessment, and in fact, such recommendations are best developed from deliberations with those closely involved previously together with those potentially involved in the future. Yet several "themes" emerge from this study that future assessment designers would do well not to neglect.

When interviewees and survey respondents were asked what they liked most, what was unique about the assessment, and what elements of the USNA they would preserve in future rounds, a few consistent messages emerged. Maybe the number one component was the assessment's extensive stakeholder engagement. Closely tied to it, was a broad consensus on the three-partite structure, i.e., the regional emphasis, the sectoral cross-cutting approach, and a national all-integrating synthesis – in short, the comprehensiveness of the assessment. Another related element found broad support, namely the design of the assessment as a public-private partnership, with numerous interviewees emphasizing the importance and role of federal agencies. Maybe the most consistent message obtained through the interviewees – no matter how favorable or critical those voices were on certain aspects of the assessment – was that people saw (as one put it) "error not in the concept but in the implementation."

It is in the implementation aspects that most critique emerged. Both interviewees and survey respondents felt that significant improvements were needed in several areas: There had to be committed funding from federal (or other) sources – in total amount, timely delivery, consistency over the entire assessment period, and evenly distributed across regions and sectors. To avoid frustrations, disenfranchisement, and disconnects between regional/sectoral and national synthesis activities, study participants also saw a need for better upfront planning (including getting buy-in from Congress), which would result in allotting adequate time to conduct the analyses, and conduct them in a logical sequence (i.e., complete components before the synthesis). Further, interviewees and survey respondents were adamant about finding better ways to shield the assessment from political influences at the highest levels. While all recognized that complete avoidance of politicization is probably unachievable given the stakes different sectors of society have in the climate issue, greater independence from and awareness of the political timetables when an assessment is begun and when it is delivered would be highly desirable. Finally, nearly unanimous consent existed with regard to the need for a clear commitment to comprehensive communication and outreach of assessment results to the wider public.

Interviewees' and survey respondents' ideas and critiques seemed to diverge most heavily on scientific matters: questions as to which approaches to use for projecting reasonable climate futures (especially the use of certain model outputs), which to use to address future changes in a variety of societal dimensions (economic, policy, demographic, technological changes), how to address uncertainties, or what aspects of global change (not just climate change) to focus on most strongly. Related to these debates was disagreement over the degree of freedom individual assessment groups should have vs. how much they all should adhere to common templates and approaches, including the specificity of guidance for stakeholder engagement.

Numerous other details were favored or disliked, but none emerged with similar clarity as the issues mentioned above. Both survey respondents and interviewees thoughtfully acknowledged that this assessment and any other assessment "can't do everything everywhere every time," but instead constitutes "the art of the possible." Or as one put it (citing Theodore Roosevelt), "Do what you can, where you are, with what you have." The importance of the assessment in this survey respondent's view was to "Start down *a new path*. Establishing a different direction is more important than how large the step is." Another added in a considered response:

> "This effort, while not the first assessment, was a pioneering effort, even an experiment. Care must be taken in evaluating it against some sort of perceived ideal assessment – nothing such really exists, even though lessons from the past. In any real effort a variety of constraints exists that necessitate choices of various types (e.g., different agencies with different flexibilities and contracting approaches; different levels of expertise in different areas; time; etc.). Ideally, there would be, for example, funds to do it and flexibility to more funds across agencies. In reality, an effort needed to be started as there would have been no way to get a major chunk of core funding – and waiting for that would have meant no effort."

Against the backdrop of enormous ambitions, real-time constraints, turn-over of political leadership, and a highly contentious and complex global change issue being addressed, it is not really surprising how the endeavor affected participants' lives. Those most deeply involved and most seriously and genuinely interested in implementing a new vision for doing assessments found the assessment to be a "first-time huge undertaking," and concluded, "I think it went pretty darn well even though there were frustrations and lots of days when I said, my God, how did I get myself into this?" The sentiment was echoed in the evaluation of a survey respondent, who said "My involvement with the National Assessment was both one of the most rewarding and frustrating experiences of my career. … I wouldn't trade the experience for anything!"

In closing, it serves to return to the opening quotes (p.4) – one by an eminent natural scientists and another by an distinguished social science scholar. Jane Lubchenco and Michael Gibbons proposed that a new contract between science and society is called for, one in which science produces information that informs critical societal decisions, and also one, in which the process of producing that socially relevant knowledge is produced in transparent and participatory ways. It would be overly simplistic and doing the First National Assessment an immense injustice to file it away as just another climate impacts assessment. With its unprecedented emphasis on stakeholder engagement –

enthusiastically embraced and attempted to implement by many (if not all) assessment leaders – the USNA must be viewed in light of this much larger movement: to rewrite the contract between science and society, to redefine and reinvigorate applied science. At a time when societal support for science seems to be waning – not just in a Congress and a White House constituted at any given time by individuals of a particular persuasion and constrained by particularly difficult budgetary times – but in the populace at large, the National Assessment opened new doors. It offered non-scientists to partake in novel and refreshing ways in a society's democratic deliberations over the meaning and implications of a critical societal issue. Clearly, it was not perfect, as few first-time efforts can ever hope to be. It disappointed some and surpassed many a hope and expectation for others. "I am stunned by, amazed with, and proud of what was accomplished" one survey respondent concluded. Another – more modest, yet appreciative of the enormous strides made – simply, yet hopefully concluded, it was a "good beginning."

6. References

2000. Competitive Enterprise Institute et al. vs. William Jefferson Clinton and Neal F. Lane. *C.A. No. 00-02383 (RU)*. District Court for the District of Columbia.

Backlund, P. 2001. Legal declaration regarding the assertions contained in Civil Action No.00-12383 (RU). 4 pp. District Court for the District of Columbia, Washington, DC.

Beder, S. 1999. Corporate Hijacking of the Greenhouse Debate. *The Ecologist* 29: 119-122.

Bierbaum, R. 2001. Letter to the Competitive Enterprise Institute. OSTP, Washington, DC.

Brown, G. E. 1997. Environmental science under siege in the U.S. Congress. *Environment* 39: 12-29.

Competitive Enterprise Institute. 2000. White House rebuffs congressmen on National Assessment. *Cooler Heads Newsletter* 4. Available at: http://www.cei.org/gencon/014,02812.cfm

Dunlap, R. E. 1998. Lay perceptions of global risk: Public views of global warming in cross-national context. *International Sociology: Journal of the International Sociological Association* 13: 473-?

Environmental Protection Agency. 1989. *The Potential Effects of Global Climate Change on the United States.* US EPA, Office of Policy, Planning, and Evaluation, Washington, DC.

Gibbons, J. H. 1998. Letter of January 8, 1998 to Dr. Robert Corell, Assistant Director for Geosciences, NSF. White House, Washington, DC.

Gibbons, M. 1999. Science's new social contract with society. *Nature* 402: C81-C84.

Gingrich, N. 1994. The Contract with America. House Speaker Newt Gingrich. Available at: http://newt.accrisoft.com/index.php

Global Climate Coalition. 2000. Comments to USGCRP on the Draft National Assessment Synthesis. 60 pp. Global Climate Coalition (and 14 other industry associations), Washington, DC. Available at: www.globalclimate.org

Global Environmental Assessment Project. 1997. *A Critical Evaluation of Global Environmental Assessment: The Climate Experience: A Report of the First Workshop on Global Environmental Assessment and Public Policy*. A Workshop convened jointly by the Committee on the Environment of Harvard University, the Center for the Application of Research on the Environment (CARE) of the Institute of Global Environment and Society, Inc., and the International Institute for Applied Systems Analysis. CARE, Calverton, MD.

Green, K. 2000. RPPI's Response to the National Assessment Report. August 16, 2000, Reason Public Policy Institute. Available at: http://www.rppi.org/nar.html

Greening Earth Society. 2000. Assessing the Impossible. *World Climate Report* 5, July 10, 2000. Available at: http://www.co2andclimate.org/climate/previous_issues/vol5/v5n20/feature.htm

Horner, C. 2002. Written Public Comments on the Strategic Plan for the U.S. Climate Change Science Program; Appendix I: Supplemental Submission from Christopher Horner, Competitive Enterprise Institute. CEI, Washington, DC.

Available at: http://www.climatescience.gov/Library/stratplan2003/comments/ccspstratplan2003-comments-jan2003-horner.pdf

—. 2003. Petition to Cease Dissemination of the National Assessment on Climate Change, Pursuant to the Federal Data Quality Act. CEI, Washington, DC. Available at: http://www.thecre.com/cei_petition.htm

Immerwahr, J. 1999. Waiting for a signal: Public attitudes toward global warming, the environment and geophysical research. 18pp. AGU.

InterAct. 2001. Evaluating participatory, deliberative and co-operative ways of working. Pages 20pp. *InterAct Working Papers*. InterAct, Brighton, UK. Available at: http://www.interactweb.org.uk/papers/discussion2.htm

Kempton, W. 1991. Public understanding of global warming. *Society and Natural Resources* 4: 331-345.

Krosnick, J. A., A. L. Holbrook, and P. S. Visser. 2000. The impact of the fall 1997 debate about global warming on American public opinion. *Public Understanding of Science* 9: 239-260.

Lubchenco, J. 1998. Entering the century of the environment: A new social contract for science. *Science* 279: 491-497.

MacCracken, M. 2000. U.S. National Assessment of the Potential Consequences of Climate Variability and Change: Introduction. USGCRP, Washington, DC. Available at: http://www.usgcrp.gov/usgcrp/nacc/background/naccbackground2.htm

MacCracken, M. C., E. J. Barron, D. R. Easterling, B. S. Felzer, and T. R. Karl. 2003. Climate change scenarios for the U.S. National Assessment. *Bulletin American Meteorological Society* 84: 1711-1723.

Malone, L. 1999. Summary of responses to questionnaire distributed by National Assessment Working Group. 5pp. NACO, Washington, DC.

McCright, A. M., and R. E. Dunlap. 2001. Challenging global warming as a social problem: An analysis of the conservative movement's counter-claims. *Social Problems* 47: 499-522.

—. 2003. Defeating Kyoto: The conservative movement's impact on U.S. climate change policy. *Social Problems* 50: 45pp.

Miller, C. A., and P. N. Edwards, eds. 2001. *Changing the Atmosphere: Expert Knowledge and Environmental Governance*. MIT Press, Cambridge, MA.

National Assessment Synthesis Team. 2000a. *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change. Foundation*. Cambridge University Press, New York, NY.

—. 2000b. *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change. Overview*. Cambridge University Press, New York, NY.

National Research Council. 2003. *Planning Climate and Global Change Research: A Review of the Draft U.S. Climate Change Science Program Strategic Plan*. National Academy Press, Washington, DC.

—. 2004. *Implementing Climate and Global Change Research: A Review of the Final U.S. Climate Change Science Program Strategic Plan*. National Academy Press, Washington, DC.

NAWG (National Assessment Working Group). 1999. Recommendation for the Conduct of Post-2000 Assessment Activities for the Subcommittee on Global Change Research. 27pp. NAWG, Washington, DC.

—. 1997. Regional Responsibilities for the First National Assessment of the Consequences of Climate Change for the United States. 9pp. NAWG, Washington, DC.

—. 1998. Terms of Reference and Charge for the SGCR National Assessment Working Group. 4pp. SGCR, Washington, DC.

—. 1999. Guidance for Peer Review of Regional and Sectoral Reports. NAWG, Washington, DC.

NCEDR (National Center for Environmental Decision-Making Research). 1998. Stakeholder Participation in the U.S. National Assessment of Possible Consequences of Climate Variability and Change: Suggested Guidelines for Doing It Right. 22 pp. NCEDR, Oak Ridge National Laboratory, Oak Ridge, TN.

O'Connor, R. E., R. J. Bord, and A. Fisher. 1999. Risk perceptions, general environmental beliefs and willingness to address climate change. *Risk Analysis* 19: 461-471.

Office of Technology Assessment. 1993a. Preparing for an Uncertain Climate - Volume 2. Office of Technology Assessment, Washington, DC.

—. 1993b. Preparing for an Uncertain Climate - Volume I. Office of Technology Assessment, Washington, DC.

Parson, E. A., et al. 2003. Understanding climatic impacts, vulnerabilities, and adaptation in the United States: Building a capacity for assessment. *Climatic Change* 57: 9-42.

Pielke Sr., R. A. 2002. Overlooked issues in the U.S. National Climate and IPCC Assessments. *Climatic Change* 52: 1-11.

Rowe, G., and L. J. Frewer. 2000. Public participation methods: A framework for evaluation. *Science Technology Human Values* 25: 3-29.

—. 2004. Evaluating public-participation exercises: A research agenda. *Science Technology Human Values* 29: 512-556.

Seacrest, S., R. Kuzelka, and R. Leonard. 2000. Global climate change and public perception: The challenge of translation. *Journal of the American Water Resources Association* 36: 253-263.

Social Learning Group, ed. 2001. *Learning to Manage Global Environmental Risks: A Comparative History of Social Responses to Climate Change, Ozone Depletion and Acid Rain*. MIT Press, Cambridge, MA.

Subcommittee on Global Change Research. 1998. Plan by the National Assessment Synthesis Team. Washington, DC.

Tozzi, J. J. 2002. Letter to John H. Marburger, Director of the Office of Science and Technology Policy, requesting withdrawal of the National Assessment. February 11, 2002, Center for Regulatory Effectiveness, Washington, DC.

United States Climate Change Science Program. 2002. Overview of U.S. Research on Climate and Global Change. CCSP, Washington, DC. Available at: http://www.climatescience.gov/about/overview-a.htm

—. 2003. The Climate Change Research Initiative. CCSP, Washington, DC. Available at: http://www.climatescience.gov/about/ccri.htm

—. 2004. Strategic Plan for the Climate Change Science Program (with access to all related documents). CCSP, Washington, DC. Available at: http://www.climatescience.gov/Library/stratplan2003/default.htm

United States Congress. 1972. Federal Advisory Committee Act, as amended. P.L. 92-463

—. 1990. U.S. Global Change Research Act of 1990. P.L. 101-606

—. 1993. Government Performance and Results Act of 1993. P.L. 103-62

—. 2001. Federal Data Quality Act (Sect. 515 of Treasury and General Government Appropriations Act for FY 2001). P.L. 106-554

USGCRP. 1999. Summary of the Atlanta Meeting, April 12-14 1999. *Acclimations. Newsletter of the U. S. National Assessment of Climate Variability and Change* 7: 5-7.

—. 2003. Educational Resources. USGCRP, Washington, DC.

Wilbanks, T. J. 1998. A Summary and Reflections on the Meeting. in S. Hassol and J. Katzenberger, eds. *Elements of Change '97. Session Two: Planning for the U. S. National Assessment of the Consequences of Climate Change*. AGCI, Aspen, CO. Available at: http://www.agci.org/cfml/programs/eoc/ASPEN/science/EOC97/eoc97session2/Summary.html

Wojick, D. E. 2000. The National Scare: Assessing "The National Assessment of the Potential Consequences of Climate Change". A Report prepared for the Greening Earth Society, April 4, 2000. 11pp. ClimateChangeDebate.org.

Wolfe, A. K., N. Kerchner, and T. J. Wilbanks. 2001. Public involvement on a regional scale. *Environmental Impact Assessment Review* 21: 431-448.

8. Acknowledgments

This study was conducted upon invitation by Paul Stern and Tom Dietz, acting on a recommendation by Tom Wilbanks. I am deeply grateful to all three for giving me this opportunity. It would not have been possible to carry out this evaluation, however, without the help of numerous people. Granger Morgan, through Patti Steranchak, graciously made available the raw data from the CMU post-National Assessment evaluation survey as well as the discussion notes from an April 2004 workshop. Thirty-one assessment leaders from the regions, sectors, the national synthesis (NAST), and the federal leadership (agencies, SGCR, OSTP, NAWG, and NACO) of the National Assessment – on very short notice – gave readily, candidly, and generously of their time, memory, and insights. Several also shared photographs of their stakeholder interactions or additional internal documents, manuscripts, and correspondence that added invaluable dimensions to the interviews and survey information. [add something on review when complete]. Other federal program staff provided additional information on outreach etc. This study was also indirectly informed by, and greatly benefited from, intense deliberations in 1997-1999 with my colleagues then in the Global Environmental Assessment Project at Harvard University. Particular thanks to William Clark, David Cash, and the assessment leaders affording us direct insight into the design and implementation process of the USNA: Michael Hall, Eileen Shea, and Ari Patrinos in particular. Finally, at NCAR, graphic designer extraordinaire Cheryl Markel created several figures, and Rebecca Haacker-Santos provided other support that allowed me to complete this study in due time. Thank you to all!