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**NOAA Science Advisory Board**

**A Review of the  
NOAA Climate Services Strategic Plan**

**Final Report to the  
National Oceanic and Atmospheric Administration**

**September 2008**

**Climate Services  
External Review Report  
July 15, 2008**

NOAA is to be highly commended for its efforts to promote and establish a National Climate Service, and for recognizing the importance of climate variability and change for society. The participants of the Climate Services Workshop, representing a significant variety of expertise and a range of institutions and organizations, have uniformly endorsed the value of such a service to the nation and the world. Climate service functions are already growing organically based on a combination of recognized societal needs and demands, improved capabilities of a broadly defined arena of climate sciences, and the funding of a limited number of targeted projects and programs. An organized and directed set of climate services has the potential to greatly enhance the value of climate information for society.

The participants in the Climate Services Workshop demonstrated a deep appreciation of the magnitude of the task of creating a national climate service and articulated the importance of addressing a full range of current and future needs. Workshop participants recognized that our approach will have to be transformative and will require substantial leadership. This service must incorporate the breadth of partners that are needed to ensure success, have sustained funding, and must be based on a vision, strategy, and implementation plan that allows it to fully serve the diverse but critical functions of enabling informed decisions in the face of climate change and variability. Given the perspective of the Workshop participants, the External Review Committee believes strongly that the “model” for climate services in the United States must go well beyond that of the current Strategic Plan.

RECOMMENDATION OF THE REVIEW COMMITTEE:

The Review Committee recommends that NOAA lead an effort, with its partners, to compare and contrast specific national options for the development of climate services. This effort should lead to a new report entitled *Options for Developing a National Climate Service*.

The report should include the pros and cons of four specific options:

1. Create a national climate service federation that would determine how to deliver climate services to the nation
2. Create a non-profit corporation with federal sponsorship
3. Create a national climate service with NOAA as the lead agency with specifically defined partners, and
4. Expand and improve weather services into weather and climate services within NOAA

The Review Committee recommends that independent “tiger teams,” reporting to a coordinating committee, should develop a set of pros and cons for each option that can be

the basis for the ultimate selection of a model for the development of U.S. climate services. The coordinating committee and tiger teams, of 5 to 8 individuals each, should include strong and experienced leaders and should include individuals both within and outside of NOAA that are representative of potential partners (other federal agencies, public and private sectors, academia, and users of climate information).

The Review Committee commends NOAA for its efforts to organize climate services within NOAA. However, the current Strategic Plan suggests a number of remaining internal challenges associated with the development of even the NOAA element of a climate service. The Review Committee would like to ensure that the resulting plan communicates a unified approach within NOAA. The final report will not be effective unless it is clear that NOAA can internally integrate the management of its programs (e.g. GFDL and NCEP). Failure to address this issue will limit NOAA's role as a leader in the development of climate services.

#### GUIDING PRINCIPLES AND OBJECTIVES FOR EXAMINING THE OPTIONS:

The development of these options and the articulation of pros and cons for each should be completed with deliberate recognition of, and reference to, a series of principles and objectives. The analysis of each option in terms of the objectives and principles presented below is not intended as a comprehensive and exhaustive exercise, but rather should be designed at a level that informs decisions in the development of a successful climate service. The scope of the proposed climate services must:

- Serve to develop products and information that will promote a variety of societal benefits including
  - Improve prediction and projection capabilities on the time scales that contribute to societal benefit
  - Promote a better understanding of how climate change and variability can promote an improved understanding of other environmental components
  - Improve decision-making capabilities in particular sectors and regions,
  - Engender new natural and social science capabilities that may have large expected and unexpected benefit, and
  - Promote improved federal, state and regional adaptation and mitigation strategies and policies.
  - Promote a more informed citizenry
- Reflect the full range of users, ranging from those who can define their needs and are ready to make use of specific information to those who have limited experience and for which the utility of climate information is not yet clear.
- Address the full range of time scales of interest to society without artificial or arbitrary divisions based on days, weeks, months, years or decades.
- Promote the extension of climate information to climate system information so that the fundamental problems associated with the climate system and diverse regions (e.g. the coastal region) and sectors (e.g. ecosystems, water, human health, agriculture, energy, insurance, social and economic infrastructure, national security, etc.) can be addressed.

- Support problem-based assessments and improved decision-making that are on global, regional, sectoral, and integrated scales.
- Create a science-based and research-supported capability that ensures that information is accessible, includes data, interpretation and integration, promotes communication and education, and promotes innovation and interaction.
- Create an active community of interaction that promotes the 3-way involvement of researchers, users, and climate information providers that is engaged throughout the process from planning, execution, assessment, and improvement and involves the active use of the information within the service.
- Recognize, incorporate and promote a “cascade” of roles extending from nationally-provided and vetted products, to defined roles of mission agencies, to a variety of interfaces with users (including regional or boundary interfaces such as Regional Integrated Science and Assessments (RISAs), Regional Climate Centers, state climatologists, NGOs, and the private sector), to the active engagement of a wide range of users.
- Define the role of various federal agencies
- Recognize that there are significant foundations required for a robust climate service underpinned by
  - A robust climate observing system
  - High spatial resolution climate system prediction and projection models with demonstrated skill
- Ensure that climate services are integrated with active research with feedbacks that will directly impact the generation of new climate service capabilities and climate services, and in turn, will directly influence research directions. This must be based on integrated, cross-cutting and end-to-end research that will support the production of climate system information. Fundamentally, this must be founded on the development of skillful forecasts and predictions and span a better understanding of human and natural systems and how they respond to change
- Include specific mechanisms to entrain successful products into the operations and capacity of the service

The development of the four options should provide well-reasoned guidance on the benefits and drawbacks of each potential path for development. It will also define an optimal role for NOAA in developing a robust and useful climate service.

#### ORGANIZATION AND CONTENT OF THE PROPOSED REPORT

An effective report will require organizational discipline. The Review committee advocates a crisp and clear organization that is developed around a compelling executive summary and four specific topics:

**Executive Summary** that describes the importance, urgency, and path forward in a single coherent page.

**Part 1. Why a climate service is needed.** This must state the case for urgency and the potential benefits of the climate service. It should include 6 to 10 compelling examples of how climate services information and products will produce actionable outcomes and that communicate the breadth of the climate services potential. These examples should include a range of specific examples of how the service will serve to develop products and information that will promote a variety of societal benefits (the areas of interest to the Review Committee are listed under the first bullet in the section on principles and objectives).

Use of specific “decision” examples from the workshop will strengthen this section (e.g. the re-location of coastal communities associated with sea level or the loss of protective sea ice, the expenditure of funds that would allow reuse of water in counties and municipalities, the development of mitigation policies associated with understanding regional changes in ecosystems). Translating these examples into recognition of the level of benefit in comparison with the cost of creating the service is an essential component as well.

**Part 2. The definition of a climate service.**

**Part 3. How it should be implemented.** The four options should be presented in context with the principles and objectives stated above, with an analysis of the pros and cons of the four options, and a path forward from each of the four options. It should also

- Define an evolution from targeted user groups, in which effective interaction can promote significant success to a broader and more comprehensive program in which the potential is not yet fully recognized.
- Propose options for the organizational structure of the service including leadership, governance, integration of partners, and budget authority.

The analysis of the pros and cons is not intended to be exhaustive, but rather sufficient to elucidate the ability of each option to address the listed set of objectives and goals of the service.

**Part 4. How success will be judged.** The report should incorporate defined performance and success criteria for each option, including input and output, and outcome and impact metrics.

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