

Preparing the Nation for Climate Change

Strategic actions for the next Administration

The United States, and indeed the world, has become increasingly vulnerable to the environmental impacts from continuing population growth, climate change, and other forces. The stresses on our land and ocean ecosystems are accelerating; in upcoming decades, we may well reach tipping points that will trigger economic, public health, and national security consequences that will affect nearly every citizen.

At risk are such basic human necessities as water, food, and shelter. All human endeavors, from farming to transportation, hinge on weather and climate, and these are changing. The combination of environmental and population stresses threatens water supplies, energy resources, agriculture, fisheries, and populated coastlines. Those stresses have amplified the risks and repercussions from natural disasters such as hurricanes, tsunamis, earthquakes, floods, droughts, wildfires, mudslides, heat waves, and coastal erosion. Climate change and pollution also alter the spread vector-borne and pathogenic diseases such as malaria, dengue fever, and cholera.

Beyond the human toll, all these can spur a cascade of grave economic, political, and military instability: expensive disaster relief, migration of large segments of the population, and conflicts over resources. The distinct possibility of an ice-free Arctic Ocean within decades, for example, rearranges not only the literal landscape, but also the landscape for energy resources, transportation, and national security.

The stakes call for quick and effective action. The challenges are to balance the often conflicting needs of our environment, economy, and energy systems. With these challenges, however, come opportunities to develop new technologies and strategies to support sustainable development, advance renewable energy systems, mitigate costly disasters, protect human life, and manage ecosystems. What we need is a high-level, coordinated, national effort that elevates the mission of preparing to adapt to impending environmental changes. The next Administration can lead changes in the executive branch to marshal the resources to accomplish the mission. These include:

- **Creating an executive-branch-level Climate Research Office**
Establish a directorate within the Office of Science and Technology Policy, with a Deputy Director for Climate, to integrate planning and budgets for climate research and for sustained climate observations (which are now widely dispersed among several agencies) and launch a focused research, observation, and services effort that maximizes results.
- **Constructing an integrated Earth System Observatory network**
Reinvigorate, expand, and establish sustaining support for the nation's technological infrastructure to collect and integrate the measurements of our planet's land, atmosphere, oceans, ice, and ecosystems, which are essential for assessing and comprehending environmental changes.
- **Building a "National Climate Services"**
Develop clear information on climate change and impacts that is valuable for addressing societal problems and a system to deliver it expediently to a broad variety of stakeholders and decision- and policy-makers.

Woods Hole Oceanographic Institution

The Woods Hole Oceanographic Institution is dedicated to research and education to advance understanding of the ocean and its interaction with the Earth system, and to communicating this understanding for the benefit of society.



Creating an executive-branch-level Climate Research Office

Earth's climate is an integrated system of complex interactions among the atmosphere, ocean, ice, land, and ecosystems. Yet the responsibilities, assets, and budgets for studying climate change and assessing its impacts traditionally have been divided into separate federal agencies (eg. NOAA, NASA, USGS, EPA, DOE and NSF), with each focusing only part of the puzzle.

As a result, planning, budgeting, coordinating, and assessing national strategy for climate research in an integrated way is nearly impossible. We urgently need a new structural approach—an entity that can transcend agency boundaries, but without the overhead of attempting to create an entirely new agency.

A first step is the re-elevation of the director of the Office of Science and Technology Policy (OSTP) to a special assistant to the President and the establishment of a new Deputy Director for Climate, on par with the two other OSTP directorates (science and technology). This will ensure that OSTP can supply expertise and advice in the fundamental policy decisions of the executive branch. This new OSTP climate directorate must lead interagency program development, foster integrated budgets, assess progress on these plans, and adjust them as needed to meet the nation's strategic goals for climate research, observations, predictive capabilities, assessments, and ecosystem management.

Constructing an integrated Earth System Observatory network

Major gains in understanding the climate system will require a systems approach to study the land, ocean, ice, atmosphere, and ecosystems and their vulnerabilities to change—including better integration of Earth and ecosystem modeling, global Earth observations, and policy/planning. Only in this way will we be able to understand the climate impacts on socio-economic structures and balance economic and environmental sustainability.

The Deputy Director for Climate should focus first on developing a robust global Earth observation program that is highly capable, in continuous operation, affordable, and integrated with partnerships with other countries. This includes reinvigorating the nation's Earth satellite program, which is now on the brink of “observational collapse” right at the time when we will need to make important societal decisions. It also includes a network of in-situ observing systems for the atmosphere, ocean, and terrestrial systems, which are now only in infant stages of development.

Building a “National Climate Services”

A robust Earth System Observatory network offers enormous opportunities to develop products and information that explicitly provide societal benefits in the form of enhanced capabilities to simulate future scenarios for the Earth system and ecosystem response; improved decision-making; and support for adaptation and mitigation strategies and policies. Pilot programs (e.g. the NOAA RISA program) already are providing a rich set of best practices for active interaction among researchers, users, and providers of climate information. This will enhance the expedient delivery of user-friendly scientific information to attack many critical problems faced by society, including the availability of water and food; the development of carbon-free energy; natural hazard mitigation, and national security.