



Smithsonian Institution

**Roadmap for the Development of a  
Climate Change Adaptation Plan**

**Prepared by the Smithsonian Climate Change Adaptation Working Group**

*September 2013*

## Table of Contents

Introduction .....	1
Climate Change Adaptation at the Smithsonian Today .....	2
Sustainability at the Smithsonian: Past and Ongoing Activities Directly Impacting Adaptation .....	8
Smithsonian Climate Change-Related Risks and Vulnerabilities .....	12
Smithsonian Institution Plan for Developing a Climate Change Adaptation Plan .....	14
Methodology for Developing the Smithsonian Climate Change Adaptation Plan.....	18
Months 1 to 6 Milestones for Climate Change Adaptation Planning .....	21
Months 7 to 18 Milestones for Climate Change Adaptation Planning .....	21

## Introduction

*“Smithsonian scientists and researchers are monitoring global terrestrial and ocean ecosystems, studying and preserving biodiversity, and examining changes in climate from a historical and cultural perspective, to document the effects of climate change so the public and policy makers can make informed decisions about the future of our planet.”*

*– Wayne Clough, Secretary of the Smithsonian*

This document sets out a Roadmap that will guide the Smithsonian Institution (Smithsonian) in developing the Climate Change Adaptation Plan (CCAP). The Smithsonian’s goal is to prepare an Institution-wide actionable plan that is informed by best science and addresses a wide range of possible climate change impacts on Smithsonian staff and visitors, collections, research, public programs, facilities, and infrastructure within the United States and in other countries. The plan, when complete, will incorporate location-specific detailed risk assessments and action plans. It will also discuss opportunities to expand Smithsonian research on climate change trends, causes, and impacts.

Smithsonian Directive 422, which specifies that sustainability and energy efficiency be integrated into all Smithsonian building projects, provides guidance on the design, construction, procurement, operations, maintenance, and removal of buildings in ways that conserve natural resources and reduce pollution. The current Director of the Office of Facilities Engineering and Operations (OFEO) is responsible for preparing and implementing the Smithsonian Strategic Sustainability Performance Plan. The Director also established the Smithsonian Climate Change Adaptation Working Group to develop this initial roadmap. The Working Group includes representatives of the following Smithsonian units: Office of the Under Secretary for Science (OUSS); three OFEO Offices – Planning and Project Management (OPPM), Protection Services (OPS), and Facilities Management and Reliability (OFMR); and Office of Policy and Analysis (OP&A). The roadmap should demonstrate the Smithsonian’s broad understanding of the challenges posed by climate change to its mission, programs, and operations, and provide a plan of action for preparing the Smithsonian’s CCAP.

The Smithsonian is committed to following the issuance of this Roadmap with the development of a CCAP. The CCAP will be submitted as part of the Smithsonian’s annual Strategic Sustainability Performance Plan.

## Climate Change Adaptation at the Smithsonian Today

The Smithsonian Institution was created with a bequest from James Smithson to the United States of America and legislation enacted by Congress in 1846 that established a unique trust instrumentality<sup>1</sup> of the federal government. The Smithsonian's mission is "the increase and diffusion of knowledge." Congress also mandated that the Smithsonian be the repository for all federal natural history and cultural collections, such as materials acquired on scientific research expeditions and cultural heritage given to or held by the U.S. Government.

In the context of the Smithsonian's broad mission and mix of federal and private funding, since its inception the Institution has expanded greatly in terms of visits, collections, infrastructure, and programs, as described below.

**People.** In 2012, the Smithsonian hosted over 30 million visits to its physical facilities in Washington, D.C., New York City, Edgewater, Maryland, Front Royal, Virginia, and Panama; 103 million visits to online sites; and tens of thousands more to its traveling exhibitions and programs. The Smithsonian employs some 6,000 people and is host to thousands of interns, fellows, visiting scholars, volunteers, and vendor and contract personnel. The safety of these people, who are active around the world, is paramount.

**Collections.** The Smithsonian is steward to the national collections, which include millions of irreplaceable objects that underpin understanding of the natural and cultural heritage of the United States and many other nations and communities around the world. In 2012, these collections included more than 137 million objects and specimens, as well as 1.8 million library volumes, and 160,000 cubic feet of archival materials. These collections include many living animals whose health and safety is critical to the survival of their endangered species. The Smithsonian both preserves and makes these collections accessible to different users for different purposes.

---

<sup>1</sup> The Smithsonian is recognized as a tax-exempt organization under Section 501(c)(3) of the Internal Revenue Code.

**Infrastructure.** The Smithsonian encompasses 19 museums, the National Zoological Park, nine research centers, collections facilities, and many pan-Institutional offices that provide support services or offer their own programming. The Smithsonian manages more than 625 separate buildings, including many national icons, and a number of award-winning gardens, collectively comprising 12 million square feet of owned and leased space on 43,000 acres. Smithsonian facilities are located in places with very diverse climates and risk exposures, from high latitudes and altitudes to the coastal tropics. In addition, the Smithsonian supports networks of permanent tree monitoring and marine research sites around the world. A vast array of utilities, site infrastructure, vehicle fleets, and other equipment support Smithsonian operations.

### **Greenhouse Gas Emission Reduction**

- Adaptation is one important response to climate change. Another is to implement strategies that reduce greenhouse gas emissions.
- In 2010, the Smithsonian established targets for reduction of greenhouse gas emissions. The Smithsonian now produces an annual inventory of greenhouse gas emissions, and is making progress on reduction. Effective strategies implemented at the Smithsonian include decreased consumption of electricity, steam, and natural gas; decreased petroleum use in vehicles and equipment; and green power purchasing.

**Programs.** The Smithsonian’s programs span a wide range of scientific, historic, cultural, and artistic disciplines, and they are carried out on a global scale. Since its inception, issues of environment, weather, change, and natural processes have been at the center of its research, public programming, and outreach.

***Natural History and Physical Science.*** For over 165 years the Smithsonian has been carrying out wide-ranging scientific research, much of it unique and the source of irreplaceable data (see the box). Since the 1980s, when the Institution held a series of symposia on key issues dealing with environmental and human change, the Smithsonian has been participating in international work to understand contemporary climate and landscape changes and the implications for the planet’s species, including humans. Key foci are atmospheric processes, ecosystem dynamics, observation of natural and anthropogenic environmental change on daily to decadal time scales, and definition of longer term climate proxies present in the historical artifacts and records of museums, as well as in the geologic records at field sites. Smithsonian research contributes core data for understanding natural adaptive processes; needs and methods for building resilience into human-adapted ecosystems; and downscaling of models to the ecosystem level for planning and testing.

## ***Examples of Climate Change in Natural History & Physical Science Research***

- The Center for Tropical Forest Science, established in 1990 at the **Smithsonian Tropical Research Institute**, originated the decades-old network of forest plots that have become the self-standing Smithsonian Institution Global Earth Observatory (SIGEO). SIGEO monitors the growth and survival of about 4.5 million trees across the Americas, Africa, Asia, and Europe. This long-term research, unique in forest science, increases scientific understanding of forest ecosystems, guides sustainable forest management and natural-resource policy, and monitors the impacts of climate change.
- The **Smithsonian Environmental Research Center** has been exploring the effects of global change on vital tidal wetlands for over four decades. One discovery is that high levels of carbon dioxide will create new soil faster, helping raise the elevation of many tidal wetlands and improving their ability to cope with sea-level rise.
- Scientists at the **Smithsonian Conservation Biology Institute, National Zoological Park** have used two different global climate models to project that more than 16,000 kilometers<sup>2</sup> of giant panda habitat in central China will likely be lost by 2080 as climate change causes their habitats to shift to higher elevations and latitudes. Less than half of their already significantly decreased habitat may be suitable in 70 years.
- Now under development is the **Tennenbaum Marine Observatories Network** of permanent marine research sites where scientists can conduct long-term studies of changing coastal marine biodiversity and coastal ecosystems around the globe.
- At the **National Museum of Natural History** the Evolution of Terrestrial Ecosystems Program has worked since 1989 using the vast fossil collections of the Smithsonian to study how life has responded to many climate changes over the last 400 million years. Since 1970 volunteers in the Department of Botany have recorded first-flowering dates for spring-blooming plants, finding that 90% of local species bloom earlier than they used to.
- In 2006, the **Smithsonian Astrophysical Observatory**, in Cambridge, Massachusetts, started a program using Global Positioning System receivers to gather data on two glaciers in southeastern Greenland. The work was focused on understanding the details of how glaciers move and how they are affected by tides, temperatures, and other factors.
- The Center for Earth and Planetary Studies at the **National Air and Space Museum** performs original research on topics covering planetary science, terrestrial geophysics, and the remote sensing of environmental change. A remote sensing program focused on urban forests is obtaining data on carbon exchange between the land and atmosphere, which can be utilized by climate change scientists as baseline data for the environment's rate of change.

Cultural Heritage Research and Preservation. The social science research taking place at multiple Smithsonian units encompasses, among other things, the interplay between humans and nature. Communities working closely with the land are often the first to see and respond to environmental changes. The Smithsonian is helping to understand how climate change impacts the traditional modes of native peoples, how they are working to adapt to these changes, and what lessons can be derived of benefit to modern society. In addition, it has been assisting countries with the preservation of cultural heritage following natural disasters, as recently happened following the 2010 earthquake in Haiti. Many of these efforts involve collaborations with foreign governments, universities, individuals, and international organizations.

Interdisciplinary Research.

Increasingly, the Smithsonian is engaging in interdisciplinary research related to climate change. The strategic plan puts forward four “grand challenges,”<sup>2</sup> supported by an associated Consortium, whose purpose is to interweave programs and operations across disciplines and the boundaries of individual museums and research centers. The Consortia support research and programs to understand the nature and impacts of climate change and adaptation, and to disseminate that knowledge throughout the world, including to its own workforce and stakeholders.

**Examples of Climate Change in Cultural Heritage  
Research & Preservation at the Smithsonian**

- The **Cooper-Hewitt National Design Museum** has hosted a number of programs on the design of sustainable buildings and infrastructure and ways governments and communities can collaborate to address changes in the interaction between human and natural systems. The 2010 event *Why Design Now?: Eco-Machine at the Omega Center for Sustainable Living* showcased a carbon-neutral and environmentally safe wastewater-treatment system that produces water for non-potable use. The museum’s 2010 *National Design Triennial: Why Design Now?* explored topics of sustainable design and highlighted innovative works that address global climate change and other contemporary issues.
- The Smithsonian has established new centers for the recovery and preservation of endangered languages through the Recovering Voices initiative, which involves the **National Museum of Natural History**, **National Museum of the American Indian**, and **Smithsonian Center for Folklife and Cultural Heritage**. Some endangered languages have been found to hold keys to environmental understanding and sustainable management.

---

<sup>2</sup> Unlocking the Mysteries of the Universe; Understanding and Sustaining a Biodiverse Planet; Valuing World Cultures; and Understanding the American Experience.

### ***Examples of Climate Change in Interdisciplinary Research***

- A number of disciplines are being integrated under the Smithsonian Institution Consortia Program **Living in the Anthropocene**, which seeks to develop a better understanding of how humans change the planet, how their effects can be controlled, and how the Smithsonian can enhance public understanding of the responsibility for impacts to the global environment.
- The **National Museum of Natural History's** Arctic Studies Program conducts research on the interactions between humans and their environments from 40,000 years ago into modern times, and on the complex history of cultural adaptations to climatically-sensitive forest and tundra zones.

*Exhibitions, Education Programs, and Outreach.* Climate adaptation is woven into educational programs at facilities such as the Smithsonian Environmental Research Center on the Chesapeake Bay in Maryland and the Smithsonian Conservation Biology Institute in Front Royal, Virginia, and within major exhibits, such as the Sant Ocean Hall at the National Museum of Natural History. It is also incorporated into multiple temporary exhibits, websites, and publications. A substantial set of education and training programs on sustainability and adaptation targets undergraduates, conservation professionals, and practitioners worldwide.

### ***Examples of Climate Change in Exhibitions, Education Programs, and Outreach***

- The **Smithsonian Conservation Biology Institute** has developed an exhibition at its Front Royal facility on Amphibian responses to the environment.
- The **National Museum of Natural History** highlights climate change science through its Forces of Change and Ocean Portal websites, and climate change and its effects on ecosystems will be a major theme in the new permanent exhibits on the history of life, scheduled to open in 2019.
- The **Anacostia Community Museum's** groundbreaking exhibition, *Reclaiming the Edge: Urban Waterways and Civic Engagement*, examines the consequences of the abuse of waterways worldwide and the efforts by communities to restore them. The exhibition is a portion of an ongoing research project on urban waterways initiated by the museum that the Smithsonian has adopted as one of its Grand Challenges.



The Smithsonian uses a range of methods and technologies to bring its resources to a wide audience, including websites, online programs, traveling exhibitions and other programs, social media, and presentations. A number of outreach initiatives designed for the general public and for families and students address climate change, seeking to increase understanding of its nature and impact, current and future, and how people can mitigate it.

## **Sustainability at the Smithsonian: Past and Ongoing Activities Directly Impacting Adaptation**

As a public trust entity that opens its doors daily to visitors and holds the U.S. national collections for the people of the United States, the Smithsonian Institution must consider very carefully the possible effects of climate change over both very long timeframes as well as in the form of near-term extreme weather events. Much of the Smithsonian's work relating to climate change adaptation is consistent with the goals of Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, issued by the White House in October 2009. These goals include evaluating the climate-change risks and vulnerabilities the Smithsonian faces; managing the effects of climate change on operations and the ability to carry out the Smithsonian's mission and public responsibilities in the short and long term; and providing annual updates that evaluate climate change adaptation performance and identify opportunities for improvement. To the extent practicable, this Roadmap aligns with the programs being developed by Executive Branch agencies under that order.

### ***Identification of Climate-Related Vulnerabilities and Potential Impacts on the Smithsonian***

***All Hazards Risk Assessment, 2005.*** In 2005, the Smithsonian completed an All Hazards Risk Assessment that provides a baseline risk profile for the entire Institution and serves as the foundation for the SI Disaster Management Program and Business Continuity (DMPBC) master plan. The risk assessment was carried out using a methodology that combined FEMA's traditional natural hazards and new man-made threat analysis.

The 2005 Risk Assessment addresses a number of priorities for disaster management at the Smithsonian, based on the 17 natural and manmade hazards and threats that were identified as having the potential for direct and significant impact on Smithsonian operations and human safety. Severe storms and lightning, wind, and landslides account for about 15% of the high vulnerability scores. While flooding represents 3.2% of them overall, when looking at specific units, it is among the top five priority threats, particularly for the National Museum of Natural History, National Museum of American History, and National Zoological Park.

Other high priorities Smithsonian-wide are protection of the products of cultural heritage and scientific research, including collections and data, the Institution's extensive infrastructure, and financial management. The findings of the hazards risk assessment have guided the development of the Smithsonian's disaster management plans and capital improvements. They have also

guided performance standards for Smithsonian-owned buildings, the need for redundant utilities and backup power, studies on shelter-in-place and flood protection, and protective measures for lightning and wildfires.

Because climate change can exacerbate the vulnerabilities identified, the All Hazards Risk Assessment will be a stepping off point for a future risk assessment as the Smithsonian addresses specific climate-related threats to its facilities and operations.

***Smithsonian Disaster Management Program & Business Continuity Plan (Smithsonian DMPBC).*** The DMPBC consists of the Smithsonian-wide master plan and 50 separate unit and office plans that correlate with critical locations across the Institution, such as for the Office of Facilities Maintenance and Reliability and the National Air and Space Museum. These plans identify contacts for critical functions, assets, records, collections, and mechanical systems; locations for shelter in place (SIP), and evacuation; pandemic plans; hazardous materials; priority collections; and more. They incorporate as appropriate the 2005 Risk Assessment’s findings and suggestions into guidelines for mitigating these hazards through emergency exercises, Continuity of Operations Plan (COOP) development, and training.

### ***Responses to Extreme Weather Events and Lessons Learned***

The Smithsonian has experienced numerous large-scale weather-related emergencies in the recent past. In 2006, the Washington, DC area experienced an historic rain event that closed some federal agencies (e.g., the IRS and National Archives, etc.) for months. Only a few Smithsonian museums required closure, and at most for only several days. The Institution successfully protected its staff, visitors, and collections during the destructive winds of the June



Street flooding in Washington during the Flood of August 11, 2001.

WJLA,  
<http://www.weatherbook.com/flood.html>



Constitution Avenue, NW, near the National Museum of Natural History.

CE News, [http://www.cenews.com/print-magazinearticle-nightmare\\_at\\_the\\_museum-8108.html](http://www.cenews.com/print-magazinearticle-nightmare_at_the_museum-8108.html)

2012 derecho, which caused massive tree damage, multi-day power outages, and collapsed tents at the Smithsonian Folklife Festival on the Mall. The most recent event was Tropical Storm Sandy, which caused flooding at the Smithsonian’s George Gustav Heye Center in lower Manhattan in New York City.

These events have provided valuable lessons about waterproofing buildings, storm preparation, enhanced artifact protection strategies, etc. These are collected formally through a program that requires After Action Reports (AARs) that review lessons learned and needed improvements, with the names of the Smithsonian offices responsible for addressing any shortcomings and due dates. Completed AARs are made available to all Smithsonian staff through the intranet system. Other mitigation actions the Smithsonian has successfully implemented include infrastructure improvements, such as strategies to protect collections and flood control, that are of particular import given that almost all facilities are located in coastal areas. Currently the Smithsonian is completing a pan-Institutional collections space framework plan to guide development of secure, energy-efficient, and robust environments to house collections and related support functions. The Smithsonian has also challenged units to reevaluate their standards for preservation environments to allow for seasonal variations and extreme weather events. While these efforts do not address climate change in full, they do lay the groundwork for doing so in the future.

### *Climate Change Adaptation Collaborations*

The Smithsonian, particularly through its Office of Facilities and Engineering Operations, is collaborating with federal, regional, and local agencies and organizations in the Washington, D.C. region on shared planning projects, joint workshops and symposia, exchange of information and strategies, and strengthening communication to improve the Smithsonian’s ability to respond



80,000 gallon capacity vault stormwater storage @ National Museum of Natural History



National Zoo: Elephant Trails, Green roof and operable skylights for natural daylight and ventilation on the completed barn

in a coordinated manner. The National Capital Planning Commission, Federal Facilities Council, and the District's Office of Planning and the Department of the Environment in particular have been exemplary in their efforts to create opportunities for exchanges. NASA has been particularly generous in sharing its climate change scientific data and successful processes for building organizational capacity and developing adaptation plans grounded in science and local ownership.

Globally, the Smithsonian is very involved with the U.S. Global Change Research Program (USGCRP) and Group on Earth Observations (GEO), among other international organizations.

## **Smithsonian Climate Change-Related Risks and Vulnerabilities**

The Smithsonian has identified natural and man-made hazards and threats that could result in a catastrophic event with direct and significant impacts on functions and infrastructure, including people, visitors, collections, and facilities. The following risks and vulnerabilities will be a critical focus of the Climate Change Adaptation Plan.

### People and Communities

The well-being of visitors, researchers, fellows, interns, and staff of the Smithsonian are a core concern. The Smithsonian is committed to the health and safety of people through multiple programs, including risk management, disaster planning, and pandemic planning programs. Availability of staff to perform critical duties during emergencies is, and will remain, a very important element of risk management at the Smithsonian.

### Collections and Related Resources

As stewards of world-renowned collections that contain tangible examples of extraordinary cultural and scientific heritage from the United States and around the world, the Smithsonian must make every effort to protect them from potential impacts of climate change. It will regularly evaluate and pursue mitigation measures to that end. It will also attend to the threats to the extensive knowledge and products derived from the collections, such as research data and program-related materials.

### Research, Exhibitions, and Other Public Programs

The Smithsonian is invested in protecting the resources that underlie its research, including laboratories and networks of plots of forests and marine ecosystems that are used for long-term research that increases understanding of the impacts of climate change. At the same time, the Smithsonian expects to expand its climate change-related research and to continue as a leading voice in conversations in this area.

The Smithsonian will carry out ongoing assessments of climate change-related risks to programs, including exhibitions, educational seminars, and family days, that disseminate knowledge to audiences of all ages. It will institute appropriate mitigation measures as needed.

### Facilities and Operations

Achievement of the mission of the Smithsonian depends directly on its facilities and infrastructure, such as buildings, utilities, and information technology systems that are the

foundation for exceptional educational, exhibition, and outreach programs, management, and continuous operations. The Smithsonian must routinely assess their needs, risks, and vulnerabilities to allow for sustainability and improvement over time. Vulnerabilities will be measured and mitigated on a regular basis as resources allow.

### Natural Resources and the Environment

The sustainability of the Institution's research facilities and their environments, which include the Smithsonian Conservation Biology Institute in Virginia, the Smithsonian Tropical Research Institute in Panama, the Smithsonian Environmental Research Center in Maryland, and the Smithsonian Gardens in Washington, D.C., is critical to maintaining the Smithsonian's world-renowned efforts to advance knowledge about the natural world. The Smithsonian must remain vigilant to potential impact of climate change on these irreplaceable resources and ensure up-to-date plans for their preservation.

### Finances

The financial viability of the Smithsonian is essential. Various offices such as the Office of Investment and Office of Contracting and Personal Property Management conduct critical functions. They address the Smithsonian's operating and capital costs, its income-generating activities, and the influence of trends in federal vs. private trust funding for the annual budget of approximately \$1 billion. Continued sustainable financial support from the government and the private sector requires the Smithsonian to assess the future funding environment, as well as secure new resources that will provide climate change adaptation support.

### Emergency Response

Emergency supplies such as food, water, and rest areas for staff engaged in COOP or disaster recovery are critical during periods of intense, direct impact. The live collections require emergency food supplies, fuel, etc., and each unit that houses live collections must assess its capabilities regularly. Transportation plans must be in place to get employees needed to protect the collections and facilities to and from their duty stations. The Smithsonian will adjust its emergency response measures as the effects of chronic climate change on facilities and operations are better understood.

### Security

Physical and technical security for each Smithsonian facility before, during, and after a climate event is paramount. Security for facilities and research sites around the world must be examined and adjusted as climate change risks and vulnerabilities are recognized.

## **Smithsonian Institution Plan for Developing a Climate Change Adaptation Plan**

Climate scientists from NASA's Goddard Institute of Space Studies have projected that annual temperature in Washington, DC metropolitan area will increase 1.5° F to 2.5° F by the 2020s and 4.0° F to 7.5° F by the 2080s, while the sea level will rise 2 to 9 inches by the 2020s and 13 to 57 inches by the 2080s. As the Smithsonian looks into the future, it recognizes the need for vigilance and a proactive strategy for dealing with climate change. This is particularly so because climate change will only intensify the extreme weather events already impacting the Smithsonian's mission.

The goal in 18 months is that the Smithsonian issues its first location-specific CCAP. Actions in that period will provide a pan-Institutional framework for applying current peer-reviewed science to the assessment of global climate change vulnerabilities and risks, identifying best practices in risk mitigation and response to near-term extreme weather events and long-term environmental changes, and planning additional location-specific CCAPs, beginning with those sites at highest risk of impact.

CCA planning will re-shape the operating environment and activities of the Smithsonian and its units. It will require that all parts of the Institution prepare for and adjust to the impacts of climate change on facilities, infrastructure, training, programs, capabilities, and operations. This work must be done in close coordination with federal, state, and local government agencies and foreign governments, and other relevant public and private organizations to ensure integrated approaches and responses. Particular attention must be paid to protection of utilities, transportation, and other essential services.

Actions in the first 18 months will also produce guidance on near-term adaptation actions to be taken. These will include continued refinement and updating of the CCAP, based on improved understanding of climate change-related vulnerabilities and threats; further implementation of measures to mitigate risks and increase resilience; and continued preparation of location-specific CCAPs. The latter will necessarily take place over several years. Resources permitting, the first 18 months will see awareness-raising and education activities involving staff and local communities, including requirements for developing location-specific CCAPs.

It is important to note the financial uncertainty within the federal government and the likelihood of continued budget downsizing, as well as the continued economic uncertainty nationally and globally. These make raising and allocating private and government funding difficult. On top of this are the uncertainties inherent in climate science. The end result is an operating environment that requires a very pragmatic and flexible approach to climate change adaptation, and a great



deal of attention to trade-offs between what is desired and what is possible over a given timeframe. It also necessitates an incremental approach to strategic planning and tactical actions to accommodate the increased flexibility needed to address unexpected issues, such as more frequent extreme weather events, accelerated climate change impacts, and resource shortages. It also argues for continuous attention to opportunities for collaborative mitigation, while laying a foundation on which to build and improve over time.

### ***Roles and Responsibilities for Developing the Climate Change Adaptation Plan***

The Smithsonian will involve internal and external parties to bolster engagement, buy-in, and commitment from across the Institution and will support public transparency of the Climate Change Adaptation Plan.

***Executive Leadership.*** The existing Smithsonian Executive Committee on Sustainability (SECS) and its Senior Sustainability Officer will provide the leadership, accountability, and inspiration for this CCA planning effort and will communicate the CCAP to key audiences and stakeholders, including the Board of Regents and Congress.

***Steering Committee.*** A Steering Committee of approximately 20 people, appointed by the SECS, will support the Program Manager (see below) in advancing understanding of climate change and in planning and implementing climate change adaptation. The committee will include stakeholders from OFEO's Office of Protection Services, Office of Facilities Management and Reliability, Office of Planning and Project Management/Office of Engineering Design and Construction, and Office of Safety, Health and Environmental Management; representatives from each distinctive climate location and each unit with unique adaptation needs; representatives from the central finance, communications, human resources, and external affairs offices; and representatives of the research and collections communities. The intent is for the Committee to have broad representation while being a workable size. Co-Chairs will be appointed by the Senior Sustainability Officer. Committee member responsibilities may include providing expertise and advice to the CCA Program Manager; representing the Smithsonian in CCA collaborations with other agencies; climate change education and outreach; modification or development of Institution-wide policies and programs to implement CCA; and high-level analysis of climate change vulnerabilities at Smithsonian locations and units.

***Climate Change Adaptation Program Manager.*** Appointed by the SECS and reporting within the Office of Facilities Engineering and Operations, this official will have responsibility for planning, implementing, and reporting progress on Smithsonian CCA. The individual will serve as the primary point of contact for external and internal communication concerning CCA and will perform or enlist others to perform additional work such as representing the Smithsonian in CCA collaborations with other agencies, selecting consultants, providing technical oversight on

consultant contracts, carrying out climate change education and outreach, and integration of CCA in Smithsonian-wide policies and programs.

***Scientific Advisors.*** Consulting scientific advisors from federal agencies, who are engaged in climate research, such as NASA’s Goddard Institute or the National Oceanic and Atmospheric Administration, and who are proficient in applying scientific information to vulnerability and risk assessment and adaptation strategies, will be vital for effective planning due to the constantly growing body of knowledge regarding climate science. Smithsonian and external scientists doing research related to climate change will be utilized to assist in raising awareness and disseminating knowledge of climate change risks to Smithsonian staff and local communities.

***Consultants.*** Consultants will be engaged to assist the Steering Committee in accomplishing all tasks, such as preparing and evaluating detailed vulnerability and risk assessments and adaptation plans. Consultants who have already worked on pan-Institutional planning projects, such as the Multi-Hazard Risk Assessment used in developing the Disaster Response plans or federal agency CCAPs, will be enlisted to decrease the time and labor in training and development of knowledge and skills.

### ***Principles Guiding Smithsonian Climate Change Adaptation***

The following principles underlie the Smithsonian’s approach to climate change adaptation and will drive development of the CCAP.

***Develop and Use the Best Science.*** Climate change adaptation will be grounded in the best-available scientific understanding of climate change risks, impacts, vulnerabilities, and mitigation responses. Best science includes data, analytic tools such as climate change models, and best practices.

***Integrate Climate Change Adaptation into All Operations.*** Climate change adaptation will be integrated into and continually updated in core Smithsonian policies, plans, practices, programs, and operations to the extent possible, drawing heavily on the experience and knowledge of other agencies. Application of Smithsonian lessons learned will ensure continuous strengthening of climate change adaptation.

***Take an Incremental Approach.*** The Smithsonian will start planning for priority near-term risks and low-cost responses, moving over time, as resources permit, to address medium- and longer term risks and mitigation.

***Build Adaptive Capacity.*** The capacity of Smithsonian staff to address the impacts of climate change will regularly be strengthened by climate change risk awareness and incorporation of

mitigation and adaptation into routine training. The Smithsonian will take advantage of the extensive expertise and lessons learned of federal agencies to help reduce gaps in capacity.

***Collaborate on Climate Change Adaptation.*** The Smithsonian will maintain strong collaborations with federal and local government agencies, as well as the private sector, and will identify and act on opportunities that will ensure seamless adaptation planning and responses to climate change events.

***Promote Sustainability.*** The Smithsonian will address the need to evaluate and integrate sustainable actions and processes into facilities, staff, program, and collections operations, with attention to the synergies that exist between sustainability and climate change adaptation, such as sustainable building designs.

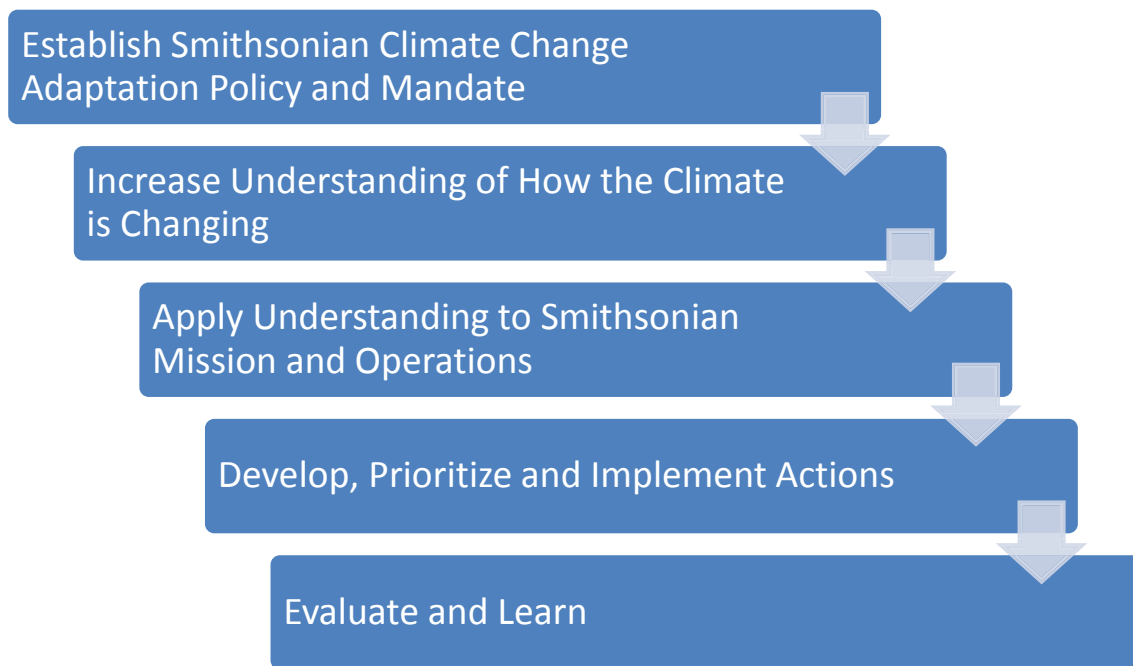
***Emphasize Outreach and Education.*** The Smithsonian will continue to engage in outreach and education that increases public awareness of climate change and potential impacts, thus fostering wider understanding of and commitment to climate change adaptation. Raising climate change risk awareness among Smithsonian staff and those who look to the Smithsonian for authoritative information about the changing world will strengthen the Institution's commitment and internal capacity to address the impacts of climate change.

***Monitor and Evaluate Performance.*** Climate change adaptation will involve continuous evaluation of performance against measurable goals and performance metrics to determine whether adaptive actions are achieving desired outcomes.

## Methodology for Developing the Smithsonian Climate Change Adaptation Plan

The process for developing the CCAP is described below. The work is to be undertaken by the Steering Committee, its co-Chairs, and support staff as appropriate unless otherwise noted. Again, the actions to develop the CCAP rely on the availability of resources previously described and any decrease in funding or support could extend the timeframe of development and reporting.

In developing its CCAP, the Smithsonian anticipates following a model similar to the one below:



From "Summary of Implementing Instructions for Climate Change Adaptation Planning, CEQ

**Actions.** The Smithsonian has identified objectives to ensure that climate change adaptation planning becomes a key element in future dialog across the Institution and moves forward at the Institutional and unit levels. Accomplishment of these objectives will create the foundation for preparation of the Smithsonian CCAP.

1. Identify and appoint Steering Committee co-chairs and members; and conduct a climate change workshop to educate the Committee on climate science, vulnerability and risk assessments, mitigation strategies, and adaptation planning  
*Responsible parties: Smithsonian Executive Committee on Sustainability*
2. Convene Steering Committee to finalize the CCAP work plan and key milestones; assign roles and responsibilities; obtain needed resources, human and financial; and prepare a draft Climate Change Adaptation Policy Statement for approval.  
*Responsible parties: Steering Committee co-chairs*
3. Put in place the structure, personnel, and lines of communication, internally and with external collaborators, needed to develop the CCAP. Specifically,
  - a. Bring on board a Climate Change Adaptation Program Manager with the requisite knowledge and experience with mitigation of and response to weather-related events and collaboration with federal and local government agencies, the private sector, and other experts.
  - b. Identify internal and external climate science advisors and unit points of contact.
  - c. Prepare statements of work and engage consultants to assist in preparing detailed vulnerability and risk assessments and action plans for each unique unit climate location or adaptation need.

*Responsible parties: Smithsonian Executive Committee on Sustainability, Steering Committee, Program Manager*

4. Finalize the initial CCAP work plan, including: resource requirements for near-term priority actions and actual and potential sources; action steps for development of location-specific CCAPs; schedule of milestones; and means to monitor progress and performance and to apply lessons learned. Disseminate the work plan throughout the Smithsonian and to external federal and other experts for review and comment.
5. Develop a preliminary 3-year order of magnitude estimate for the CCAP development process, and identify possible internal and external resources needed to support climate change adaptation planning. Needed resources include funds for salaries and benefits for the Program Manager and other staff; consultant contracts; outreach and education materials; travel; and additional data and information on location-specific climate-related risk.

*Responsible party: Steering Committee*

7. Issue the Smithsonian climate change adaptation policy statement.

*Responsible party: Secretary of the Smithsonian*

8. Expand the Smithsonian's CCA knowledge base, with particular attention to refining understanding of the distinctive risks and challenges faced by Smithsonian as a whole and by facility and location in the near-, medium-, and long-term.

- a. Discuss methods and actions to increase understanding of climate change science and Smithsonian risks and vulnerabilities and their potential impacts on achievement of the Smithsonian's mission and sustained operations across the Institution (this is an ongoing activity).
- b. Update the 2005 risk and vulnerability assessment specifically for climate change, using best science and focusing on the near term, but also carrying out projections for the medium and long term.
- c. Carry out a high-level analysis of how climate change will affect the Smithsonian.

*Responsible parties: Steering Committee, Program Manager, advisors, and contractors*

8. Identify and implement accessible near-term adaptation measures, making full use of best practices and the experience of other organizations, and set priorities, with attention to ease of implementation and resource requirements, and potential for piggy-backing on other projects at the Smithsonian, such as building renovation, as well as activities of external organizations.

*Responsible parties: Steering Committee, support staff, unit points of contact, advisors, and contractors*

9. Begin the process of location-specific CCA planning with awareness-raising and educational activities with local Smithsonian staff and communities. Conduct initial programs and workshops at the unit level to increase understanding of climate change impacts and mitigation strategies, utilizing test-case units. Start developing plans for preparing CCAPs, beginning with an updating of risks and vulnerabilities, and identifying gaps in knowledge and needed mitigation strategies. Identify the resources and support that individual units may require.

*Responsible parties: Steering Committee, support staff, unit points of contact, advisors, and contractors*

10. Continue collaboration with external organizations in the DC metropolitan area.

*Responsible party: Steering Committee*

## **Milestones for Climate Change Adaptation Planning Months 1 to 6**

**Climate Change Adaptation Plan Roadmap** is approved

**Smithsonian CCA Policy Statement** is drafted

**Organizational structure for development of the CCAP** is in place

- Steering Committee co-chairs and members are appointed
- Climate Change Program Manager is appointed
- Internal and external climate science advisors and unit points of contact have been recruited

**Months 7 to 18 CCAP work plan** is drafted and approved

## **Milestones for Climate Change Adaptation Planning Months 7 to 18**

**Climate Change Workshop** is held to educate the Steering Committee on climate science, vulnerability and risk assessments, mitigation strategies, and adaptation planning

**Smithsonian CCA Policy Statement** is approved

**Multi-year CCAP work plan is drafted including order of magnitude estimate for the CCAP development process, and identification internal and external resources needed to support climate change adaptation planning** are finalized

**Multi-year CCAP work plan** is approved

**Consultants to assist in preparing detailed vulnerability and risk assessments and action plans for each unique unit climate location or adaptation need** are under contract

**Programs to increase understanding of climate change science and Smithsonian risks and vulnerabilities and their potential impacts** on achievement of the Smithsonian's mission and sustained operations across the Institution are being implemented.

**High-level analysis of how climate change will affect the Smithsonian** is being implemented

**Requirements and timeline for development of detailed unit Climate Change Action Plans** are in place

**A location-specific CCAP** is finalized, including prioritization based on available resources and opportunities for leveraging actions through linkages to such activities as building renovation identified

**The first set of unit-level programs and workshops** to increase awareness and understanding of climate change impacts and mitigation strategies, utilizing test-case units, is completed

**Multi-year work plan to update and improve the CCAP** is approved, with key milestones, roles and responsibilities, and required resources