SMITHSONIAN INSTITUTION

Climate Change Action Plan

AUGUST 13, 2021

Presented for Review by the Federal Chief Sustainability Officer and National Climate Task Force

Smithsonian

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From the Secretary of the Smithsonian

As the world's largest museum, education, and research complex, the Smithsonian Institution faces unique challenges and equally unique opportunities in adapting to a changing climate. We research and curate the nation's cultural and scientific heritage and as such, we must not only prepare for and mitigate impacts of the climate crisis but also create a more sustainable future so that generations to come will continue to be inspired by our vast collections of spaces.

The Smithsonian features 19 museums, numerous research centers, and the National Zoological Park. We have permanent locations in eight states, Washington, DC and Panama and are active in over 80 countries. We have been entrusted with 155 million collections items, 2,000 living animals, 2.1 million library volumes, and over 10,000 live plants. Most of these invaluable collections, often housed in historic buildings, require carefully controlled environments — environments that require narrow temperature and humidity ranges and offer protection from extreme events like flooding.

The care and protection of these collections, while adding additional challenges is not an insurmountable hurdle when working towards sustainability and resiliency. Rather, our complex requirements are used as motivation to ensure we are doing all we can to be cultural and scientific stewards in preserving our shared history.

The Smithsonian is committed to the goals of Executive Order 14008, and remains focused on increasing sustainability while becoming a more climate-ready organization. With our impressive research programs, education capacity, and facilities expertise, we are well-suited to lead this charge.

Through previous efforts, Smithsonian identified and has been addressing climate-related vulnerabilities. Mitigating risk remains a high priority, including addressing climate resiliency in our long-term plans, relocating at-risk collections, and training staff to respond to extreme weather and engineering solutions to reduce the risk of flooding.

We do all this to protect our collections, buildings, and grounds while also caring for the health and prosperity of the multitude of communities where we and our visitors live and work. The response to a changing climate cannot be separated from the need to achieve environmental justice. Globally, a warming planet's costs are disproportionately shared as low-income communities and communities of color are frequently vulnerable to the threats from climate change.

We lead by example; it is our goal to positively impact our visitors, volunteers, and staff. By providing informative and engaging exhibits and events in our museums and virtually in home and schools around the world, we educate, spark conversations, and inspire.

We draw on the creativity and expertise of our staff as we grapple with one of the greatest challenges of our lifetime. This Climate Action Plan is an important part of our efforts as it notes past and ongoing successes, identifies current challenges, and plans for future achievements as integral parts of a comprehensive federal focus on the climate crisis.

Lonnie G. Bunch III
Secretary of the Smithsonian Institution

Introduction

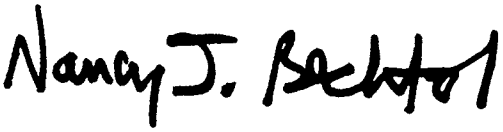
As one of the foremost research complexes in the world, the Smithsonian has long kept climate change, sustainability, and stewardship of the planet a focus of our scientific research as well as our operational decisions — a focus that spans across all aspects of the Institution for a truly One Smithsonian approach.

This Climate Action Plan details our Institution-wide efforts to assess our vulnerabilities, enhance our resiliency, research the Earth system, adapt to a changing climate and its effects, and educate our staff and the public on the climate crisis. Because the Smithsonian is such a multi-faceted organization, these initiatives are not siloed into certain portions of the Institution. Instead, many areas, specifically our public programs, our research, our collections, our administrative functions, and our facilities infrastructure, which touch every part of the Institution, are all vital to our ongoing approach in facing climate change.

Smithsonian's Climate Action Plan, combined with our Climate Change Policy, are the backbone of how we are and will address these urgent concerns of preparing for and mitigating against the impacts of climate change as well as our steps to create a more sustainable future. From developing programs and exhibits specifically targeting interconnected and changing Earth systems for our virtual and in-person visitors, to engaging staff in the ways they too can be part of the climate solutions, education and outreach will be a priority as it supports our overarching mission of the "increase and diffusion of knowledge."

But knowledge alone is not enough. Action based on what we know to be our vulnerabilities will continue. Moving collections at risk of damage or destruction because of increased flooding, building flood gates, developing infrastructure redundancies in case of power or telecommunication outages, and devising ways to better manage storm water are all in process. We also keep our eyes to the future as we incorporate sustainability and climate resiliency into all of our long-term plans and new projects. We're making smart and strategic purchasing decisions and consolidating our footprint to lessen our impact. In short, we are taking every measure to protect our buildings and collections while also doing what we can to be good stewards of not just our national treasures, but our world.

As the Smithsonian's Sustainability Officer and Director of Smithsonian Facilities, this work and its execution falls under my purview, but its success is due to the efforts of a skilled team of experts and Smithsonian units uniquely suited to face this challenge. We look forward to collaborating with the Administration on our shared goals of protecting our communities from a changing climate and will advance our plans to build a more sustainable and prepared Smithsonian.



Nancy Bechtol
Smithsonian Institution Chief Sustainability Officer
Director, Smithsonian Facilities

Five Priority Agency Actions

PRIORITY ADAPTATION ACTION 1

Public Programs

ACTION DESCRIPTION

Coordinate and consolidate climate change public outreach activities taking place in units, research centers, and other areas of the Institution.

ACTION GOAL

Improving internal Smithsonian communication and collaboration on climate change education to increase the visibility and impact of the Institution's public climate change outreach. The Smithsonian's longer-term goals are to align outreach to critical, worldwide public conversations and actions already underway and to inform the national and global dialogue around climate change issues including environmental justice and equity as well as solutions to the climate crisis such as carbon emission reduction, resiliency measures, increased sustainability, etc.

AGENCY LEADS

The National Museum of Natural History (NMNH) and the National Zoo/Smithsonian Conservation Biology Institute, working across the Smithsonian and in consultation with the Office of the Under Secretary for Education and the Office of the Under Secretary for Science and Research.

RISK OR OPPORTUNITY

Increased collaboration around the Smithsonian will allow units to share best practices, leverage resources, and co-design. This approach will ensure that the individual efforts roll up into a greater and more impactful whole for target public and peer audiences. This year's actions will assess for the first time how and where climate outreach is happening across the Smithsonian and bring together subject matter experts to identify best practices, gaps, and opportunities in areas of climate education related to scientific understanding of the evidence of climate change, raising awareness about the impacts on ecosystems, infrastructure, environmental justice, public health, and other aspects of humans and nature, and connecting to solutions from individual to global to affect change. Coordinated efforts will ensure that climate change outreach addresses issues of equity, diversity, accessibility, and inclusion in support of the Smithsonian's Our Shared Future Initiative and that it aligns with each participating units' strategic plan. This work also lays the foundation for the Life on a Sustainable Planet Initiative and builds connected experiences across the Smithsonian for our range of audiences.

SCALE

Cross-functional and pan-Institutional communications and collaborations will inform and elevate the work of individual units and research centers.

The 31,000-square-foot Deep Time exhibition at the National Museum of Natural History, structured as a journey through time, educates visitors on how humans are shaping the future and the fate of life on Earth.

TIMEFRAME

Some individual outreach already underway (see below, under Highlights of Accomplishments to Date):

- Our Shared Future: Reckoning with Our Racial Past — launched June 2020.
- Inventory to be completed September 2021.
- Incubators to be held September 2021–May 2022.
- Life on a Sustainable Planet working group Fall 2021.
- Future collaborative projects TBD by May 2022.

IMPLEMENTATION METHODS

For Smithsonian's collective work to have a major impact, the Institution needs to better understand what they do, better articulate the primary questions to answer, and better implement their work. The Smithsonian will do this by:

1. Assembling an Inventory of Climate Change Outreach that captures Smithsonian activities and sharing it with the community. This inventory will help inform and provide the foundation for a series of Smithsonian-wide discussions of how best to collaborate on climate change outreach.

2. Initiating Life on a Sustainable Planet, a Smithsonian-wide mechanism for coordinating and funding major outward-facing sustainability efforts such as the annual Earth Optimism events, the STEM-focused renovation of the National Air and Space Museum (NASM), the Smithsonian Science Education Center's Sustainable Development Goals curriculum, NMNH's Deep Time and planned People and Nature exhibitions, and many others. Actions to be undertaken this year include:
   - Form a small working group to build out a strategic plan for Smithsonian Life on a Sustainable Planet science & research and work with the Undersecretary for Education to create STEM education plan.
   - Develop a strategy around environmental justice with the Under Secretary for Science and Research, the Under Secretary for Museums and Culture, the Under Secretary for Education, and the Chief Diversity Officer.

PERFORMANCE

Performance will be measured by:

- Inventory compiled and distributed across the Smithsonian by September 2021.
- Life on a Sustainable Planet working group members will be identified by August 2021 with a working group launched by September 2021.
- Development of an implementation plan for Life on a Sustainable Planet outreach programs, including work on environmental justice.

INTERGOVERNMENTAL COORDINATION

The focus for this year is internal to the Smithsonian, though some existing projects and programs are already functioning through interagency partnerships. Smithsonian has hosted Congressional Evenings at various museums, including science- and research-focused units, to introduce members of Congress, their staffers, and families to the work of the Smithsonian. These events will continue as Smithsonian operations return to normal. The Smithsonian hosts members of Congress for individual tours when requested. The Institution's subject matter experts also serve as witnesses at climate-related congressional hearings.

RESOURCE IMPLICATIONS
Improving the coordination and consolidation of climate change public outreach activities will rely on support for Life on a Sustainable Planet implementation, funding of grants, and staffing increases. These activities will be executed with available resources.

CHALLENGES/FURTHER CONSIDERATIONS
A challenge will be getting participation from understaffed and under-resourced units that might not have time for the incubator meetings.

Getting the word out, keeping people informed, and finding the right participants will likely be challenging in such a heterogenous organization. Assigning a coordinator to stay on top of the organization and the communication will be essential.

HIGHLIGHTS OF ACCOMPLISHMENTS TO DATE
The Smithsonian already conducts public outreach activities for various audiences that address climate change and environmental justice. Some past and ongoing examples include:

- Climate-themed NMNH After Hours programs;
- Teacher academies led by the Smithsonian Environmental Research Center;
- Smithsonian Astrophysical Observatory's partnership with NASA on the TEMPO Ozone Bioindicator Garden Project;
- Smithsonian Science Education Center's Science for Global Goals curriculum;
- Smithsonian Gardens' Habitat exhibition exploring the idea that "protecting habitats protects life";
- Smithsonian Gardens' Anacostia Community Museum Landscape which connects the museum to the neighborhood, educates visitors on the people and plants that make this community unique;
- NMNH's National Fossil Hall: Deep Time exhibition;
- Environmental Justice and African American Communities Summer Workshop;
- Smithsonian staff presented climate-related topics at conferences of the American Alliance of Museums, the Mid-Atlantic Association of Museums, and the Society for College and University Planning, and also collaborated on presentations with NARA and the National Gallery of Art;
- Smithsonian's Conservation Commons Earth Optimism symposium and year-round events; Smithsonian Global Health Program, focusing on the health of all species (human and non-human) as being linked to each other and the environment, offers capacity building and training.

Smithsonian Gardens Habitat includes 14 distinct exhibits in indoor and outdoor garden spaces at various Smithsonian museums, all exploring a central theme: protecting habitats protects life.

Located at the Smithsonian Environmental Research Center in Edgewater, Md., the Global Change Research Wetland (GCREW), a 22-hectare brackish marsh, is home to several long term experiments designed to predict what the future holds for coastal wetland ecosystems as they cope with accelerated sea-level rise.

PRIORITY ADAPTATION ACTION 2

Research

ACTION DESCRIPTION

Advance the Smithsonian's robust national- and global-scale programs in science and the humanities to increase and diffuse knowledge on the causes and consequences of climate change past, present, and future as it relates to the Earth system; biodiversity, ecological relationships, and ecosystem stability; as well as health impacts, equity, and justice, and human activities that influence and respond to climate change.

ACTION GOAL

Climate change is a major research focus at the Smithsonian and can be classified into four categories: (a) climate change consequences for biodiversity, species, communities, ecosystems, and people; (b) ecosystems as mediators of climate change via feedbacks on greenhouse gases; (c) past climate and climate-human interactions as prologue to climate futures; and (d) present and future Earth and planetary atmospheres. Actions goals were chosen that cut across these categories to represent broad Smithsonian goals.

1. Increase public access to Smithsonian's climate and climate change research collections and long-term data; work with institutions in the US and abroad to make data available for climate change analysis; increase synthesis of data and collections to address climate change challenges; and advance research to protect collections and data against the effects of climate change.

2. Expand academic and agency partner participation in Smithsonian-led national and global research networks dedicated to documenting climate change and its impacts. Examples are the Forest Global Earth Observatory (ForestGEO), the Marine Global Earth Observatory (MarineGEO), the Coastal Carbon Network (CCN), the Global Autonomous Reefs Monitoring Structure program, the Global Coral Biobank Alliance, and the Ocean DNA Initiative.

3. Continue partner-led participation in national and global research networks. Examples include the Marine Biodiversity Observation Network (MBON), Caribbean Coastal Marine Productivity (CARICOMP) network, the Global Forest Carbon Database Program, the Global Curatorial Project, and the National Ecological Observatory Network (NEON).

4. Continue long-term experimental manipulations related to understand how organisms and ecosystems will respond to climate change. Examples include coastal wetland and tropical forest responses to future carbon dioxide and temperature levels; experiments to refine the use of fossil gingko leaves for reconstructing past atmospheric carbon dioxide concentrations; global warming effects on bamboo growth in giant panda habitats; effects of soil warming on lowland tropical forests; and potential bird adaptation to climate change.

5. Develop partnerships that leverage the Smithsonian to inform climate solutions. Examples include strategies to quantify and improve the value of managed forests and initiatives to add coastal habitats to Nationally Determined Contributions under the Paris Agreement.

6. Develop new sensors and platforms to improve climate change datasets. Examples include launching the TEMPO satellite to improve air quality data and forecasting; and MethaneSAT to monitor methane emissions from oil and gas extraction activities.

AGENCY LEAD

Action leads include the Under Secretary for Science and Research (OUSSR), unit directors, and individual scholars. Overall coordination will take place by OUSSR and via the Life on a Sustainable Planet initiative. Action (1) will be led by the Smithsonian units where the program is based with support from the Smithsonian's Chief Information Officer. Actions (2) and (3) will be led by the unit directors and directors of each program who will either reach out to external partners (2) or respond to the needs of external partners (3). Actions (4) and (5) will be coordinated by the OUSSR and the Sustainable Planet lead, and through the individual researchers who compete for grant funds but also requires the support of the unit Director and SI Facilities. Action (6) is the responsibility of the Smithsonian Astrophysical Observatory (SAO).

RISK OR OPPORTUNITY

Aside from funding cuts, individual research activities are typically designed to be robust against risks such as data loss or destruction of experiments and equipment. An important opportunity is to identify Smithsonian climate change activities that are synergistic and integrate across them. Opportunities include building data repositories and tools rapidly share and synthesize data on common platforms and to leverage Smithsonian's convening power to advance the analysis and application of climate change data. There is also untapped potential to leverage extensive Smithsonian biological and geological collections to advance climate change research.

SCALE

Research activities occur across all spatial and temporal scales and all scales of biological complexity from microbes to the other planets of the solar system.

TIMEFRAME

Smithsonian climate change research specializes in long-term observations and experiments often lasting several decades. Most of the action goals for research are long-term and are expected to continue for a decade or more while some is short-term lasting three to five years.

PERFORMANCE

Performance of long-term observations and experiments is judged by four criteria: (a) continuity of the records or experimental treatments, (b) curation of the data and metadata, (c) public access to the data or collection, and (d) scholarly insights from the activity in publications, public presentations, and scientific outlets.

INTERGOVERNMENTAL COORDINATION

Smithsonian climate change research is highly collaborative and engages many federal partners. The activities in Action Goal (3) typically involve one or more federal partners and coordination is achieved through the formal administrative structure of the network or project team. In many cases the relationship with federal partners is one of grantor (federal) and grantee (Smithsonian) in which case coordination is through the formal grant administration process.

The Smithsonian Tropical Research Institute (STRI) Tropical Dome Project at Gamboa Outdoor Laboratories simulates extreme future climate scenarios and document the resulting effects on tropical trees, shrubs, vines and herbs.

RESOURCE IMPLICATIONS

The continuity of long-term observations, experiments, and collections that support climate change research at the Smithsonian is dependent on support for Smithsonian research staff, research facilities, and for staff and facilities to support Action Goal (1) which will increase public access to Smithsonian climate change research and collections, and support synthesis of climate change research. The work will be executed with available resources.

CHALLENGES/FURTHER CONSIDERATIONS

The Smithsonian's climate change research resources are vast but a challenge to share with the public and the climate science community without dedicated staff. Much of SI's research efforts are based beyond the National Mall and therefore have more challenges in reaching the public The Institution is making progress implementing FAIR (Findable, Accessible, Interoperable, Reusable) data standards but the pace is too slow for the Smithsonian's unique data and collection resources to be leveraged for understanding and solving a wide variety of climate change challenges. New support for data curation and data synthesis activities is needed.

HIGHLIGHTS OF ACCOMPLISHMENTS TO DATE

- 40 years of data to address the question "How does climate change impact forest diversity and function?" is publicly available (ForestGEO).
- 60 years of spectroscopic parameters to predict light transmission in the atmosphere (HITRAN).
- 26 years of data on changes in host, pathogen, and vector dynamics due to climate change in the Hawaiian Islands.
- 26 years of data on how the most severe global climate change event of the past 66 million years affected life on land.
- 30 years of data on how indigenous people of Alaska and the Bering Strait understand and cope with the rapidly changing Arctic environment.
- 35 years of tidal wetland responses to elevated carbon dioxide, the world's longest running climate change experiment.
- 40 years of data to address the question "How does climate change impact marine ecosystem diversity and function?" (MarineGEO).

PRIORITY ADAPTATION ACTION 3

Collections

ACTION DESCRIPTION

Protect the national collections from increasingly extreme weather through long-term planning and preparedness training, while reducing or not increasing our energy reliance. Mitigate the risks to collections from extreme weather, including flooding, and reduce energy demand for collections storage by moving collections, or improving storage enclosures and spaces to make them flood safe, energy efficient, and protected from extreme weather events. Prepare staff for responding to extreme weather events via collections emergency preparedness training.

ACTION GOAL

Enable lower energy demand and increased resilience in collections storage through annual purchase and installation of high-quality, gasketed storage cabinetry and collections enclosures that buffer changes in indoor environments. High-quality cabinets and enclosures in compact, dense storage will replace open shelving; poor-quality storage cabinets; and other containers that necessitate tighter indoor temperature and humidity control. High-quality gasketed cabinets provide increased protection to collections particularly during power outages, temperature extremes, or water incursions. Such cabinets and enclosures enable reduced reliance on the energy grid by allowing an ongoing, wider range of acceptable ambient relative humidity.

Provide flood safe, energy efficient spaces for collections to promote preservation throughout extreme weather events, and thereby provide environments that support long-term stewardship of collection items. Plans for the following new collections support facilities will include progressively lower energy demand, including planning efficient off-the-National-Mall storage facilities in low flood risk locations for two new museums.

- POD 6 addition to the Museum Support Center (MSC): (FY2021–2025)
- Dulles Collections Center (DCC): Master Planning (FY2023–2024) construction of Module 2 and Hangar additions (FY2023–2029)
- Suitland Collections Center (SCC) including Building 38: (FY2021–2023)
- NMNH Master Plan Update: (FY2021–2023)
- National Museum of the American Latino: Collections Facility (included in the DCC Master Plan)
- Smithsonian American Women's History Museum: Collections Facility (included in the DCC Master Plan)

Additionally, renovation projects will incorporate relocating collections internally within structures on the National Mall where flooding is projected.

AGENCY LEAD

The Smithsonian Collections Space Committee provides vision, leadership, coordination, and review of collections space projects and policies.

Project rendering of the Dulles Collections Center at the National Museum of Air and Space — Udvar Hazy Center.

Project rendering of the Suitland Collections Center located in Suitland, Md.

RISK OR OPPORTUNITY

Flooding is a risk in the National Mall area and New York as identified in the 2015-2019 Climate Change Adaptation Plan and 2013 Roadmap for the Development of a Climate Change Adaptation Plan. Other weather extremes, including temperature swings, tornados, high winds, fire, and hurricanes necessitate robust emergency response preparedness for collections. Opportunities in moving collections to flood-safe locations provide opportunity to assess collection items for relevance to Collections Plans, and improve their preservation and ease of access, including digital access.

SCALE

Projects are site-specific and coordinated across the National Capital Region and New York City.

TIMEFRAME

Ongoing, reported on an annual basis. Collections and climate change adaptation projects are now routinely included within museum and campus master plans.

IMPLEMENTATION METHODS

- Preparing for more severe weather and its effects on collections is organized through the Preparedness and Response in Collections Emergencies (PRICE) team. Examples of trainings include a Wet Salvage Workshop, an online Long-Term Drying and Mitigation Techniques course, and an in-development online Salvaging Wet Collection Items course. The PRICE team ensures needed supplies, equipment, and contracts are in place. A Logistics Action Team is creating a library of Statements of Work (SOWs) and Requests for Quotes (RFQs) and organizing transportation for collection emergencies. Data from a Collections Emergency Kit Survey is being integrated into the Institution's central geospatial data system, SI Explorer, accessible to everyone within the Smithsonian to share kit contents and locations.
- Cooperative agreements are implemented with local agencies.
- Through Pan-Institutional committees and existing annual surveys, data is gathered to identify locations where strategic improvements to collections storage furniture will have the most impact in enabling resilience and lowering energy demand. The Smithsonian is using central Collections Care Initiative funding, Facilities Capital funding, and individual unit funding to purchase and install protective storage furniture and other enclosures on an annual basis.
- The installation of backup power systems in vulnerable locations where enclosures cannot sufficiently buffer temporary indoor environment changes due to power loss from storms.
- Implementation of data dashboards so stakeholders can understand how practices affect indoor environment and energy use. Building automation system set points are routinely reviewed, including the use of CO2 data to determine HVAC settings for outside air and energy use.

PERFORMANCE

The National Collections Program will track the quantity of high-quality, gasketed cabinets installed to manufacturer specifications on an annual basis. Collections care statistics will be tracked annually on a public dashboard.

The number of collections emergency preparedness trainings and trainees will be tracked annually by the Preparedness and Response in Collections Emergencies (PRICE) Team. Energy intensity and greenhouse gas emissions across Smithsonian locations, the majority of which contain collections, will be tracked annually and made available on a public dashboard.

Collection space interiors: Inside the Dulles Collection Center — Module 1 (left). Collection storage space inside the Museum Support Center (right).

INTERGOVERNMENTAL COORDINATION

The Pod 6 project includes collections space for the National Gallery of Art. To facilitate preparedness for extreme events and power outages, the Smithsonian Office of Emergency Management partners with local DC and other emergency response organizations, including FEMA, DC Fire and Rescue, Homeland Security, and the Maryland State Police Department. Smithsonian also partners with the National Park Service, the Heritage Emergency National Task Force, the DC Alliance for Response, the American Institute for Conservation's Emergency Committee, the Foundation for Advancement in Conservation's Connecting to Collections Care, and the Collection Care Network.

RESOURCE IMPLICATIONS

Actions may be accomplished with existing staff and funding resources, but progress will be phased over time.

CHALLENGES/FURTHER CONSIDERATIONS

There is a high initial cost of making facilities resilient. Yet adapting to climate change is the first line of defense for collections against extreme weather and flooding, while enabling visitors to feel safe. Should Smithsonian collections not be made more resilient, the long-term ability to provide collections for research, outreach, museum, and education programs to meet Smithsonian's mission to increase and diffuse knowledge will be threatened.

HIGHLIGHTS OF ACCOMPLISHMENTS TO DATE

Since 2013, the Smithsonian tracked incremental improvements to the physical accessibility, physical condition, storage equipment, and housing materials for collections holdings, or has kept pace with collections stewardship while collections have grown. Between 2006–2021, the federal Collections Care and Preservation Fund has provided over $10M for storage equipment or enclosures that protect collections against extreme weather events and power failures while reducing the need for energy-intense indoor environmental controls. Museum, unit, and capital project funds have contributed significantly to the purchase of these efficient, protective enclosures. Over the past ten years, we have made gradual reductions in energy intensity while preserving collections, despite rising temperatures and increases in our collections holdings.

The Smithsonian's Declaration on the Collections Preservation Environment was published for decision making that allows for reduced energy demand while providing for long-term collections preservation to meet the Smithsonian mission. The 2013 Summit on the Museum Preservation Environment and the published Proceedings, as well as the 2020 symposium Stemming the Tide: Global Strategies for Sustaining Cultural Heritage Through Climate Change and new publication made positive contributions in the field of cultural heritage. These events and publications integrate climate considerations from various disciplines and encourage peers in the field to examine traditional museum practices critically and take proactive steps to address climate change and build resilience.

In 2016, the Smithsonian established the Preparedness and Response in Collections Emergencies team, including a new permanent chair position and three action teams, establishing programs, trainings and organizational frameworks to improve the Smithsonian's ability to respond to emergencies affecting collections. To date, PRICE has connected with 1,298 individuals at the Smithsonian through events, trainings, workshops, and outreach efforts. The Smithsonian uses the LiveSafe app for Institution-wide reporting of incidents including damage related to flooding and weather-related emergencies.

PRIORITY ADAPTATION ACTION 4

Management/Procurement/ Finance/Human Resources

ACTION DESCRIPTION

The Smithsonian continues to pursue administrative efficiencies to improve resilience to the impacts of climate change, such as energy savings in buildings, consolidation of leased spaces, collaboration and co-location with other agencies to streamline collections space, and reduction of transportation between buildings.

The Smithsonian continues to review and refine existing, or establish new, policies, procedures, and staff education programs that promote consideration of prevailing environmental and social concerns for enhancing climate adaptive and climate resilient practices by employees, not only while at work but also in their personal endeavors, that will serve to:

- Ensure that products purchased for business and personal use are environmentally safe and climate change adaptive and resilient.
- Include sustainable purchasing and services requirements in contracts where practicable and feasible.
- Continue and improve, where possible, landfill diversion rates by encouraging on-the-job and personal recycling or composting, and availing personal property for reutilization.
- Practice environmental stewardship in facilities design and construction, landscaping design, and grounds maintenance to minimize emissions.
- Encourage use of public transportation, motor pooling, and walking or cycling in lieu of personal vehicles.

These initiatives represent a continuation of existing efforts in collaboration with Smithsonian leadership and staff in the facilities and grounds, personal property, staff transportation and travel, procurement, human resources, and financial management offices.

ACTION GOALS

- All Smithsonian procurement solicitations will include sustainability and climate adaptive and resilience requirements where appropriate and feasible for the goods and/or services being procured. Additionally, climate change considerations will be integrated into procurement strategies to increase participation of small and disadvantaged businesses.
- Ensure all Blanket Purchase Agreements (BPAs) and special use agreements issued by the Smithsonian or other agencies on which the Smithsonian piggybacks include federal environmental sustainability requirements and clauses pertinent to fostering environmental and biodiversity preservation and climate change adaptive and climate resilience efforts.
- Continue efforts to train Smithsonian employees to include climate change in their procurement decisions. This includes awareness of our available BPAs for green cleaning and janitorial supplies, reviewing and updating policy, and tracking climate change metrics, where possible.

AGENCY LEAD

The Office of Contracting & Personal Property Management with input from Smithsonian Facilities, the Office of Human Resources (OHR), the Office of Finance and Accounting, and other Smithsonian units identified to be major stakeholders in planned actions.

SCALE

Smithsonian efforts to increase its climate change adaptive and climate resilience practices may have only a small impact in the communities where our facilities and sponsored programs are located. But globally, the Smithsonian will be demonstrating the commitment required to protect environments and communities around the world.

TIMEFRAME

FY2021-2025

IMPLEMENTATION METHODS
The Smithsonian will assess the extent to which procurement-related documents contain information/ requirements for staff and contractors' considerations and compliance with climate change adaptation and climate resilience requirements, by:

- Exploring the increase of BPAs that promote climate change and promoting their use across the Smithsonian.
- Working with our Amazon Business partners to promote Climate Pledge Friendly products.
- Confirming Priority Sources' commitments to availing supplies that are eco-friendly.

In addition, the Smithsonian will track reduction of leased space and consolidation efforts and highlight the benefits those initiatives bring to climate change, including:

- Reduction of transportation used by the workforce who are required to travel between multiple locations in the metropolitan DC region.
- Energy efficiencies achieved through projects like the POD 6 Collections space consolidation that reduce the number of collections spaces, and subsequently, the building systems required to operate those facilities.

The Smithsonian will review and update the following policies and procedures to incorporate guidance on climate change adaptation and climate change resilience requirements:

- **Smithsonian Directive 314 —** Contracting
- **Smithsonian Directive 315 —** Personal Property Management
- **Smithsonian Directive 322 —** Charge Card Program
- **Smithsonian Directive 416 —** Real Estate Asset Management
- **Smithsonian Directive 421 —** Mobile Asset Fleet Management
- **Smithsonian Directive 422 —** Sustainable Design of Smithsonian Facilities

Finally, the Smithsonian will continue to promote a robust telework program to reduce green-house emissions, while also encouraging the use of public transportation.

PERFORMANCE

- Beginning in July 2021, the Smithsonian will use Amazon Business Climate Pledge Friendly products to better track spending on climate-friendly products.
- Work with OHR to track telework and transit benefit numbers.
- Work with Smithsonian Facilities to track reduction of leased spaces and consolidation of collections spaces.
- Work with the Property Management Officer and designees to establish methods for tracking property reutilization, electronics recycling, and landfill diversion.

INTERGOVERNMENTAL COORDINATION
The Smithsonian will continue to maintain awareness and seek advice from the National Climate Task Force and Office of the Federal Chief Sustainability Officer.

RESOURCE IMPLICATIONS
Estimates of resources required, in addition to presently apportioned staff, are not available at this time. The work will be executed with available resources.

CHALLENGES/FURTHER CONSIDERATIONS
The ability to track Smithsonian and contractor achievements effectively and efficiently against goals is hindered by the limitations of internal information systems and the need to use external information and reporting systems. The Smithsonian will seek to overcome such challenges and implement changes where resources and staff education permits.

HIGHLIGHTS OF ACCOMPLISHMENTS TO DATE
The Smithsonian is finalizing revision of several relevant Smithsonian Directives (SDs), written policies governing the management, administrative and programmatic operations of the Institution. These include:

- **SD 422 —** Sustainable Design of Smithsonian Facilities: This policy applies to all Smithsonian Units and all facilities under the control of the Smithsonian in the US and international locations. The policy has been updated to include the 2020 Guiding Principles for

Sustainable Federal Buildings as its core principles. The policy requires that all Smithsonian facility construction projects be sustainable with goals set based on project cost. Projects less than $2.5 million will be LEED certified, projects greater than or equal to $2.5 but less than $5 million will be LEED Silver, and projects greater than or equal to $5 million will be LEED Gold.

- **SD 414 —** SI Energy Management Program: The revisions reinforce the role of energy efficiency as a prerequisite of sustainable design, and promotes cost-effective actions to conserve energy and water, incorporating these criteria into all procurements involving energy and water systems. It establishes new building efficiency performance standards for owned and leased facilities.
- **SD 600 —** Collections Management: A comprehensive revision is ongoing and includes environmental impact, sustainability, and evidence-based decision-making processes as factors in policy governing preservation of museum, archive, library and living collections.

PRIORITY ADAPTATION ACTION 5

Facilities and Infrastructure

ACTION DESCRIPTION

Take action to reduce the impacts of flooding identified across the Smithsonian at vulnerable facilities located on the National Mall, National Zoological Park (NZP) Rock Creek, New York City, Smithsonian Environmental Research Center (SERC), and Smithsonian locations in Florida. These will include continuing and new initiatives that are addressed in Master Planning, pre-project planning, feasibility studies, and project designs.

ACTION GOAL

Improve protection against flooding from interior stormwater drainage, riverine and coastal flooding, and storm surge, which are likely to intensify due to climate change. Flooding is already a major concern at these locations, although the impacts and vulnerabilities are site specific.

- National Museum of American History (NMAH) West Site Drainage Improvements and Temporary Flood Protection Study PN 1803118 will implement Master Plan recommendations to identify urgent and long-range flood protection while improving site access for visitors and maintenance. It will identify flood protection measures that can be implemented immediately and in the medium- and long-term to improve resiliency.
- National Museum of the American Indian — New York (NMAI-NY) Upgrade Electrical & Emergency Power System PN 1595602 will replace and relocate the emergency generator to improve capacity and protect it from flood risk. The lower-Manhattan museum was affected by flooding during Hurricane Sandy.
- National Museum of Natural History (NMNH) West Wing Basement Drainage PN 1900104 project will address flooding of the loading dock entrance at the west side using a 100-year flood event. Potential measures under consideration include connecting site drains to the existing cistern.
- Suitland Collections Center (SCC) Pod 6 Addition to Museum Support Center PN 1630102 — A new

dedicated collections storage facility addition to the existing Museum Support Center will provide a sustainable facility allowing Smithsonian collections to move from flood-prone basements in the National Mall buildings.

- NZP Upgrade Central Boiler Plant PN 2033112 will address the reliability and resiliency of the boiler plant facility and systems serving the NZP Rock Creek campus, located in the Rock Creek flood zone, including live collections. The scope includes potentially elevating equipment and critical systems to work with the existing flood wall.

- SI Explorer Enhancements will inform leadership and stakeholders about properties with the greatest flood risk by adding flood zones, flood risk themes, and architectural finished floor elevation drawings to our Geospatial Information System viewer (SI Explorer) and Facility Management System (Facility Center). Flood elevations will be added to the database in FY 2021.

AGENCY LEAD

Smithsonian Facilities (SF) provides project management and oversight, through its Office of Planning, Design and Construction, supported by SF Office of Facilities Management and Reliability. Site development and landscape design and planning is supported by Smithsonian Gardens. Property portfolio flood risk data management is supported by SF Office of Business Administration and Technical Services.

RISK OR OPPORTUNITY

- Addresses current flooding and future flooding scenarios identified in the Smithsonian Climate Change Adaptation Plan (CCAP).

- Addresses need for redundant, diversified infrastructure.

- Relocates vulnerable collections from flood-prone areas. Furthermore, it addresses multiple issues simultaneously, including electrical grid, electrical utilities infrastructure, resilient site landscaping, stormwater management, and flood risk management.

SCALE

Projects are at a property-level scale. Cumulatively, they will address larger campuses.

TIMEFRAME

- Projects that are in the FY2021 and FY2022 capital plans.

- Design and construction phases of projects that are in future year plans.

- Studies to recommend projects for implementation in future years.

IMPLEMENTATION METHODS

Master Plans identify projects to address the climate adaptation vulnerabilities identified in the Smithsonian CCAP, for inclusion in the Institution's capital plans. Capital plans are projected out over ten years but are planned for two years. Project requirements are identified in the Facilities Requirements Database (FReD) and in pre-project planning. Feasibility studies and concept design studies are frequently done to clarify scopes and approaches prior to design development and provide opportunities to identify flood protection levels. Projects are phased to facilitate implementation.

MILESTONE DATES FOR RELEVANT PROJECTS

- **NMAI-NY Custom House Upgrade Electrical & Emergency Power System —** Concept Design complete in FY2021 with further design phases in FY2021-2022.

- **NMAH West Site Drainage Improvements and Flood Protection Study —** Concept FY2021-22.

- **NMNH West Wing Basement Drainage —** Concept FY2021; implementation in FY2022.

- **NZP Upgrade Central Boiler Plant —** The study will be complete in FY2022; with design finished in late FY2022; and construction planned for FY2023 (may be phased based on funding availability)

- **SCC Pod 6 Addition to Museum Support Center —** The final design will be completed in FY2022; with construction planned for FY2025.

- **SI Explorer —** The addition of flood zone layers and building finished floor elevations is anticipated in FY2021-2022.

The Smithsonian is taking action to improve protection against flooding. This includes project plans for The Museum of the American Indian in New York City (left) and the National Museum of American History (right) .

PERFORMANCE

Design development and construction milestones are tracked in dashboards and monitored by Integrated Facilities Teams (IFT) monthly.

INTERGOVERNMENTAL COORDINATION

The Smithsonian collaborated with the National Capital Planning Commission (NCPC) and the US Army Corps of Engineers (USACE) in a process to identify a comprehensive flood protection solution for the Federal Triangle area and the National Mall. Further feasibility and environmental studies might be undertaken as an interagency collaborative effort. The Smithsonian is coordinating with GSA's plans to provide below-grade waterproofing to mitigate risk of future flooding, as occurred during the Superstorm Sandy at the US Customs House in NYC. The Smithsonian is also a member of the DC Silver Jackets that shares information about flood risk mitigation projects and resources. The Smithsonian also partners with the National Park Service and D.C. City Government to act as emergency shelter space for individuals on the national mall in case of inclement weather, natural disaster, or other emergency.

RESOURCE IMPLICATIONS

Future design and construction phases recommended by the NMAH and NMAI master plans, as well as other projects, will need to be funded. Federal Triangle area stakeholders include multiple federal agencies or entities with individual budgets and will require a responsible entity to design, construct, and manage the comprehensive interagency Federal Triangle flood mitigation project. The project could be considered a critical structural flood initiative under current efforts to improve infrastructure.

CHALLENGES/FURTHER CONSIDERATIONS

Challenges include maintaining ongoing resources for flood protection with competition from other Smithsonian priorities, including the development of two new museums and major revitalizations of four museums and the Smithsonian Institution Building (Castle). The cultural changes likely to occur with education are anticipated to encourage more seamless integration of sustainable and resilient design. The completion of future phases of the Smithsonian CCAP to expand analysis of flood risks and other climate-related effects to other facilities will require staff or consultant resources and are likely to await a return to normal operations following the pandemic.

HIGHLIGHTS OF ACCOMPLISHMENTS TO DATE

The Smithsonian completed Phases 1 and 2 of the CCAP, identifying vulnerabilities and documenting local climate information, and has been integrating the results of those into projects and Master Plans. A prior analysis of specific flood vulnerabilities in the Federal Triangle area provided information that was used to design the National Museum of African American History and Culture, which has not flooded despite being located near the lowest point in the watershed. The flood gate for the National Air and Space Museum east loading dock ramp is 100% designed and will be part of Phase II construction scheduled from April/May 2022 through Sept 2024. The Smithsonian relocated the central data server to a remote location that is not subject to flooding. With that facility now aging, a feasibility study is planned to explore relocation to a more robust, climate-ready, and secure facility.

Special Topic Areas

TOPIC 1

Updated Climate Vulnerability Assessments

Note: The Smithsonian has not updated its vulnerability assessments related to flooding based on the latest National Climate Assessment. Scenarios were developed 2015–2017 using the higher ranges of then-available data given the risks to irreplaceable cultural and scientific resources.

VULNERABILITY 1

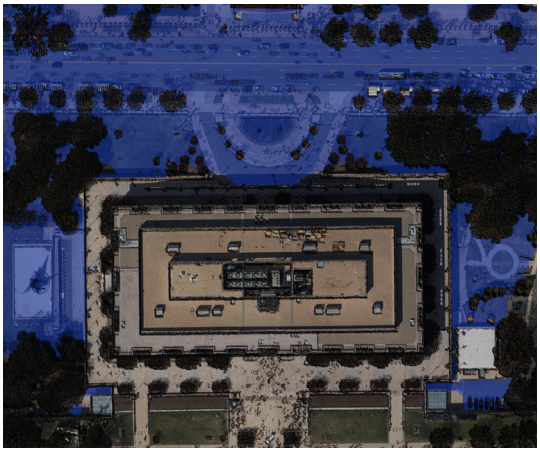
Severe storm events causing flooding could outpace the Smithsonian's current capacity to fund and execute projects to provide increased individual site and building resilience at its most vulnerable National Mall facilities.

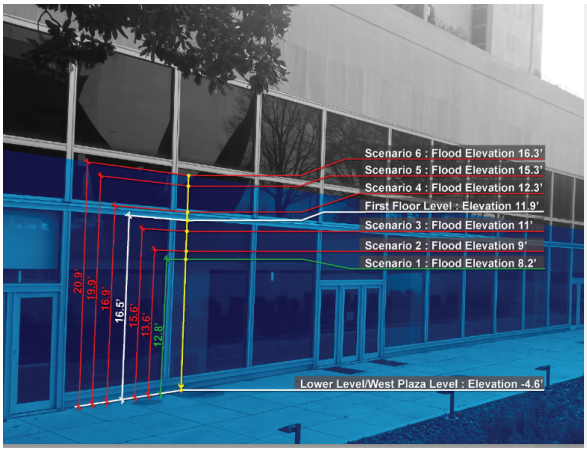
CLIMATE CHANGE AND IMPACT
(including impact of no action)
Increased frequency and intensity of storms and sea level rise could cause interior drainage and storm surge flooding, impacting museums in the Federal Triangle Area north of the National Mall and at its southeast end. Museum collections could be damaged by flooding and high humidity levels, particularly if climate control systems, essential employee access, and generator fuel supply are impacted by the storm event. This could limit Smithsonian's ability to serve its mission to increase and diffuse knowledge as objects and spaces could be damaged, destroyed, or become inaccessible. Closures of Smithsonian facilities typically have a disparate impact on those lower wage staff and contractors unable to perform their work remotely and in the absence of public visitors.

ADAPTATION ACTION
(including known barriers to implementation)
Adaptation projects being planned and implemented in the areas of collections and facilities are described in Climate Actions #3 and #5. Resilience projects for National Mall facilities in the 1% and 2% flood plains are being incorporated in the Smithsonian's capital plan but compete with all requirements for facilities revitalization, including those that address more immediate and certain infrastructure failure.

Existing aging stormwater sewer systems in the National Mall/Federal Triangle Area handle roughly a 15-year storm and are increasingly less able to handle major storm events that come with little warning to this low-lying area of a large watershed. An interagency study is being undertaken by the DC Silver Jackets to assess the cost benefits of a major investment in a National Mall pumping station to increase the capacity to pump storm water from the area into the Potomac River.

Barriers to implementing individual building and site projects as well as shared infrastructure projects include





The Smithsonian Climate Change Adaptation Plan depicts the effects caused by various current and projected future flood and sea level rise scenarios, including one the most vulnerable buildings, the National Museum of American History, which sits within the 100-year flood hazard area.

high costs for both. The North site project at the National Museum of American History (the National Mall museum most vulnerable to flooding) includes a flood wall and other measures that add resiliency. Its master plan estimated the cost to be $38.9 million (2018 $). A master plan update for the National Museum of Natural History (second most-vulnerable National Mall museum) FY2021–2023 will identify climate change resilience project priorities. Construction of a shared National Mall pumping station was estimated to cost approximately $400 million (2011 $). If a shared interagency project were deemed cost-effective, the structure of organizational responsibilities would need to be addressed.

ESTIMATED TIMELINE AND MEASURES FOR INDICATING PROGRESS

Individual flood resilience projects will be implemented over the 20+ years of a typical facility master plan as funding is available. For National Mall facilities in or near the flood plain, master plans for the National Museum of American History and the National Museum of the American Indian were completed in 2018 and 2020. A master plan update for the National Museum of Natural History will begin this year and will be complete in FY 2023. NASM's major revitalization project which is ongoing through 2025 includes two large underground cisterns and a higher flood gate at the loading dock ramp. Its library and archival collections were permanently relocated to the less vulnerable Udvar-Hazy Center. The Hirshhorn Museum and Sculpture Garden project currently completing design includes a new stormwater management system where none currently exists.

Progress in improving collections space is tracked through regularly scheduled updates to the Smithsonian-wide Collections Space Database that includes assessment of the quality of collections storage equipment, space envelope integrity, and capacity to maintain required temperature and humidity conditions, all factors that contribute to resiliency. The next update will take place August-December 2021.

The Federal Area Interior Flooding assessment is being led by the interagency DC Silver Jackets Team. A Preliminary Flood Damage and Impact Assessment is currently in preparation.

ACHIEVABLE WITHIN CURRENT FUNDING LEVELS?

Incremental progress on individual building resilience is achievable within current funding levels but may not keep pace with increasing climate change impacts.

HOW IS VULNERABILITY DISCLOSED IN SMITHSONIAN FINANCIAL REPORTING AND ENTERPRISE RISK MANAGEMENT PROCESS?

Climate change has not previously been integrated and disclosed in the Smithsonian's risk management process. However, that may be considered going forward.

VULNERABILITY 2

Leased Collections Space facilities do not provide the same level of climate resilience as Smithsonian-owned facilities built to current standard. Leased facilities approaching Smithsonian standards are scarce in the marketplace and would be even more scarce in the aftermath of a major climate event.

CLIMATE CHANGE AND IMPACT
(including impact of no action)

Increased frequency and intensity of storms and sea level rise can cause flooding. Hotter weather can impact the

cost and reliability to maintain consistent temperature and humidity conditions. In a severe climate event, Smithsonian staff will be less able to take emergency action at shared leased facilities. Leased facilities typically are less robust in their construction than Smithsonian facilities built to current standards, making them less able to address individual events and long-term impacts. If a gradual shift to owned facilities does not occur, lifecycle costs will be greater and collections may be less well-protected. If collections or capabilities are impacted, it limits Smithsonian's ability to reach audiences, conduct research, and diffuse knowledge.

ADAPTATION ACTION
(including known barriers to implementation)
The Collections Framework Plan (2014) calls for a gradual transition to more resilient and cost-effective owned facilities for collections stored on a more permanent basis (i.e. longer than 5 years). Barriers to implementation include potential challenges in funding construction of owned space to take advantage of opportunities to terminate leases and the challenges in making budget shifts from lease payments to capital and operations funding. Specific measures include:

- In anticipation of lease terminations over time, construct collections space at Smithsonian's Dulles and Suitland Collections Centers to house collections currently in leased space.
- Where feasible, consider purchase of leased facilities, particularly those in which the Smithsonian is the sole occupant and has invested significant additional federal capital.
- In anticipation of potential climate events requiring removal of Smithsonian collections from an impacted facility, negotiate and maintain Blanket Agreements with providers of acceptable pre-screened temporary emergency collections storage space.

ESTIMATED TIMELINE AND MEASURES FOR INDICATING PROGRESS
The Suitland Collections Center Plan incorporates phased planning over 40 years to accommodate vacating leases, growth and decompression of collections, and moves of collections from substandard and vulnerable locations to new facilities at both Dulles Collections Center and Suitland. Progress will necessarily be gradual and recorded in the collections space database to reflect completion of capital projects and any shifts from leased to owned space. These would also be reflected in our annual inventory.

The Smithsonian has negotiated a lease which includes an option to purchase its largest leased collections storage facility at Pennsy Drive in Landover, MD beginning in 2030.

Lease for the larger of two spaces at the Crozier Fine Arts Apollo Drive facility includes two extensions for five years that would be coordinated with any shift to owned facilities.

Blanket purchase agreements for IDIQ emergency collections space are in place with three vendors and the intent is to re-advertise these in 2022.

ACHIEVABLE WITHIN CURRENT FUNDING LEVELS?

Yes, if leased facilities continue to be available and offer sufficient extensions until owned replacement space is constructed and if federal budget shifts from lease payments to capital and operating costs are addressed with OMB and Congress.

HOW IS VULNERABILITY DISCLOSED IN SMITHSONIAN FINANCIAL REPORTING AND ENTERPRISE RISK MANAGEMENT PROCESS?
Uncertainties regarding potential availability of owned facilities to replace leased facilities are addressed by negotiating renewal options that provide adequate flexibility at a reasonable cost. Climate change has not previously been integrated and disclosed in the Smithsonian's risk management process. However, that may be considered going forward.

VULNERABILITY 3

Increasing temperatures will place strains on already aging mechanical systems in some Smithsonian facilities with the potential to exacerbate utility costs and greenhouse gas emissions. A Smithsonian-wide analysis has not been done on this climate change impact. Individual projects are, however, addressing it.

CLIMATE CHANGE AND IMPACT
(including impact of no action)

Increased heat is impacting Smithsonian facilities concentrated in the DC, Maryland, and Virginia region, but also those in NY, MA, AZ, FL, HI, and Panama. A no-action failure to adequately take this into account in management decisions surrounding facility design, including energy sources, systems and envelope designs, would have undesirable cost and climate impacts and decrease our ability to be fully operational, to adequately conserve our collections, or to meet our mission.

ADAPTATION ACTION
(including known barriers to implementation)

Wherever feasible, major revitalization projects will include and prioritize improvements to envelope insulation values, more efficient mechanical systems with N+1 redundancy, and will increase the proportion of cleaner or more renewable energy sources. Barriers to implementation can include costs as well as constrained sites and historic structures, and for many facilities, the requirement to keep portions of facilities operating during construction to accommodate visitors and collections which can impact feasible options.

ESTIMATED TIMELINE AND MEASURES FOR INDICATING PROGRESS

Major revitalization projects are ongoing and generally guided by master plans, including those for the National Air and Space Museum (under construction through FY2025), the Restoration of the Historic Core (Castle, AIB, and Central Utility Plant), in its Schematic Design Phase, with construction start in FY2023; and Hirshhorn Museum and Sculpture Garden (multiple revitalization projects in various stages of planning, design and construction through approximately FY2028). Measures for indicating progress include energy analyses prepared as part of design stages as well as commissioning and audits after construction, including those for LEED certification.

ACHIEVABLE WITHIN CURRENT FUNDING LEVELS?

Yes, for those facilities in construction. For facilities in design, alignment of designs and funding requires proactive efforts and management decision-making to preserve features that increase resiliency and lower operating costs and GHG emissions.

HOW IS VULNERABILITY DISCLOSED IN SMITHSONIAN FINANCIAL REPORTING AND ENTERPRISE RISK MANAGEMENT PROCESS?

Major revitalization projects include an overall risk management assessment study as well as a PDRI project definition review process during design. These are typically focused on unknown or less predictable conditions that can impact budget and schedule and less directed at long term project resiliency.

TOPIC 2

Enhancing Climate Literacy in the Management Workforce and the Public

The Smithsonian's mission area offers staff, including the management workforce, a robust set of learning opportunities to enhance their climate literacy. These opportunities are presented through internal communication products, exhibits, live events, and digital resources.

The Recycling Task Force (RTF) is the primary distributor of climate literacy content targeted to Smithsonian employees. While the group focuses most of their efforts on enhancing sustainable practices within the Institution, the content delivered is closely tied to climate change and often tackles the broader issues that expand employees grasp and understanding of the topic.

All Smithsonian staff receive the RTF's quarterly email newsletter, Sustainability Matters, which includes articles covering a broad range of topics. The RTF also hosts a web site that includes a searchable archive of the previous 10+ years of articles. Supplementing their digital resources, the team conducts various outreach events, including a recent virtual Q&A session featuring leadership from across the Institution involved with sustainability efforts.

Briefings about Smithsonian's Climate Change Adaptation Plan, including climate and resiliency information, continue to be provided to internal and external stakeholder groups.

Engaging audiences of all types on the issues surrounding climate change is a core tenet of the Smithsonian's mission. Exhibits, events, and digital resources are not only targeted to the general public, other governmental groups, and congress, but to employees as well. A sampling of those resources is included below:

Exhibits
National Museum of Natural History – Journey Through Deep Time
Cooper Hewitt Design Museum – Nature by Design
Smithsonian Gardens — Habitat
Networks & Events
Smithsonian Conservation Commons
Earth Optimism
Earth Day/Earth Hour
America Recycles Day
Digital Resources
Global Climate Change in Perspective
Making Sense of Climate Change: A 6 Part Series
Ecosystems on the Edge: Climate Change

These resources only scratch the surface of the learning opportunities available to staff. Yet, enhancing staff's climate literacy via voluntary opportunities does not necessarily mean that an effective climate literacy education program is in place. Over the course of the next year, the Smithsonian will begin planning the development of a mandatory climate literacy training course for its management workforce.

The SI Chief Sustainability Officer will lead climate literacy enhancement efforts by:

- Forming a team to determine the required educational components of a climate literacy program tailored to the management workforce.
- Developing a web-based training course to educate the management workforce on critical climate change topics.
- Ensuring the management workforce is aware of the training requirement and track participation across the Institution.

TOPIC 3

Describe Agency Actions to Enhance Climate Resilience

The Smithsonian is dedicated to enhancing climate resilience through the management of installations, buildings, facilities, and natural and built infrastructure across the Institution's properties in the United States and abroad. In developing a process to evaluate and prioritize mitigation actions, the Smithsonian must account for requirements for improving efficient operations while still maintaining suitable environments for diverse collections, staff, and visitors.

Each Smithsonian property has an integrated facilities team (IFT) comprised of staff from the Office of Planning Design and Construction, the Office of Business Administration and Technical Services, the Office of Safety and Environmental Management, the Office of Facilities Management and Reliability, the Office of Protection Services, museum building managers, and others across the organization. The IFT discusses the planning, design, construction, operation, maintenance, preservation, repair, renovation, and management of Smithsonian owned and leased facilities and encourages coordination. Several facilities are nearing 150 years old, some of which are designated as national historic landmarks. This presents unique challenges as the IFT must be innovative in creating solutions that protect both the integrity of the structure and the historic status.

Ongoing revitalization of aging facilities continues to be a priority to maintain the goal of reducing energy use and managing water. Adaptation actions pursued by the Smithsonian have been achieved within Facilities Master Plans, property management, renovation and new construction projects, and horticultural activities.

The master planners in the Office of Planning, Design, and Construction coordinate development of campus-wide and individual building master plans among inter-disciplinary stakeholder groups that identify long-term strategies to address resiliency through feasibility studies, renovation, and new construction, which allows the Smithsonian to improve performance and accommodate evolving programs and expanding collections. A key facet of this is to incorporate climate change actions into projects for long term growth and development.

The Smithsonian's Real Estate, Contracting, and Property Management staff have also contributed to climate resiliency through purchasing the Capital Gallery West Tower and portions of the East Tower for the Smithsonian Headquarters Consolidation effort. This will consolidate staff within a LEED-Silver building, reduce inter-office travel, and better safeguard staff against climate events with a more centralized footprint.

To renovate and replace outdated facilities and systems, the Smithsonian has begun a major revitalization project. The Smithsonian Institution Building, the "Castle," is the Institution's first home and its symbolic heart. The Arts and Industries Building opened in 1881 as the first home of the National Museum. Together, these buildings comprise the Smithsonian's Historic Core. Both buildings need major revitalization, work that will include new and efficient heating, air conditioning, and ventilation systems, new electrical and plumbing systems, and new telecommunications, security, and life safety systems. A new, underground Central Utility Plant will provide efficient mechanical and electrical infrastructure with significantly reduced greenhouse gas emissions while increasing the climate resilience of the Historic Core.

The revitalization of the National Air and Space Museum also demonstrates the Smithsonian's commitment to climate readiness and adaptation. The project includes installation of a 108,025-gallon cistern on the west side of the building and a 130,705-gallon cistern on the east side to collect stormwater from the roof to be used to irrigate the surrounding gardens. In addition to the cisterns, six existing trees and 56 newly planted trees will provide stormwater retention.

The Suitland Collections Center master plan provides a framework to renovate and correctly maintain stormwater assets. It includes a plan to reduce impervious surfaces to aid in stormwater runoff.

The revitalization of the Historic Core will include renovations to the Smithsonian Instituion Building (Castle).

In addition to the built infrastructure, the Smithsonian also manages a vast landscaping portfolio through Smithsonian Gardens (SG). There are several resiliency considerations that SG brings both to their own projects and when collaborating on capital projects.

Trees that were appropriate for the Smithsonian campus when planted may no longer be appropriate to re-plant. In 2012, when the USDA revised their plant hardiness zone map, the revision showed Smithsonian's region to be 5 degrees Fahrenheit and a half-zone warmer than the previous map (1990). Because Smithsonian Gardens is planning for the next 200 years when planting trees, resiliency and adaptation to warmer weather is vitally important.

There are many advantages of a campus with a full tree canopy, including reduction in runoff (leaf canopies reduce erosion caused by falling rain; leaf canopies provide surface area where rainwater lands and evaporates; roots take up water; roots create conditions in the soil that promote infiltration; they make the soil more permeable), absorption of carbon dioxide, and reduction in the urban heat island effect.

To increase climate resiliency, the Smithsonian is moving to planted areas as a landscaping feature over traditional, manicured turf area. Planted areas are better able to reduce runoff, they are a more effective carbon sink, the soils for planted beds have a higher organic content than the soils for turf, they provide wildlife habitats, they require less water, and they provide educational and interpretive opportunities. For example, the recently completed Anacostia Community Museum (ACM) Landscape provides protection and habitat restoration to the Anacostia River often dubbed "the forgotten river" due to continued abuse and neglect. ACM is in an underserved community at higher risk for the negative impacts due to climate change. By focusing on this landscape, the Smithsonian is protecting a vulnerable ecosystem while also introducing visitors to the plants that make this area unique and teaching them how to live more sustainably.

Smithsonian Gardens also recently introduced its resiliency practices to the D.C. Department of Energy and Environment at Smithsonian-hosted on-site workshop.

The Smithsonian strives to achieve climate resilient facilities and services through future mitigation actions. The Smithsonian will be selecting sites for two new museums and climate resilient practices and actions will be considered during design, construction, operations, and maintenance. Site selection will include vulnerability assessments that will determine risk and impact on the surrounding environment and evaluate potential locations with respect to FEMA 1% and .2% flood plain. Sites will be evaluated for their accessibility to and representational capacity to serve their respective stakeholders including American Latinos and American Women.

Our asset management process includes several systems: Facility Requirements Database, IBM Trirega (Facility Center), Management Evaluation and Technical Review, and Facility Condition Assessment. The data obtained from these systems provides a criticality score to allow the Smithsonian to prioritize the maintenance of facilities, spaces, and assets by weighing twelve influencing factors. The system can potentially be used to help make decisions in keeping Smithsonian assets and systems resilient. Adding a "climate risk" factor to be weighed into the criticality score could be a useful way to evaluate assets at risk due to climate change or to keep assets climate resilient.

The Smithsonian Institution is a unique organization in that it sees 30 million visitors per year, and its "goods and services" revolve around robust collections. Smithsonian's climate-ready actions must account for all elements that comprise the Institution.

An important aspect of making collections climate-robust is making them available digitally. As of FY2020, the Smithsonian has posted 6.5 million digitally-available objects and specimens through the collections search feature on si.edu. In an effort to innovate and meet mission needs, an office dedicated to digitization, the Digitization Program Office (DPO), was founded in 2009 to "increase the quantity, quality, and impact of digitized Smithsonian collections" through cutting edge technologies and high-quality processes. Not only does digitizing help to better manage collections, but it also enhances public access. But, should access to collections be limited for any reason, including impacts of climate change, either in person or digitally, Smithsonian will not be able to meet its mission.

Additional climate-ready management actions regarding the "goods and services" involve building awareness for staff and visitors by providing timely alerts through LiveSafe technology for urgent staff notifications or increasing weather awareness for snow events or to prepare for hurricane season.

The Smithsonian is planning for a new centralized data center to ensure integrity of information services and is increasing the availability of emergency generators to provide power to facilities housing vulnerable collections. This is imperative as continued, quality information services and technology keeps Smithsonian staff productive while providing digital access to our visitors.

The five most critical supplies or services that are at risk due to disruption by acute extreme weather events or long-term climatic change include Smithsonian's telecommunications network and digital collections records; the ability to conduct research and outreach; being able to provide access to facilities, collections, or grounds, or websites to diffuse knowledge; the protection of collections; and adequate water supply for fire suppression.

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