

**U.S. House of Representatives
Committee on Science and Technology
Subcommittee on Research and Science Education**

**Testimony of Ms. Claudine Brown
Director of Education, Smithsonian Institution**

21 July 2010

Mr. Chairman and Members of the Subcommittee –

It is my great pleasure to appear before the Subcommittee to testify about science education at the Smithsonian Institution. I was recently named the director of education for the Smithsonian. Prior to this position, I served for more than a decade as the director of the arts and culture program at the Nathan Cummings Foundation in New York. Although I have been away for awhile, I am not new to the Smithsonian. In 1990, I was the Smithsonian's director of the National African-American Museum Project. In this position, I coordinated the efforts of advisory committees that considered the role of the Smithsonian in the development of a national museum devoted exclusively to the documentation of African American life, art, history and culture. In 1991, I was the deputy assistant secretary for the arts and humanities and developed policy for many Smithsonian museums. It is good to be back at the Smithsonian, especially at such a pivotal time in its history, a time when our education offerings will reach new audiences on the Mall in Washington, DC, throughout the country and the world.

As early as his installation ceremony, Secretary Clough made it clear that the Smithsonian would be focused on education. The Smithsonian has a long history of serving educators by providing extensive informal and formal education for learners of all ages. During this time in our history when we are of necessity considering our world holistically, encyclopedic institutions like the Smithsonian are uniquely suited to help learners understand the connections between the sciences, arts and humanities. We believe that the Smithsonian is essential in helping educators better understand and explain our complex and interconnected world. The Smithsonian looks forward to partnering with more educators in schools and institutions of higher education to provide access to resources that will help prepare students for the future. The Smithsonian's new strategic plan referenced by Secretary Clough in his remarks has already begun to make important inroads regarding our educational outreach as we address our four Grand Challenges.

As the director of education, I will be responsible for defining the Smithsonian's education program and will report directly to the Secretary. I have been tasked with the development of an Institution-wide plan for educational initiatives, the implementation of assessment strategies that will measure our impact on the field and securing support for projects that will benefit K-12 students. In this capacity, I will also oversee two of the Smithsonian's educational

organizations—the National Science Resources Center, the Smithsonian Center for Education and Museum Studies and hope to oversee the Smithsonian Institution Traveling Exhibition Service, the Smithsonian Associates, and the Smithsonian Affiliates program as well. I will also coordinate the efforts of 32 education-based offices in museums and science centers throughout the Smithsonian.

Currently, many of the Smithsonian museums, research centers, and outreach offices work with educators on both a local and national level to enhance the teaching of science through the use of our collections and research. We assist school administrators with the development of strategic plans that lead to the implementation of research-based science education programs in their districts. We provide traditional curricula, and digital teaching tools so that we can enhance school based learning. We also train teachers throughout the country who use our curriculum to teach science in innovative ways. We continue to be well-respected for offering timely and engaging on-site programs that give educators and students direct access to primary source materials and expose them to concrete examples of natural phenomena and scientific innovations. One of my challenges will be to unify our many education initiatives and help the Smithsonian become a greater resource for students and teachers across the country—especially those who don't have the opportunity to participate in on-site programming.

High-quality, inquiry-oriented science instruction is essential for effective science education programs. Museums, zoos, our 20 libraries, botanic gardens and other sites that offer hands-on learning can play an important role in transforming education in our nation. The lessons that we learn from teaching science in our museums and research centers are rapidly being translated into digital forms that can be broadly disseminated.

We are living in a moment when the convergence of the intellectual and creative capital of the Smithsonian Institution and the opportunities made possible by the digital revolution lead to broad and engaging points of access for learners of all ages. By using new technology extensively, we will reach new generations and audiences and make it easier for them to reach us. The social networks that did not exist until recently such as blogs, Twitter, YouTube, Wikipedia, podcasts, and Web cams are quickly becoming transformative for the Smithsonian.

Technology presents a new opportunity to shape the future of education. It is no longer acceptable for us to share only a small percentage of our 137 million specimens and artifacts in an age when the Internet and technology have made it possible to share it all. In addition to technology, we need to continue our focus on education programs— which are areas of profound strength at the Smithsonian. We need to make our collections, talented scholars, researchers, and educators accessible worldwide by providing additional platforms, opportunities, and creative vehicles for educating and inspiring people of all ages and cultural backgrounds. Our job is to authenticate and inform the significance of the collections, not to control access to them. In doing this, the relevance of the Smithsonian to education can be greatly enhanced as we learn

from learners new applications for our scholarship. By focusing on these areas, we can inspire people on a national and international basis.

The Smithsonian is playing a key role in advancing science education across the country. I would like to take a few minutes to highlight some of the many Smithsonian educational programs that have a direct impact on science education.

Smithsonian Center for Education and Museum Studies

The Smithsonian Center for Education and Museum Studies (SCEMS) has made great use of technology by hosting a number of virtual conferences. People from around the world join Smithsonian scientists, curators, and educators in real time as together they explore Smithsonian research and collections. In addition to live interactive sessions, the conferences include moderated forums, demonstrations of educational resources and strategies, virtual exhibit hall presentations, podcasts, social networking, and gaming/simulations. All sessions are closed captioned and archived for future viewing.

To date these conferences have included 34 hours of live programming, 20,000 participants from 100 countries, all U.S. states and territories, more than 3,000 cities, and 6 continents. Audiences have included K-12 teachers and students, university and community/technical college faculty and students; librarians; congressional staff members; Girl Scout troops, tribal councils; and staff members of congressional offices and government agencies, non-governmental organizations, museums, corporations, as well as the general public.

SCEMS also uses technology to take Smithsonian experts and collections into our nation's classrooms. Educators search by state standards from a database of over 1,700 educational resources on SmithsonianEducation.org. Teachers and their students participate in interactive Smithsonian online conferences—making predictions, asking questions, and posting ideas of their own. Students play simulations and games and complete community-based missions inspired by Smithsonian research. In Smithsonian workshops, teachers and teens create their own games, scavenger hunts, blogs and podcasts and share them through social networks. Recent topics for the Centers programs have included climate change, understanding spatial relations in the universe, and problem solving methods across disciplines.

National Science Resources Center

As part of its mission, to insure “the increase and diffusion of knowledge,” the Smithsonian is committed to scientific literacy for learners of all ages. The National Science Resources Center (NSRC) was established in 1985 by the Smithsonian Institution and the National Academies to improve the learning and teaching of science for all students in the United States and throughout the world. To achieve the Smithsonian's and the Center's missions, NSRC has, for more than two decades, leveraged the research and expertise of the Smithsonian, the National Academies

and other institutions to develop science education programs in partnership with dozens of government agencies, academic institutions, corporations and museums.

The Smithsonian, through the auspices of the NSRC is committed to helping leaders learn how to implement a systemic approach to science education by connecting educators and decision makers to the vast resources and research of the Smithsonian Institution and the National Academies. NSRC programs are now in K-12 science programs in more than 1,200 school districts representing 30% of the U.S. student population in 48 states as well as overseas in nine countries. More than 90% of the school districts with which NSRC works have made long-term improvements in the way they teach science, resulting in significant gains in student achievement.

Smithsonian Astrophysical Observatory and the Harvard-Smithsonian Center for Astrophysics

The Smithsonian is fortunate to have a national program known as the Smithsonian Astrophysical Observatory (SAO). SAO's mission is to advance the public's knowledge and understanding of the universe through research and education in astronomy and astrophysics. SAO engages in cutting-edge research in areas ranging from small, individual projects to major partnerships with other government organizations and academic institutions. Founded in 1890, SAO is the largest and most diverse astrophysical institution in the world. It has pioneered the development of orbiting observatories and large, ground-based telescopes; the application of computers to study astrophysical problems; and the integration of laboratory measurements and theoretical astrophysics. Observational data are gathered at SAO's premier facilities including the Sub millimeter Array (SMA) observatory on Mauna Kea Hawaii.

The Harvard-Smithsonian Center for Astrophysics (CfA) brings the resources and research facilities of the Harvard College Observatory and the Smithsonian Astrophysical Observatory under a single director to pursue studies of basic physical processes that determine the nature and evolution of the universe. CfA is involved in many aspects of education and public outreach, from major museum exhibits to curriculum development to education research. CfA's Science Education Department is a leadership organization that provides professional development in astronomy and basic science for teachers and curricula for grades K-12.

Smithsonian Environmental Research Center

Established in 1965, the Smithsonian Environmental Research Center (SERC) is the leading national research center for understanding environmental issues in the coastal zone. The site encompasses 3,000 acres of land and 14 miles of protected shoreline on the Chesapeake Bay that serve as a natural laboratory for long-term ecological research. The unique location provides valuable opportunities to study the interactions of aquatic, terrestrial and atmospheric components of complex landscapes. Through interdisciplinary, experimental research, SERC

scientists are working to understand how ecosystems interact and are linked in this critical zone where the land meets the sea, and how physical and chemical processes sustain life on Earth.

Education and outreach are major components of the Smithsonian Environmental Research Center (SERC). SERC offers a broad array of opportunities for people of all ages to learn about the ecology of the Chesapeake Bay area and to increase their appreciation for the environment. SERC offers on-site K-12 programs, distance learning, public programs and professional training.

SERC has been a prime location for groups to get hands-on experience with environmental science and ecology. Recently, SERC has dramatically increased its efforts to educate a larger population about the Bay and its watershed by providing distance learning and web-based education programs for K-12 students and adults. These new programs are designed to complement, not replace, the existing hands-on education programs, by expanding our reach and offering students nationwide an opportunity to learn about an important ecosystem, and visit behind the scenes at SERC where conventional visitors are unable to go. Geographic distance, cost, and limited time can prevent members of the public, especially schoolteachers and students, from making the trip. Communication technologies developed for distance learning, however, have connected students and teachers from across the country to Smithsonian scientists who study the Chesapeake Bay and its watershed. SERC's Education Program is committed to broadening society's understanding of the environment, communicating an awareness of how human activities influence ecosystems, and training future generations of environmental scientists.

Smithsonian Tropical Research Institute

The Smithsonian Tropical Research Institute (STRI) in Panama is dedicated to fostering a greater understanding of biological diversity issues. The training of future generations of tropical biologists has been identified as a priority among the goals for scientific excellence in STRI's strategic plan. Fellowships are the primary goal of scientific training at STRI, but other strategies include internships, field courses, seminars and workshops. STRI in collaboration with McGill University developed an interdisciplinary and inter-institutional graduate program based in Panama. Recently, the Smithsonian joined Arizona State University in an innovative education and science partnership aimed at sustaining a biodiverse planet. The partnership will create opportunities for ASU undergraduates, graduate students and faculty to participate in fieldwork at Smithsonian facilities in Panama, as well as for the development of virtual global classrooms that center on current research in tropical ecosystems. Smithsonian scientists will also participate in ASU degree programs.

Smithsonian Conservation Biology Institute

The Smithsonian Conservation Biology Institute (SCBI) is a program of the Smithsonian's National Zoological Park. It is one of the world's most extensive programs of conservation biology research. SCBI works directly with teachers, students, and their parents to develop awareness of and appreciation for the need to preserve biodiversity at home and abroad. Hands-on methods of teacher training and student involvement in conservation education are used at SCBI. National Zoo staff and research associates have offered training courses in the United States and at more than 20 international locations on a variety of topics for over three decades. During this time, more than 5,000 individuals from more than 85 countries have taken part in such efforts.

In October 2008, the Smithsonian and George Mason University created a new, comprehensive academic program, the Smithsonian-Mason Global Conservation Education Program. This new program incorporates multidisciplinary faculty from the Zoo's Center for Conservation Education and Sustainability and George Mason University's Center for Conservation Studies and will train students to help avert and treat the looming biodiversity crisis. The program will provide academic opportunities for as many as 50 undergraduate students per semester, and an additional 60 professional or graduate students.

National Air and Space Museum

The National Air and Space Museum (NASM) offers a variety of free educational programs for school groups and organized youth groups. The museum has developed teaching posters and guides for students in grades K-12 that will advance their knowledge of science and technology. Areas of focus for curricula include: *Living and Working in Space*, which introduces students to the environmental conditions in space, the challenges that must be overcome to live and work there, and advances in spacesuit technology; *Embracing The Impossible: Popular Response to the Aerial Age* exposes students to primary source materials that help them understand how people felt about the new technology of flying in the early 1900s; *Reflections on Earth: Biodiversity and Remote Sensing* includes lessons for interpreting satellite images and field studies; Students learn to measure and monitor forest biodiversity on a local, regional, and global scale; and *Destiny in Space* is a guide that examines our future prospects for space exploration. NASM's activities, information, and resources cover a range of topics including: muscle response to weightlessness, robotic guides, suiting up for space, communication and gardening in space.

Students may also interact with the National Air and Space Museum without leaving the classroom! The museum offers Interactive Videoconferencing programs featuring the museum's staff and docent volunteers. NASM also offers Electronic Field Trips (two-way distance learning interactions) as well as occasional webcast educational programs. Use of the unique National

Air and Space Museum collection and the universally-engaging nature of aviation and space make these programs relevant and exciting. These interactive electronic experiences augment teacher lesson plans.

National Museum of Natural History

As one of the largest science classrooms in the world, the National Museum of Natural History supports the work of teachers who seek to explore the natural world through the Museum's exhibits, and online resources. The Museum's work is built on a foundation of scientific research by the Museum's staff of over 150 scientists and curators as well as the national and international community of scientists. There are more than 126 million artifacts and specimens in its collections. The Museum provides both field-trip-related and non-field-trip-related lesson plans, web-based activities for students, and other resources that can help teach a range of science and natural history topics.

A visit to exhibitions such as the O. Orkin Insect Zoo and the Butterfly Pavilion bring the natural world up close and personal with the opportunity to interact with living creatures. Venues such as the Discovery Room and the Naturalist Center offer a hands-on approach to learning, using artifacts and specimens from the Museum's collections to make science and scientific processes real. The museum's goal is to educate and inspire the next generation and encourage respect for the natural world. The museum's programs are designed to address these goals. Two of its key professional development programs are *Dig it: Secrets of Soil* and *Project Archaeology: Investigating Shelter-Archaeology of the Colonial Chesapeake*. Lesson plans cover such topics as Measuring Biodiversity Across North America, Anthropology, Ecosystems, and Lewis and Clark as Naturalists.

National Zoological Park (NZP) and Friends of the National Zoo (FONZ)

The Smithsonian's NZP and FONZ offer a wide variety of programs, resources, internships and volunteer opportunities for students of all ages. Each year thousands of school groups, individual students, and teachers use the Zoo as a living classroom. They come to gain a better understanding of the natural world in which we live, to enjoy beautiful animals in an outdoor oasis, and to engage in exciting, hands-on science. On average, the National Zoo reaches 5,800 DC students and trains 75 teachers in workshops each year. Uncounted thousands more students enjoy the Zoo during field trips. There are many exciting programs at the Zoo that teach about science for example, Bridging the Americas/Unidos por las Aves is a cross-cultural environmental education program that partners elementary and middle school classes in the DC Metro area with classes in Latin America and the Caribbean. Partnered classes learn about the migratory birds that connect these two regions of the hemisphere. The program is designed to instill an appreciation for migratory birds and the need to protect the habitats they depend on throughout the year, as well as to stimulate an interest in learning about other countries and their

cultures. Teachers are provided with content, materials, and support that enable them to use birds as a theme for teaching required standards and beyond in multiple subject areas.

Smithsonian Institution Traveling Exhibition Service

In its nearly 60 years of delivering Smithsonian exhibitions to museums and science centers across the nation, SITES has devoted fully one third of its program to science. From projects that bring North American visitors close to the wonders of the tropical rainforests in the southern hemisphere to tracking the elusive giant squid, the work of Smithsonian scientists and researchers is always on exhibit somewhere in the United States. SITES exhibitions invite its audiences to explore anthropology, astronomy, biology and environmental studies, entomology, geology, paleontology, ichthyology, oceanography, polar studies, vertebrate biology and veterinary studies. Current offerings include a close-up look at the fascinating world of ants, satellite images of Earth seen from space, insights into the scientific research at McMurdoe Station in Antarctica and x-rays of spacesuits along with rarely exhibited astronaut gear. Future projects include an interactive exhibition about diseases that pass from animals to humans and back again and a careful assessment of invasive species.

The Smithsonian Associates

The Smithsonian Associates (TSA) provides science education as a part of GEAR UP through the US Department of Education. Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) encourages middle and high school students to consider pursuing higher education. GEAR UP is a federal program that grants funding to states and partnerships that provide programs and services for increasing low-income students' preparation for postsecondary education. GEAR UP programs serve cohorts of students before they begin seventh grade and supports them through high school.

TSA is working with the Lafayette Parish School System in Louisiana on a six year effort to engage teachers and students from 6th to 12th grade in science learning. Smithsonian scholars will deliver 11 programs for the duration of the GEAR UP grant. TSA's upcoming informal science education programs include: *Time and the Brain*; *Our Asymmetrical, Imperfect and Gloriously Messy Universe*; *Northern Lights*; *A Message from the Sun*; and *Dark Matter and Dark Energy: Cutting-Edge Findings*.

Thank you for giving me the opportunity to testify. I look forward to working with the committee and Members of Congress in providing the Smithsonian's insight, experience and expertise regarding science education. I know that the Smithsonian can continue to play an important role as a resource for change in the current science education paradigm. I would be pleased to answer any questions you might have.