

Proposal to "Museums for America" Program  
by the Sciencenter, Ithaca, NY

**"Global Warming Activity Toolkit"**

**1. Project Design**

**Goals and strategic objectives:** Every day, we read or hear in the media about the growing consensus that global warming is occurring, and that if we do not take action soon, our global society will face unprecedented environmental change (and probable disaster). Our museum, in researching trends for a recent strategic planning process, determined that educating the public on the science of sustainability (and global warming in particular), at both the local and international levels, was the most important thing that we could apply our resources toward for the next five years.

In support of this strategic application of our educational efforts, we propose to develop a set of engaging, hands-on science activities to help the Sciencenter and other museums throughout the world raise awareness of the science and issues related to global warming while also building their audiences by addressing a topic in current science (as opposed to older and accepted topics commonly addressed in science museums). The strategic goals of the project are to:

- Advance our mission to "inspire people of all ages and backgrounds to discover the excitement of science through programs and exhibits that promote learning through interaction"
- Advance our vision to "touch the mind of each and every young person in our community; expanding our reach and depth over time"
- Advance our organization's strategic goal of contributing to the health of our planet by educating the public on the science of sustainability.
- To develop the capacity to better engage visitors by creating public forums on topics of current science, using technology such as interactive polling devices with real-time display of results.

The specific project objectives include:

1. Develop 10 hands-on, cart-type science activities for families in a museum setting or for children in an afterschool setting, that will involve them with the science of climate change and global warming. *Example: develop an activity using ice, water, and other materials to show what happens to sea level when ice sheets melt; depending on whether the ice is supported by land or is floating, the effects on water level in the container (sea level by analogy) are surprisingly different.*
2. Develop 4 hands-on, self-guided science activities, each of which can be packaged in a 1-gallon Ziplock bag and bundled together into a student backpack for check-out by families at the front desk in a museum setting. *Example: develop an activity using thermometers beneath black and white covers, and a stopwatch, to demonstrate heat absorption and relate it to solar radiation on shrinking snow masses.*
3. Develop a 2-hour workshop for children and adult caregivers on alternative energy source, for delivery in a museum or school setting. *Example: develop a workshop on alternative energy, such as wind, that reduces atmospheric CO<sub>2</sub> and its greenhouse effect; provide materials for families to build, test, and optimize a small wind generation system using simple parts and a fan for the wind.*
4. Develop a 20-minute public forum on global warming for visitors, moderated by museum educators or volunteers in a museum amphitheater setting. The forum will use new technology and will employ "active learning" techniques by the university community (thought-provoking questions, audience small-group discussion of issues, and low-cost remote polling devices) so participants can anonymously vote on issues and see real-time histograms of their collective responses on a PowerPoint slide.

We will use formative evaluation to test and revise all of the activities and ensure that they are as engaging and educational effective as possible. We will deliver the hands-on activities to underserved youth at the Greater

Ithaca Activities Center (a local multicultural community center), the B.J. Martin School (a nearby school serving mostly African American and Latino children), and 4 rural, out-of-county schools.

**We will disseminate all products internationally through ASTC's online Global Warming Toolkit, a website that provides educational support on global warming to museums throughout the world.**

**Partnerships:** To accomplish these objectives efficiently, we will partner with several experts and three networks of scientists and engineers at the national and international level to generate engaging activities that are technically sound and educationally effective. Each partner has a strong interest in sustainability and is interested in the proposed project because it will help them further their own educational and outreach mission.

- Prof. Lou Derry, Dept. of Earth & Atmospheric Sciences, Cornell University. Prof. Derry is an expert on the science of global warming; he has lectured extensively on the subject and will advise the project on scientific correctness during the conception of topics for educational activities.
- Prof. Maria Terrell, Dept. of Mathematics, Cornell University. Prof. Terrell, who directs Cornell's Teaching Assistant Program, has more than 10 years of research and practice in active learning techniques that enhance learning through the use of "deep questions" to better engage students; Terrell will use the project to test how her university-based research translates to family audiences.
- Walter Staveloz, Association of Science-Technology Centers (ASTC) Washington, DC. Mr. Staveloz is Director of International Relations and leads the 3-year project IGLO (International action on GLObal warming); he will review ideas for educational activities and will facilitate the posting of all activities to an online toolkit on global warming. Dr. Charles Trautmann, executive director of the Sciencenter, is on ASTC's board. He is secretary of ASTC's Education Committee and works closely with Mr. Staveloz.
- Dr. David Herring, National Oceanic and Atmospheric Administration (NOAA). Dr. Herring is a member of the IGLO Education Committee and a national expert on global warming; he will assist in conceiving educational activities and reviewing them to ensure that the science is correct.
- Dr. Rhian Salmon, Executive Director, International Polar Year (IPY) (2007-2009). Dr. Salmon is an advisor to the IGLO project and is director of a network of over 10,000 scientists worldwide who work on polar climate change science. She will use this network of scientists to help generate ideas for activities and review them in the prototype stage.

**Project Management, process for making mid-course corrections, evaluation:** Dr. Rae Ostman, Director of Education at the Sciencenter, will manage the project. Prior to joining the Sciencenter staff in 2005, Dr. Ostman was a project manager at the Exploratorium in San Francisco, where she successfully completed a major NSF-sponsored education project entitled "Going APE: Active Prolonged Exploration." She will oversee the development of the activities, testing, formative evaluation, revision, implementation at the local level, and posting on the ASTC website. She will oversee the project triple-constraints of quality, budget, and schedule. Our grant projects director, Dr. Catherine McCarthy, will provide administrative support, reporting, and subcontract oversight.

Ms. Alexis Abramo, staff education program developer, will assist in developing, testing and finalizing the educational activities. Ms. Abramo, who has an M.A.T in science teaching, has developed many successful activities for youth and family audiences for museum and classroom settings.

The Sciencenter has a strong culture of formative evaluation in all that we create, and we list our general process for developing new activities on the one-page summary of our strategic plan (which includes the statement "Prototype everything!"). For this project, each educational activity will go through a rigorous process of idea generation and vetting that includes: staff review of all ideas, prototype development, formative evaluation by staff, revision, retesting, write-up, and posting on the Internet.

We will engage Seavoss Associates, Inc., an experienced educational program evaluation firm, to advise us during the project, make 2 formative evaluation visits, and conduct the summative evaluation. The evaluation will involve two parts: 1) an assessment of how well the project met its goals, and 2) a mini-longitudinal study of the depth of impact of the project three months after visitor participation. In particular, this study will document the degree to which museum visitors were changed by their experience and extended their learning by doing something at home after participating in a program at the museum.

This approach serves our strategic vision by documenting the depth of involvement of our audience and will help us to build capacity for future educational projects. To carry out the survey, we will invite a sample of participants to write their name and address on an envelope and list an email address. Three months after their participation, we will email them or mail a one-page survey with postage-paid return envelope in their self-addressed envelope. This technique should foster a high return rate. The survey will assess visitors' recollection of experiences at the museum and will ask about related follow-up activities to document whether the museum experience inspired further interest or a change in attitude or behavior.

## **2. Grant Program Goals**

This project serves the Museums for America goal of "strengthening the museum's ability to serve the public through high-priority activities that advance the mission and strategic goals of the Sciencenter" in the following ways:

- The Sciencenter will use this opportunity to build the capacity to create new educational activities that address current public issues in science. (Our current portfolio of activities addresses basic and time-tested scientific principles such as magnetism, simple machines, buoyancy, etc.) These new activities will help visitors explore their curiosity on current science, which we expect will lead to deeper museum experiences, better word-of-mouth, and growth of our overall audience.
- The project will help us to build the capacity to apply the field of "active learning" for the first time to our amphitheater and public lecture presentations. The principles of active learning were developed for university classroom settings and, while showing considerable promise for museums, have not yet been translated to public presentations in informal settings at museums.<sup>1</sup>
- The purchase and use of low-cost anonymous polling devices ("clickers") and state-of-the-art radio frequency (RF) receiver technology<sup>2</sup> will add a useful tool to our amphitheater presentation capabilities. This addition represents another objective of our strategic plan: to use emerging technology to enhance our educational efforts.

## **3. How the Project Fits Into Strategic Plan and Mission**

This project advances the Sciencenter's mission, vision, and strategic plan in several specific ways:

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<sup>1</sup> In active learning, a presenter encourages deeper engagement of a group of learners in a lecture-type format by asking thought-provoking questions and facilitating periodic small-group discussions between lecture segments (e.g., in a museum amphitheater presentation on a topic). Inquiry-based learning, in contrast, is a process that involves getting students to ask their own questions and follow their interest and curiosity in answering the questions that they themselves ask (e.g., in a hands-on classroom presentation on a topic of science).

<sup>2</sup> Previous polling technology used infrared technology, which required users to point their remote at a single point in the amphitheater (difficult for families with children). New devices, enhanced recently with RF technology, do not require aiming and therefore represent a significant improvement for family audience use. They are not yet widely known in museums; the older devices received mixed reviews because of the difficulty of aiming them.

- The activities will be the first in our educational program to support public education about sustainability, a mission-based topic of science which the museum identified in 2006 as its highest priority for the next five years.
- The project serves as a strategic investment in the Sciencenter's institutional capacity to deliver educational program more effectively in the following three ways:
  1. By building activities on current science, we hope to build our audience
  2. By implementing new technology (anonymous polling devices and the associated software), we will serve an element of our strategic vision of increasing the depth of involvement of our audience in amphitheater-type programs
  3. By cross-fertilizing from the field of "active learning" in university settings, we will incorporate techniques of deep questions and audience involvement to increase the impact of our programming.
- The project will reach an estimated 15,000 individuals per year in our regional audience with hands-on, mission-based educational activities, making a significant contribution toward our vision of reaching large numbers of our local audience.
- The project could reach tens of thousands of museum visitors world-wide through posting and promotion in ASTC's online Global Warming Toolkit.<sup>3</sup> This outcome would support our core value of "openly sharing our best practices in exhibits, programs, and museum management with a wider audience."
- The activities are high-priority for the public, as evidenced by the rapid increase in public concern over global warming in the past two years; this interest is unlikely to decrease unless current trends stabilize or reverse.

The project will lead to systemic change at the Sciencenter by increasing our ability to use technology and by linking us with scientific experts who can assist us and partner with us in future projects related to sustainability.

We anticipate that the activities we develop will serve our visitors and after-school audiences for a minimum of 5 years following the grant period. The project may also provide a new revenue stream through the sale of packaged educational materials for the activities as well as through the rental of our facility to other groups wishing to use the new technology in our amphitheater for their own public forums.

#### **4. Strategic Plan: Process and Financial Resources**

During our planning process, we determined that as a science museum, one of the most important things we can do is to address the issue of environmental sustainability. This outcome is reflected in our strategic plan, which includes "sustainability" as a key strategic initiative for the next five years. This initiative includes an *internal component* (i.e., converting to sustainable practices where possible, buying green products, etc.) and an *external component* (i.e., promoting public awareness about sustainability and the role of science). Each component is supported by short-term as well as long-term activities.

As described more fully in the 2-page summary of our strategic plan, the Sciencenter's planning committee (4 staff, 3 trustees, and 2 advisors) is an active one that meets bimonthly to facilitate developing, updating, and monitoring our strategic plan. Our most recent strategic plan (created in July 2005 and updated in 2006) is a living document that: 1) actively guides our annual work plan and 2) drives the investments we make in programs, exhibits, and organizational processes and institutional capacity.

<sup>3</sup> The director for the proposed project, Dr. Charles Trautmann, is responsible in part for the assembly and promotion of ASTC's online Global Warming Toolkit.

The plan input was broad-based and included 9 external focus groups, 14 external interviews, a board-staff retreat, and 16 planning workshops at various all-staff, board, and advisory board meetings over an 8-month period. Staff and trustees had the opportunity to review three drafts. Key portions of the plan are posted on staff bulletin boards and used regularly in decision making. Overall, the planning process led to two key insights:

- **Vision:** We came to the vision that we should use every resource at our disposal to reach “each and every young person” in our local community and also provide opportunities for in-depth exploration of science for those most interested in science. We should expand our community geographically and with respect to age over time.
- **Strategic theme:** We came to the realization that we could make the greatest impact on our local and global communities by focusing on public awareness of the need for environmentally sustainable practices and showing the role that science can play in creating a sustainable world for future generations (e.g., developing sustainable energy, reducing of global warming, creating green materials, etc.)

The proposed project will support our strategic plan by enabling us to develop educational programs to raise public awareness about the issue of sustainability. It will also support other elements of our strategic plan by helping us to expand our audience and introduce new technology.

The financial resources of the Sciencenter support our strategic plan in eight ways:

1. Most of our \$1.2 million budget (79%) supports programs, with only 6% for fundraising and 15% for administration. (We have essentially no debt, with only 0.6% of budget going to debt service).
2. We will end the current year in the black (including depreciation) for the 16<sup>th</sup> year in a row.
3. Next year, we are budgeting \$12,000 (1%) for internal sustainability efforts (e.g., replacing incandescent bulbs with CF bulbs that use less energy, buying recycled paper for copier and stationery, buying 100% wind-generated power, etc.).
4. 51% of our budget supports our main asset – our people – through salaries and benefits.
5. In 2006, we have supported 51 days of off-site professional development for our staff of 17, which builds our capacity to serve our mission by growing our people.
6. We budget \$10,000 (0.8%) annually to toward our endowment initiative, another key strategic initiative. Our goal is to raise \$4 million for endowment by 2010 to provide 10% of our budget.
7. We invest 3.3% of our budget for facility maintenance and upgrades, to ensure an excellent facility that supports our educational programming and exhibits.
8. 29% of our budget is supported by grants, which are strategically selected to advance our mission and vision by allowing us to create exhibits and educational programs that support our plan. We have an active process for identifying grant opportunities and weighing them against our organizational strategy. This MFA proposal is a direct result of that process.

## **5. Appropriateness of Project for Institution, Audience**

The proposed project is designed to will serve families visiting the Sciencenter with children under 12, which constitute nearly 90% of our visitors. Front-end surveys have tested the interest of our visitors and indicated that they are both highly concerned about environmental sustainability and uniformly enthusiastic about programming around this topic at the Sciencenter.

Our regional audience is 89% Caucasian, 7% African American, 3% Latino, and 1% other ethnicities. Our staff closely reflects these regional demographics and is 88% Caucasian, 6% African American, 6% Latino. The City of Ithaca has a population of 30,000 and Tompkins County is otherwise rural with a population of 100,000. Our audience highly interested in science, with Cornell University strong in math, science, and engineering and located 2 miles away. Our museum audience segments by age are 55% under 12 years old; and 45% between 25 to 45 years old; 5% teens; and 5% over 45 and seniors.

As with most museums, we serve a higher percentage of the people close to us. Our reach into the rural parts of our service region has been limited. In keeping with our strategic vision to expand our reach over time, we plan to use the proposed funding to begin delivering family science night programs at elementary schools located over 20 miles away – reaching a segment of our regional audience that we currently do not serve.

Our front end research is explained more fully in an attachment. Locally, we surveyed 24 visitors and received strong support for the activities in the proposed project. Additionally, we made use of an international ASTC survey of 32 museum directors and educators from five continents, who were asked to rank 108 potential educational programs, exhibits, and other activities on global warming. The proposed cart science activities and backpack activities ranked #1 and #2 overall. The proposed public forum ranked #10 and was the next highest ranked program idea that did not involve computers. (The family workshop was not included in the study). These results indicate that the project meets a clear need for museums.

We will promote the proposed programs to the public in at least eight ways.

1. Perhaps most importantly, all activities will be disseminated to science museums internationally through the Association of Science-Technology Centers online Global Warming Toolkit website. The Sciencenter's executive director is secretary of ASTC's Education Committee overseeing the design of the website and posting of materials on it.
2. All four activities (cart science, backpack, public forum, and family workshops) will be publicized to our upstate New York museum audience through our monthly eNewsletter, quarterly print newsletter, and at the museum itself through our regular signs and calendars of current activities.
3. The interactive activities will be presented by our teen and volunteer museum guides from carts on the museum floor; these activities are highly visible and always popular with visitors.
4. Backpacks containing family activities in Ziplock bags will be visible and available at the front desk for checkout; visitors leave a drivers license, which is returned when the backpack is returned.
5. Public forum presentations will be held on a regular basis for museum visitors and announced on the museum's PA system.
6. The family workshops will be publicized as above; generally, our workshops are well-subscribed and have waiting lists.
7. We will use the backpack and cart activities in our afterschool outreach classes at community centers.
8. We will use the activities in family science nights, promoted through regional school channels.

## **6. Project Resources: Time and Budget**

The Sciencenter has successfully completed \$4.5 million in sponsored educational program and exhibit development projects during the past decade without a budget overrun or a missed deliverable. The Sciencenter's grant projects director, Dr. Catherine McCarthy (5% time for two years), will ensure proper administrative management, monitor the evaluation consultant, and reporting to IMLS. Our strategic plan has a target range of 25-35% for grant funding as a percentage of our total budget, and we will remain within that range if the proposed project is funded.

A Gantt chart following the budget shows the project timeline. It includes staggered periods for research, prototyping, revising, evaluating, finalizing, and disseminating the four principal educational products (10 science cart activities, 4 family science backpack activities, public forum, and family workshop), in addition to evaluation and dissemination. All staff involved allocated time in their work plans during the project period to accomplish the project work.

The overall project budget is \$149,424, of which we have requested 50% from IMLS. Cost sharing will be primarily through contribution of indirect costs and staff time covered by operating funds and a grant from the Park Foundation (focused on expanding the Sciencenter's audience through new programs and outreach to rural portions of our service area).

## **7. Project Resources: Personnel and Technology**

Dr. Charles Trautmann, PhD, executive director, will serve as project director. During 16 years as director of the Sciencenter, he has managed dozens of projects totaling more than \$4 million. He serves on the board of the Association of Science-Technology Centers and is secretary of ASTC's education committee.

Dr. Rae Ostman, Director of Education, will manage the project. Prior to joining the Sciencenter staff in 2005, Dr. Ostman was a grant project manager at the Exploratorium in San Francisco, where she managed a multi-year NSF-sponsored museum education project titled "Going APE: Active Prolonged Exploration." She will oversee the development of the educational activities, including their ideation, development, formative evaluation, revision, implementation at the local level, and preparation for posting on the ASTC website for international dissemination as part of the Global Warming Toolkit. As project manager, Ostman will monitor the standard triple-constraint of quality, budget, and schedule. She will devote 20% time to the project over 2 years. Her commitment to sponsored projects will be 50%.

Ms. Alexis Abramo, staff education program developer, will assist in developing, testing and finalizing the educational activities. Ms. Abramo, who has an M.A.T in science teaching, directs the Sciencenter's summer science camp and has developed many engaging and successful activities for youth and family audiences in both museum and classroom settings. She will devote 25% time to the project over 2 years. Although responsible program delivery, she is not committed to any other sponsored projects.

Other staff will assist with specific portions of the project. Dr. Catherine McCarthy, grant projects director, will provide administrative support for the project. Hester Vermaak, public relations manager, will ensure promotion through our printed, broadcast, and web-based publicity channels. Dr. Charles Trautmann, executive director, will facilitate distribution of the program materials online through ASTC's online Global Warming toolkit; he is secretary of the site's education committee. Once developed, our staff and volunteer presenters will deliver the activities to the public at the Sciencenter, while we anticipate that many others will download the activity write-ups for delivery at museums worldwide through ASTC's online toolkit.

The Sciencenter will purchase 50 radio-frequency polling devices (similar to small TV remotes) and the associated receiver (about the size of a USB flash drive) plus software with project funds. We will use this project to build capacity to make use of the equipment in this and other public forums that we develop. Because polling is anonymous, and only summary totals are displayed. The opinions of individuals, as expressed by their votes, are not displayed or stored. There are no technology or facility-related issues for this project since all of the activities will be designed using readily available supplies and materials.

# BUDGET FORM - PAGE FOUR

## Section B: Summary Budget

	\$ IMLS	\$ Cost Share	\$ TOTAL COSTS
1. Salaries and Wages	24,633.00	33,201.00	57,834.00
2. Fringe Benefits	6,897.00	9,296.00	16,193.00
3. Consultant Fees	3,200.00		3,200.00
4. Travel			0.00
5. Supplies and Materials	9,300.00		9,300.00
6. Services	9,875.00		9,875.00
7. Student Support			0.00
8. Other Costs			0.00
<b>TOTAL DIRECT COSTS (1-8)</b>	<b>53,905.00</b>	<b>42,497.00</b>	<b>96,402.00</b>
9. Indirect Costs	20,754.00	32,268.00	53,022.00
<b>TOTAL COSTS (Direct and Indirect)</b>	<b>74,659.00</b>	<b>74,765.00</b>	<b>149,424.00</b>

## Project Funding for the Entire Grant Period

1. Grant Funds Requested from IMLS	74,659.00
2. Cost Sharing:	
a. Cash Contribution	
b. In-Kind Contribution	74,765.00
c. Other Federal Agencies*	
d. TOTAL COST SHARING	74,765.00
3. TOTAL PROJECT FUNDING (1+2d)	149,424.00
% of Total Costs Requested from IMLS	50.00%

\* If funding has been requested from another federal agency, indicate the agency's name:



ID	Task Name	2008												2009											
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
1	<b>Task 1 - 10 CART SCIENCE ACTIVITIES</b>																								
2	Research																								
3	Prototype, revise																								
4	Finalize & post on ASTC website																								
5																									
6	<b>Task 2 - 4 BACKPACK SCIENCE ACTIVITIES</b>																								
7	Research																								
8	Prototype, revise																								
9	Finalize & post on ASTC website																								
10																									
11	<b>Task 3 - PUBLIC FORUM ON GLOBAL WARM.</b>																								
12	Research																								
13	Prototype, revise																								
14	Finalize & post on ASTC website																								
15																									
16	<b>Task 4 - HANDS-ON FAMILY WORKSHOP</b>																								
17	Research																								
18	Prototype, revise																								
19	Finalize & post on ASTC website																								
20																									
21	<b>Task 5 - EVALUATION</b>																								
22	Planning meeting with consultants																								
23	Formative evaluation review #1																								
24	Formative evaluation review #2																								
25	3-month mail / email survey																								
26	Summative evaluation																								
27																									
28	<b>Task 6 - DISSEMINATION</b>																								
29	All activities posted on ASTC website																								
30	Activities in use at Sciencenter																								
31	Activities used in afterschool enrichment																								
32	Family science nights at rural schools																								
33	Final Report to IMLS																								

Global Warming Activity Toolkit  
Date: Wed 11/15/06

Task Milestone

Summary