

**Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)**

LCCMR ID: 168-F

Project Title:

Climate Change Education for Middle School Students

LCCMR 2010 Funding Priority:

F. Environmental Education

Total Project Budget: \$ \$294,163

Proposed Project Time Period for the Funding Requested: 2 years, 2010 - 2012

Other Non-State Funds: \$ \$235,000

Summary:

This project will develop an integrated suite of programs for middle school students throughout Minnesota to increase their understanding of the evidence, impact and potential solutions for global climate change.

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Sponsoring Organization: Science Museum of Minnesota

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Location:

Region: Statewide

County Name: Statewide

City / Township:

_____ Knowledge Base	_____ Broad App.	_____ Innovation
_____ Leverage	_____ Outcomes	
_____ Partnerships	_____ Urgency	_____ TOTAL

I. PROJECT STATEMENT: Global climate change presents unprecedented challenges to our economy, security and natural resources. The rate and impact of climate change is predicted to continue accelerating over coming decades. In ten years, today's eighth grade students as adults will be faced with increasingly complex decisions regarding the impact of human behavior and global climate change. Building awareness and increased understanding of climate change now will better prepare these students to make informed decisions that impact their lives today and in the future.

This project seeks to develop and engage middle school students in an integrated set of educational experiences that focus on: (1) Human activities are now comparable to natural processes as driving forces of atmospheric change, (2) The behavior of Earth's atmosphere in the 21st Century will be increasingly determined by human behavior, and (3) Human ingenuity is the key to adapting to and mitigating the extent of the climate changes that humans have set in motion.

The Science Museum of Minnesota (SMM), in collaboration with partners listed in Section III, will develop a suite of integrated programs, including a large-group school demonstration program, classroom video conferencing, and out-of-school investigations. These programs will serve middle school students in schools throughout Minnesota and underserved youth in after-school programs in St. Paul. This project will create a set of education resources and programs that will endure well after the formal conclusion of this project.

II. DESCRIPTION OF PROJECT RESULTS

Result 1 - Climate Change Program Development Budget: \$221,763

Working in close cooperation with its partners, SMM will develop a set of integrated learning activities, investigations and demonstrations that connect the lives of middle school students to the issues and challenges of climate change. Students will be encouraged to examine the evidence of our changing climate, to explore the role human activity plays as a new driving force in atmospheric change, and to develop an increased awareness of the broad range of consequences created by climate change. Students will develop a greater understanding of the science concepts needed for an in-depth understanding of climate change (Attachment: MN Science Standards – Climate Change Alignment). Climate change program development efforts will build upon current SMM educational projects focused on climate change and other global change issues. In particular, SMM's Anthropocene Atmosphere Initiative supported by a NASA grant will significantly benefit this project's videoconferencing and out-of-school programming goals.

Deliverables:

1. Develop large-group school demonstration program. Pilot and evaluate program at six middle schools in 2010/2011 school year
2. Develop, pilot, and evaluate a set of videoconference class sessions at six middle schools in the 2010/2011 school year.
3. Develop, pilot and evaluate climate change activities and investigations with three out-of-school youth programs in the 2010/2011 school year.

Result 2: Climate Change – In-School Programs Budget: \$67,200

SMM will provide climate change programs free of charge for 24 selected schools throughout Minnesota. A combination of a live, high-impact demonstration program and extended student interactions with resources, materials and scientific expertise through videoconferencing sessions will promote in-depth understanding of the evidence, impact, and potential solutions for future climate change.

Deliverables:

1. Present climate change demonstration and videoconferencing programs at 21 schools to an estimated 9,600 -14,400 middle school students throughout Minnesota.
2. Collect student assessment and teacher evaluation data to measure student impact and inform final program changes for future program years.

Result 3: Climate Change – Out of School Programs

Budget: \$5,200

Supported by SMM's NASA grant, a team of high school students from SMM's Kitty Andersen Youth Science Center will provide climate change activities at community events and out-of-school programs for underserved youth in the metro area. The team will also explore the use of videoconferencing with out-of-school programs in greater Minnesota.

Deliverables:

1. Deliver climate change activities and investigations to 1,800-4,500 external audiences at nine community events.
2. Deliver climate change activities and investigations to 400-500 youth in out-of-school programs during the school year and summer time.
3. Pilot videoconferencing for students in out-of-school programs in communities throughout Minnesota.

Result 4: Climate Change Distance Learning Program

Budget: \$0

SMM's NASA grant will produce an eight-week distance-learning course for grades 7-12 science educators nationwide. The Question of Carbon (QOC) – Distance Learning Course for Teachers will continue with the interdisciplinary study of global change by scientists at GISS and Columbia University's Earth Institute. QOC will be a valuable resource in SMM's development of its large-group school demonstration program and video conferencing sessions.

Deliverables:

1. In 2009, QOC will be developed and reviewed by an external evaluation group. Then it will be submitted to Columbia University Teachers College of New York as a continuing education course.
2. In 2010, QOC will enroll 25 teachers nationally with one instructor assisting the self-directed learners. In 2011 and 2012, QOC will expand to reach more teachers nationally and all of its on-line resources will be available free of charge for SMM to use in its program development and delivery.

III. PROJECT STRATEGY

A. Project Team/Partners

- ~~Jon Foley, Ph.D., Director, Institute on the Environment (IonE), University of Minnesota.~~ IonE combines scientific research, leadership development, and private and public partnerships to discover solutions to Earth's environmental problems. Dr. Foley will advise this project on the science of climate change and will serve as the conduit for all climate change scientific expertise within IonE.
- ~~Kent Cavender-Bares, Ph.D., Research Scientist, Climate Central (CC).~~ CC is a non-profit organization based in Princeton, N.J. (and with offices at IonE) that distributes to media nationally the latest scientific information about climate change. Dr. Cavender-Bares will help provide SMM access free of charge to all of CC's professionally produced multimedia climate change products.
- ~~Carolyn Harris, contractor, NASA Goddard Institute for Space Sciences (GISS) and Columbia University's Earth Institute (CUEI).~~ Ms. Harris is developing The Question of Carbon (QOC) Distance Learning Course for Teachers with GISS and CUEI through the support of SMM's NASA grant. All QOC content and resources will be available for use by this project.

B. Timeline Requirements

Year 1 – Develop programs, resources, and infrastructure to present and evaluate at pilot sites.

Year 2 – Present programs at selected schools, conduct program evaluation, and revise programs.

C. Long-Term Strategy

The climate change programs will become part of SMM's slate of programs that will be offered to in-school and out-of-school audiences well after the conclusion on this project. For example, SMM's large-group school demonstration program Water was part of the LCMR-supported H₂O Minnesota project that formally concluded on June 30, 1991. It continues to be updated and offered by SMM to schools and has been presented over 1,500 times to over 200,000 students since 1991.

Project Budget

Science Museum of Minnesota: Climate Change for Middle Schools

IV. TOTAL PROJECT REQUEST BUDGET (2 years)

Budget Items	AMOUNT
Personnel:	
Project Director: L. Thomas- Director School Outreach/School Visits, (Yr 1, 15% FTE) (Yr 2, 10% FTE)	\$ 18,385
Project Managers : A. Ward - KAYSC Programs (Yr 1-2, 5% FTE), S. Crannel - Distance Learning (Yr. 1, 25% FTE) (Yr 2, 5%FTE)	\$ 18,948
Outreach Specialists - Develop In-school programs (Yr 1- 60% FTE) (Yr 2- 30% FTE)	\$ 37,950
Evaluation: Director (Yr 1, .5% FTE) (Yr 2, .75% FTE), Evaluator (Yr 1, 9% FTE) (Yr 2 10% FTE), Evaluation Associates (Yr 1 15% FTE) (Yr 2 35% FTE)	\$ 20,067
Multi Media Tech Support (Yr.1, 6%FTE)	\$ 3,000
Benefits	\$ 39,607
Contracts: N/A	
Equipment/Tools/Supplies:	
Video Conference Hardware/Software/Equipment required for delivery of In-School & Out of School Programs	\$ 30,000
Large Group Demonstration Program – Props, Media, Materials (2 program sets @ \$8,000/set)	\$ 16,000
Out of School Program Materials - Magic Planet Projection Globe & program materials	\$ 31,000
Acquisition (Fee Title or Permanent Easements): N/A	
Travel:	
Mileage for program development and pilots (12 site visits x 50 miles x .55/mile)	\$ 330
Additional Budget Items:	
Climate Change Demonstration Programs (Yr. 1, 6 days@ \$1050/day) (Yr. 2, 24days @ \$1050/day)	\$ 25,200
Climate Change Video Conference Sessions (Yr. 1, 12 days @ \$875) Yr. 2, (48 days@ \$875/day)	\$ 42,000
Climate Change Out of School Programs - (9 community events @ \$300, 20 after school programs @ \$125)	\$ 5,200
Evaluation materials and services	\$ 6,476
TOTAL PROJECT BUDGET REQUEST TO LCCMR	\$ 294,163

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ Being Applied to Project During Project Period:		
NASA Grant - Anthropocene Atmosphere Initiative	\$ 235,000	<i>Secured</i>
Other State \$ Being Applied to Project During Project Period: N/A	\$ -	
In-kind Services During Project Period: N/A	\$ -	
Remaining \$ from Current Trust Fund Appropriation (if applicable): N/A		
Funding History: N/A	\$ -	

Minnesota Academic Standards in Science – Climate Change Alignment

Grade	Strand	Sub-Strand	Standard	Benchmarks
5	The Nature of Science and Engineering	The Practice of Science	Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.	Explain why evidence, clear communication and skepticism is an essential part of doing science.
5	Earth and Space Science	Human interaction with Earth Systems	In order to maintain and improve their existence, humans interact with and influence Earth systems.	Compare the impact of individual decisions on natural systems.
5	Life Science	Human Interactions with Living Systems	Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	Identify a common engineered system and evaluate its impact on the daily life of humans, the local environment and wildlife habitat.
6	The Nature of Science and Engineering	Interactions Among Science, Engineering, Technology and	Designed and natural systems exist in the world. These systems are made up of components that act within a system and interact with other systems.	Describe a system in terms of parts, processes, subsystems, inputs and outputs.
6	Physical Science	Energy	Energy can be transformed within a system or transferred to other systems or the environment.	Describe how energy is transferred in conduction, convection and radiation.
7	Life Science	Human Interactions with Living Systems	Human activity can change living organisms and ecosystems.	Describe ways that human activities can change the populations and communities in an ecosystem.
8	Earth and Space Science	Interdependence Within the Earth System	Patterns of atmospheric movement influence global climate and local weather.	Describe how the composition and structure of the Earth's atmosphere affects energy absorption, climate and distribution of particulates and gases.
8	The Nature of Science and Engineering	The Practice of Engineering	Scientific inquiry is a set of interrelated processes used to pose questions about the natural world and investigate phenomena. There are multiple sequences that may be used for the process of inquiry.	Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence; differentiate between explanation and description.
8	Earth and Space Science	Interdependence Within the Earth System	The sun is the principal external energy source for the Earth.	Explain how heating of the Earth's surface and atmosphere by the sun drives convection within the atmosphere and hydrosphere producing winds, ocean currents, and the water cycle, as well as influencing global climate.

SMM Project Manager Qualifications and Organization Description

Project Director: Larry Thomas, Director School Outreach/School Visits, B.S. Agricultural Education, Life Science Education, and Middle School Science Education has directed all aspects of the Science Museum's School Outreach and School Visits Departments for 20 years. Larry has overseen the development and management of the wide range of student programs that currently serve over 200,000 students annually throughout Minnesota. Larry led the school programs project teams for the LCMR funded projects H2O Minnesota (89-91), Three Rivers Initiative (95-97), Green Steer (91-92), and Enhancing Civic Understanding of Ground Water (07-09). In addition Larry has led school program efforts for BRAIN to Middle Schools (Hughes, NIH 2000-04), EarthScapes (NSF 02-05), and EiE ACES (Cargill 08-12).

Science Museum of Minnesota:

Beginning its second century in 2008, the Science Museum of Minnesota (SMM) was founded as the St. Paul Academy of Arts and Letters in 1907. In the hundred years since, SMM has grown from a scientific literary society to an institution nationally and internationally recognized for its dynamic exhibits, innovative programming, and science learning resources, from professional development workshops for K--12 teachers to cutting-edge online resources. Although the depth and breadth of SMM and its programs have changed dramatically, science and environmental education continue to be at the heart of the museum's mission. Today, SMM is both a traditional natural history museum and a contemporary science and technology center. This combination allows us to serve diverse audiences--from visitors who learn from objects and history, to those who prefer more interactive learning.

Mission: "Turn on the science: realizing the potential of families, educators, and policymakers to achieve full civic and economic participation in the world."

Strategic Plan:

SMM is a unique hybrid: a natural history museum with scientific research, collections, and interpretive exhibits and a science/technology center with innovative interactive exhibits emphasizing hands-on learning. The museum's aspirations for an expanded role in STEM (Science-Technology-Engineering-Math) literacy and education in Minnesota and nationally are embodied in the Statement of Strategic Intent in its newly adopted strategic plan:

- SMM will be the nation's premier model for bringing science to the public in innovative ways that also foster creative partnerships with leading education, business and community organizations. We will:
- Inspire people to an uninhibited enthusiasm and curiosity about science and its impact on their lives.
 - Lead a transformation in how science centers and museums relate to their public and express their missions.
 - Establish ourselves as a central and vital force in our community's aspirations for education, business and civic well-being.
 - Be a force for change to a world beyond the walls of our great institution.
 - Become a nexus of communication between the scientific community, policy-makers, and the general public.
 - Spearhead our community's stewardship for the environment and our collections.