

## DISAPPEARING ARCTIC

## HIGH SCHOOL LESSON PLAN OUTLINE

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*Increasing heat indexes...diminishing polar ice coverage...rising sea levels... the science is undeniable. But sometimes it takes an artist to show it.*

*Disappearing Arctic is an interdisciplinary program featuring works by artists who bring us face-to-face with the science of global climate change. Students will*

### **Explore**

...video art and photography about the arctic

### **Connect**

...art with the sciences of climate change and human impacts

### **Express**

...thoughts about and responses to climate change in personal journals

### **What will students experience and do?**

**Take a tour** of art made for a distinct purpose—to spur meaningful dialogue about climate change—in the exhibition *Cape Farewell: Art & Climate Change*, organized by Cranbrook Art Museum and now on view at Cranbrook Institute of Science. Students will explore the work of seven artists who traveled to the Arctic with Cape Farewell, a project that brings together artists, scientists, and writers with the goal of producing new, creative ways to express the urgency of climate change.

**Discuss and respond** to the artists' interpretations and expressions of climate change. Students will keep a journal during the tour recording their personal thoughts and responding to key questions designed to help them close gaps between themselves and the arctic, between their lives and the global impacts of climate change. The program supplements the intent of the art—to bring awareness of the relevance of climate change to students' lives and to encourage them to engage their creative minds toward a new future.

### **Who's it for?**

Grades 9-12

### **How long is the program?**

45 minutes

### **How do I sign up?**

For more information about booking this program and to schedule other tours,

- visit online: <http://science.cranbrook.edu/educational/group/program.asp>
- call: 248.645.3210, Mon-Fri, 8am-4pm

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| <b>LESSON TITLE:</b>         | Disappearing Arctic  |
| <b>Type of Lesson:</b>       | Interdisciplinary—Art and Science, with curriculum links to English Language Arts and Social Studies   |
| <b>Audience/Grade Level:</b> | 9-12   |
| <b>Lesson Length:</b>        | 45 minutes   |
| <b>Teaching Space:</b>       | <ul style="list-style-type: none"> <li>• Special Exhibition Hall—<i>Cape Farewell: Art &amp; Climate Change</i></li> </ul>   |
| <b>Lesson Developer:</b>     | Swarupa Anila, Senior Interpretive Specialist at the Detroit Institute of Arts collaborated with colleagues at Cranbrook Art Museum and Cranbrook Institute of Science to design this program. |

### **Program Goals**

#### **After participating in this lesson**

1. Students will see art as helping us explore the world in new ways—that artists look at the world around them and make works that help viewers see differently.
2. Students will explore art about or inspired by arctic landscapes to gain new understanding of the science of climate change and its impact on the earth through the example of the arctic.
3. Students will become aware of the ways the arts are forms of agency that can prompt meaningful change.

### **PROGRAM EXPERIENCE**

This 45-minute tour of the special exhibition *Cape Farewell: Art & Climate Change* incorporates in-depth facilitated discussion, discovery-based questioning, and personal writing exercises. Students will be supplied with notebooks and pencils to integrate journaling into their exploration, echoing the activity of Cape Farewell artists who kept personal records of their experiences and observations during their journeys into arctic landscapes. The tour will emphasize the specific ways the works of art bring attention to climate sciences through the visible evidence of global warming in the form of melting glaciers and arctic ice cover. Students will be encouraged to explore interdependence by examining the cyclical impact of human activity on climate change and the potentially devastating impact of climate change on human existence. Works of art featured in the discussion are

- David Buckland, *The End of Ice*, 2005
- David Buckland, *Ice Texts*, 2004-5
- Antony Gormley, *Marker One*, 2005
- Alex Hartley, *Nymark (Undiscovered Island)*, 2005-6
- Gautier Deblonde, *The Svalbard Series*, 2003-5
- Siobhan Davies, *Endangered Species*, 2006

## **GLOSSARY/ DEFINITIONS**

**agency**—the ability to affect change; every individual has agency

**appropriate**—to take exclusive possession of something (e.g. land, money); to set apart for a particular use

**carbon dioxide (CO<sub>2</sub>)**—a colorless gas found naturally in the environment (humans and other animals expel when breathing) but a major by-product emitted by factories and cars; one of the gases that impacts the earth's environment when in high concentrations in the atmosphere

**climate change**—the increase in the earth's temperature as a result of natural and human activities

**climate change action**—lifestyle and societal changes that help reduce the causes and effects of climate change

**colonization**—the process or act of establishing a site for living in a new territory

**complicity**—the extent to which one participates in a phenomenon

**endangered species**—a living organism threatened with extinction

**erode**—to wear away from the action of wind, water, or glacial ice

**glacier**—a large body of ice moving slowly down a slope or valley or spreading outward on a land surface

**greenhouse gases**—a combination of gases—carbon dioxide, methane, nitrogen, oxygen, etc.—in Earth's atmosphere that hold in the sun's heat and support life

**iceberg**—a large floating mass of ice detached from a glacier

**ice cover**—massive span of ice covering parts of the earth's land and ocean

**interdependence**—the various ways living things affect and depend upon other living things

## **TEACHER RESOURCES AVAILABLE AT SCIENCE SHOP:**

Exhibition catalog

*Burning Ice: Art & Climate Change*, ed. David Buckland, Ali McGilp, Sion Parkinson, London: Cape Farewell © 2006, \$33

For more information, call 248.645.3207

## **REFERENCES / RESOURCES**

1. Cape Farewell project on the web

<http://www.capefarewell.com/>

A website about the artists, scientists, Cape Farewell expeditions, 2001 to present. Link to artist blogs at

<http://www.capefarewell.com/art/artists.html>

2. Cape Farewell project synopsis

<http://www.youtube.com/watch?v=TaBuWghj3mo>

a video synopsis of the first Cape Farewell expedition of artists and scientists to the high arctic in 2004

2. NASA's *Eyes on the Earth*

<http://climate.nasa.gov/>

NASA's official website with constant updates on the earth's vital statistics and addressing causes, effects, and other issues related to climate change science; includes a "climate time machine" measuring the steady decrease in arctic ice cover annually since 1979

(<http://climate.nasa.gov/ClimateTimeMachine/climateTimeMachine.cfm>)

3. *An Inconvenient Truth* © Paramount Pictures 2006

A documentary film by Nobel Peace Prize recipient and former U.S. Vice President Al Gore, who addresses the facts and misconceptions about global warming and the urgency of the crisis

4. *Climate of Change* © Century Films 2010

<http://www.climatecrisis.net/pdf/Climate-of-Change-Presskit.pdf>

A documentary film focusing on the efforts of everyday people all over the world—from Indian middle school students to London executives—doing what they can in the fight against global warming

5. What is the impact of climate change on human health?

[www.who.int/mediacentre/news/statements/2008/s05/en/index.html](http://www.who.int/mediacentre/news/statements/2008/s05/en/index.html)

An online statement by the World Health Organization discussing the implications of climate change for human health and welfare

6. The Climate Project

<http://www.theclimateproject.org/>

A non-profit organization of 3,000+ dedicated volunteers from diverse backgrounds worldwide who have been personally trained by former U.S. Vice President and Nobel Laureate Al Gore to educate the public and raise awareness about climate change.

7. Earth Vital Signs

<http://twitter.com/EarthVitalSigns>

Join and receive periodic tweets with environmental updates from NASA

8. *The Storms of My Grandchildren: The Truth About The Coming Climate Catastrophe And Our Last Chance To Save Humanity* by James Hansen, Bloomsbury Publishing © 2009

A book by NASA climate scientist James Hansen, the first scientist to testify before congress about climate change, describing the immediacy of the climate change crisis. Interview with the author at

[http://www.environmentreport.org/story.php?story\\_id=4857](http://www.environmentreport.org/story.php?story_id=4857)

## **CROSS CURRICULUM LINKS**

This program focusing on art creates links to and between science, English language arts, and social studies curriculum standards. The program is tailored to the grade level of visiting classes.

### Grade Level Content Expectations

#### **Visual, Performing, and Applied Arts**

**Strand I: Create**—Students will...

**C.2** Develop an idea, question, or problem that is guided by the personal, historical, contemporary, cultural, environmental, and/or economic contexts of the visual, performing, or applied arts discipline.

**C.4** Use the best available and appropriate instruments, resources, tools, and technologies to facilitate critical decision-making, problem solving, editing, and the creation of solutions.

**C.5** Reflect on and articulate the steps and various relationships of the artistic/creative process.

**Strand II: Perform / Present**—Students will...

**P.1** Apply the techniques, elements, principles, intellectual methods, concepts, and functions of the visual, performing, or applied arts discipline to communicate ideas, emotions, experiences, address opportunities to improve daily life, and solve problems with insight, reason, and competence.

**P.3** Describe and consider relationships among the intent of the student/artist, the results of the artistic/creative process, and a variety of potential audiences or users.

**Strand III. Respond**—Students will...

**R.1** Observe, describe, reflect, analyze, and interpret works of the visual, performing, or applied arts.

**R.2** Identify, describe, and analyze connections across the visual, performing, and applied arts disciplines, and other academic disciplines.

**R.3** Describe, analyze, and understand the visual, performing, or applied arts in historical, contemporary, social, cultural, environmental, and/or economic contexts.

#### **Science**

**E5.4A** Explain the natural mechanism of the greenhouse effect, including comparisons of the major greenhouse gases (water vapor, carbon dioxide, methane, nitrous oxide, and ozone).

**E5.4B** Describe natural mechanisms that could result in significant changes in climate (e.g., major volcanic eruptions, changes in sunlight received by the earth, and meteorite impacts).

**E5.4C** Analyze the empirical relationship between the emissions of carbon dioxide, atmospheric carbon dioxide levels, and the average global temperature over the past 150 years.

**E5.4D** Based on evidence of observable changes in recent history and climate change models, explain the consequences of warmer oceans (including the results of increased evaporation, shoreline and estuarine impacts, oceanic algae growth, and coral bleaching) and changing climatic zones (including the adaptive capacity of the biosphere).

**E1.2B** Identify and critique arguments about personal or societal issues based on scientific evidence.

**E2.1B** Analyze the interactions between the major systems (geosphere, atmosphere, hydrosphere, biosphere) that make up the Earth.

**E2.1C** Explain, using specific examples, how a change in one system affects other Earth systems.

**E2.2A** Describe the Earth's principal sources of internal and external energy (e.g., radioactive decay, gravity, solar energy).

**E2.2B** Identify differences in the origin and use of renewable (e.g., solar, wind, water, biomass) and nonrenewable (e.g., fossil fuels, nuclear [U-235]) sources of energy.

**E2.2C** Describe natural processes in which heat transfer in the Earth occurs by conduction, convection, and radiation.

**E2.2D** Identify the main sources of energy to the climate system.

**E2.3A** Explain how carbon exists in different forms such as limestone (rock), carbon dioxide (gas), carbonic acid (water), and animals (life) within Earth systems and how those forms can be beneficial or harmful to humans.

**E2.4A** Describe renewable and nonrenewable sources of energy for human consumption (electricity, fuels), compare their effects on the environment, and include overall costs and benefits.

**E2.4B** Explain how the impact of human activities on the environment (e.g., deforestation, air pollution, coral reef destruction) can be understood through the analysis of interactions between the four Earth systems.

**E4.2A** Describe the major causes for the ocean's surface and deep water currents, including the prevailing winds, the Coriolis effect, unequal heating of the earth, changes in water temperature and salinity in high latitudes, and basin shape.

**E4.2B** Explain how interactions between the oceans and the atmosphere influence global and regional climate. Include the major concepts of heat transfer by ocean currents, thermohaline circulation, boundary currents, evaporation, precipitation, climatic zones, and the ocean as a major CO<sub>2</sub> reservoir.

**E4.3B** Describe the damage resulting from, and the social impact of thunderstorms, tornadoes, hurricanes, and floods.

**B3.2A** Identify how energy is stored in an ecosystem.

**B3.2B** Describe energy transfer through an ecosystem, accounting for energy lost to the environment as heat.

**B3.4C** Examine the negative impact of human activities on ecosystems

**P4.2A** Account for and represent energy transfer and transformation in complex processes (interactions).

**P4.2C** Explain how energy is conserved in common systems

**P4.9B** Explain how various materials reflect, absorb, or transmit light in different ways.

**C2.2A** Describe conduction in terms of molecules bumping into each other to transfer energy. Explain why there is better conduction in solids and liquids than gases.

**C3.3A** Describe how heat is conducted in a solid.

**C3.3B** Describe melting on a molecular level.

### English

**CE 1.1.2** Know and use a variety of prewriting strategies to generate, focus, and organize ideas (e.g., free writing, clustering/mapping, talking with others, brainstorming, outlining, developing graphic organizers, taking notes, summarizing, paraphrasing).

**CE 1.1.3** Select and use language that is appropriate (e.g., formal, informal, literary, or technical) for the purpose, audience, and context of the text, speech, or visual representation (e.g., letter to editor, proposal, poem, or digital story).

**CE 1.2.1** Write, speak, and use images and graphs to understand and discover complex ideas.

**CE 1.2.2** Write, speak, and visually represent to develop self-awareness and insight (e.g., diary, journal writing, portfolio self-assessment).

**CE 1.2.3** Write, speak, and create artistic representations to express personal experience and perspective (e.g., personal narrative, poetry, imaginative writing, slam poetry, blogs, webpages).

**CE 1.5.1** Use writing, speaking, and visual expression to develop powerful, creative and critical messages.

**CE 2.1.10** Listen to and view speeches, presentations, and multimedia works to identify and respond thoughtfully to key ideas, significant details, logical organization, fact and opinion, and propaganda.

**CE 2.1.11** Demonstrate appropriate social skills of audience, group discussion, or work team behavior by listening attentively and with civility to the ideas of others, gaining the floor in respectful ways, posing appropriate questions, and tolerating ambiguity and lack of consensus.

**CE 2.2.2** Examine the ways in which prior knowledge and personal experience affect the understanding of written, spoken, or multimedia text.

**CE 3.2.5** Respond to literature in a variety of ways (e.g., dramatic interpretation, reader's theatre, literature circles, illustration, writing in a character's voice, engaging in social action, writing an analytic essay) providing examples of how texts affect their lives, connect them with the contemporary world, and communicate across time.

## ***POST-VISIT ACTIVITIES***

### Extend Journaling Activities

#### 1. Write

Teachers may have students form groups of four and revisit their journal exercises. Students may contribute some of the words and phrases they wrote during the Disappearing Arctic tour and collectively write a poem or a new creative work.

#### 2. Reflect

One day after Disappearing Arctic tour, ask students to recall a work of art they remember well or took particular notice of and write a half-page reflection

- describing what they saw, i.e. the visual elements of the work
- expressing what it made them think
- exploring what it made them feel

Repeat one week later. Student may choose the same or another work of art.

### Other Activities

#### 3. Resolve

Invite students to resolve to make one change in their lives in the effort to reduce their individual carbon footprints. Small changes are as achievable and potentially longest lasting, but big changes can also be encouraged as coming out of high aspirations. Examples may include turning the water off when brushing, walk rather than drive, use public transit and carpool more, eat meat one time less each week, etc.

Check back on their progress periodically—after a week, a month, and several months.

#### 4. Participate

Invite students to write to their state and U.S. senator and congresspersons describing their concerns for the future of climate change.