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CHASING ICE



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CHASING ICE

Directed by Jeff Orlowski 2012 | USA | 75 min

TEACHER'S GUIDE

This guide has been designed to help teachers and students enrich their experience of *Chasing Ice* by providing support in the form of questions and activities. There are a range of questions that will help teachers frame discussions with their class, activities for before, during and after viewing the film, and some weblinks that provide starting points for further research or discussion.

The Film

In the spring of 2005, acclaimed *National Geographic* photographer James Balog was dispatched to the Arctic on a tricky assignment: to capture images that tell the story of the Earth's changing climate. At the time, Balog was skeptical. Even if human-caused climate change is real, can we correct it? But what he saw on that first trip was too compelling to dispute. Balog had to act and so created the Extreme Ice Survey, a multi-year project that would, through time-lapse photography, document dramatic changes to numerous glaciers around the world. With stunning cinematography and access to never before seen areas of the Arctic, *Chasing Ice* documents Balog's incredible journey to provide incontrovertible proof—at great risk to his own health—that our planet is in crisis and what we do to it matters.

The Filmmaker

In 2007, Jeff Orlowski got his first taste of the Arctic when as a Stanford student he seized an opportunity to work as a videographer with National Geographic photographer James Balog on the initial expedition of The Extreme Ice Survey (EIS). That winter, the EIS team scouted and filmed glaciers that now appear in the documentary feature film Chasing Ice. Orlowski, a New York native, has been filming the EIS project around the world, working in some of the most extreme conditions imaginable on locations in Iceland, Greenland, Bolivia, the Alps, Alaska and Glacier National Park, Montana. Orlowski is an Emmy-winning filmmaker and founder of Exposure Labs. His latest project, Chasing Coral, is a feature film following a team of adventurers trying to reveal how the oceans are changing. It premiered at the 2017 Sundance Film Festival, along with a virtual reality piece in the New Frontier lineup. This work continues the momentum of Chasing Ice, for which Orlowski also served as director, producer and cinematographer. After premiering at Sundance, it received an Academy Award nomination and won an Emmy award for Outstanding Nature Programming. In 2016, Orlowski was named the inaugural Sundance Discovery Impact Fellow for environmental filmmaking.

Source: http://www.chasingcoral.com

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VIEWING THE FILM WITH STUDENTS

The following three subsections are intended to provide you with a range of Pre-Viewing,

Viewing and Post-Viewing activities. They are followed by a set of questions based upon the

film's larger thematic domains, some follow-up questions and quotations, sample curricular

outcomes and a page of weblinks for further investigation.

Pre-Viewing Activities

Show students the trailer and/or poster for the film (http://www.chasingice.com). Have students work in small groups to try and identify themes or ideas conveyed by the trailer and/or poster. As a larger group, discuss with students how effective/affective the trailer and/or poster are as media pieces.

After looking at the poster, have students complete a KWL chart. In the K column, have them write notes on what they already know about global climate change, and/or the documentary. In the W column, they should ask questions they would like answered. Students should complete the L column after they have watched the documentary.

Print several of the questions or quotations from the Extension Activities section of this guide on individual sheets of paper. Have students work in small groups or with partners to discuss if they agree with the ideas.

Set a purpose for viewing by having a discussion about one or more of the questions or quotations from the Extension Activities section of this guide. Have them share the statement and what they think or believe about it with the class.

Have students define and discuss the following terms: (a) glaciers, (b) calving, (c) continental ice sheet, (d) alpine glaciers, (e) core sample, (f) ice shelves, (g) cryosphere, (h) icebergs and (i) climate change.

Have students choose one of the terms listed above. They can use a word organizer, by dividing a box in four. In each of the four boxes, have them write in one corner the following: Definition, Non-examples, Examples and Use in a Sentence. Ask the class their opinion about the word. Take it up as a class.

Go over some key glaciation terms using the National Snow and Ice Data Center website (http://nsidc.org) which has

a cryosphere glossary. Calving, glacier, climate change and ablation are some useful terms, among others, to go over with your students. Included on the site are fact sheets on ice sheets, ice shelves, icebergs and arctic sea ice.

Have students read the online article "The Big Thaw" from *National Geographic* (http://nationalgeographic.com/ Type the title of the article into the search function of the website). The article explores the issues around global warming and melting glaciers. Show the photos from the photo gallery and discuss each one. Then have a class discussion using a mind map on global warming and the global consequences from melting glaciers. Use four categories to organize the class brainstorm: social, environmental, economic and political.

Have students explore NASA's website on global climate change (http://climate.nasa.gov). Links to explore include those on arctic sea ice cover, carbon dioxide levels, sea levels, global temperature and land ice cover (http://climate.nasa.gov).

Using a T-Chart, have students compare the positive and negative effects of climate change.

Show the class a short video clip (1:20 minutes) titled "Petermann Ice Island 2012: On the Move" from YouTube (http://www.youtube.com/ Type the title of the clip into the search function of the website) and discuss the negative impacts of calving and melting glaciers. Discuss both the environmental and social impacts worldwide.

Have students read the report titled *Vital Climate Change Graphics* that was updated in 2005 by the United Nations Environment Programme (UNEP) and GRID-Arendal which focuses on the environmental and socio-economic impacts of climate change (http://www.grida.no/ Type the title of the report into the search function of the website).

Viewing Activities

Have students complete the PBS viewing guide on documentaries (http://www.pbs.org/pov/docs/Copies%20 of%20Viewing%20Guide.pdf). Students can revisit their completed documents as a Post-Viewing Activity.

Have students jot down five ideas for discussion, or questions that the film raised in their minds.

Have students take note of the different filming techniques during the film. Some of these include aerial shots, slow motion and time-lapse photography. Discuss the usefulness of each technique.

Have students jot down two to three ideas for discussion, or questions that the film raises in their minds. As an Extension and/or Post-Viewing Activity, students can enter their questions into an online response or polling system and can vote on the questions or issues they would like to explore in further detail. Encourage students to use multiple levels of Bloom's Taxonomy.

Post-Viewing Activities

Show the students their quotations from the Pre-Viewing Activity and see if their opinions were changed, altered or enhanced by the film.

Assign some of the questions and quotations from the Extension Activities section of this guide for homework to be taken up the next day in class. Check for completion.

Have students complete an exit note (a single small sheet of paper with one phrase or idea written on it) that demonstrates one thing they have learned, felt or decided as a result of watching the film.

Discuss with students their initial reactions to the various scenes and situations addressed in the film.

Do a follow-up of the KWL chart Pre-Viewing Activity. Students will work with an elbow partner to review the questions posed in column two of the KWL chart and complete column three.

Have students choose one of the events from the film and write a diary entry as if they were part of the event.

Have students revisit their Venn diagram comparing various viewpoints on climate change issues. Have them add more information based on what they learned from the film.

Ask students to hypothesize about how the world's climate could change over the next 100

years if humans do nothing to limit the levels of their greenhouse gas emissions. Have them also make predictions about the effects such climate changes could have on humans.

Ask students to write two or three persuasive paragraphs answering the following questions: In your opinion, is climate change an imminent world threat? Why or why not? Based on your opinion, what actions do you believe should be taken to address the global warming issue?

Have students join in the National Geographic's "The People v. Climate Change" to share an environmental portrait of someone taking positive steps to protect the Earth. Have students use #MyClimateAction to share a first-person perspective on how we as humans face climate change (http://yourshot.nationalgeographic.com/ Type #MyClimateAction into the search function of the website).

Show students the TED Talk from James Balog titled "Timelapse Proof of Extreme Ice Loss," which discusses image sequences from the Extreme Ice Survey (http://www.ted. com/ Type the name of the talk into the search function of the website).

Have students visit the interactive Google Map made by NASA, illustrating sea levels rise up to 60 metres (http://flood.firetree.net). Split the class into seven groups based on the land divisions organized on the website: Europe, North America, South America, Africa, Southeast Asia, China and Japan, and Australia. Have each group raise the sea level in increments of five metres starting at 5m and going up to 60m, while identifying the populations and areas most at risk of suffering damage from coastal flooding.

Have a class role-play about climate change, where students will be acting as members of the UNFCCC. The role play will mimic a UN Climate change summit for all Annex I and Annex II and non-Annex I parties (http://unfccc.int/parties_and_observers/items/2704.php) to come and voice their opinions to the UN Secretary-General of the United Nations and UNFCCC Executive Secretary and the supporting council. The members will listen to all aspects and opinions and come to a decision with his/her fellow councillors about what each country will do to decrease their carbon emissions as set out in the Kyoto Protocol in 1997. They will also need to come to an agreement that something needs to be done about climate change in the very near future; agree to a percentage cut in emissions by 2050; and agree on how to provide money for

poorer countries so they can pay for the damage caused by climate change. The website Climate Interactive includes a Facilitator Resources and Materials guide along with a PowerPoint resource and other handouts and reading on climate change (https://www.climateinteractive.org/ Select Programs, then World Climate). The guide leads you through key concepts in running World Climate negotiations, from preparation and room setup to sample scripts and debriefing techniques allowing students to explore what is needed to address our climate challenge. Allow one day for preparation and one day for the role-play activity. Students will write a personal response on the role play, addressing all sides of the issue and their personal opinion. The activity and rubric, called UN Climate Change Summit Role Play, can be found on the following pages of this guide.

WEBSITES AND ONLINE RESOURCES

About the Film

http://www.chasingice.com

Facebook: https://www.facebook.com/chasingice

Twitter: https://twitter.com/chasingice

Instagram: https://www.instagram.com/chasingice

Additional Resources

Environment Canada: Environment Canada lists its actions on climate change.

http://www.climatechange.gc.ca

Extreme Ice Survey: Founded in 2007 by James Balog, the Extreme Ice Survey (EIS) is an innovative, long-term photography project that merges art and science to give a "visual voice" to the planet's changing ecosystems. The site provides links for teachers, links to sample lessons, a glossary and fact sheets about glaciers, and a photo gallery.

http://extremeicesurvey.org

NASA, Global Climate Change: A website with interactive data links for arctic sea ice cover, carbon dioxide levels, sea levels, global temperature and land ice cover offers an excellent visual resource with graphs, interactive maps and videos on global climate change.

http://climate.nasa.gov

National Center for Atmospheric Research: The UCAR Center for Science Education, which operates the NCAR, provides online educational resources and professional development opportunities for educators.

https://scied.ucar.edu/ Select Teachers.

National Geographic: The June 2007 article "The Big Thaw" features James Balog's work and discusses global warming and the global implications from melting glaciers. http://ngm.nationalgeographic.com/ Type the title of the article into the search function of the website.

National Snow and Ice Data Center (NSIDC): The centre supports research into our world's frozen realms: the snow, ice, glaciers, frozen ground, and climate interactions that make up Earth's cryosphere. A page on educational resources includes a cryosphere glossary, a digital library and atlas, repeat photography of glaciers, Google Earth links, and print and multimedia resources. Also included are fact sheets on ice sheets, ice shelves, icebergs and arctic sea ice. http://nsidc.org

PBS: James Balog and other scientists document the runaway melting of arctic glaciers in a *NOVA* episode titled "Extreme Ice." Related links include Q&As with experts, interactive exploration of the seafloor and glacial satellite imagery.

http://www.pbs.org/wgbh/nova/ Type the title of the episode into the search function of the website.

United Nations Framework Convention on Climate Change: In 1992, countries joined an international treaty, the United Nations Framework Convention on Climate Change, to cooperatively consider what they could do to limit average global temperature increases and the resulting climate change, and to cope with whatever impacts were, by then, inevitable.

http://unfccc.int/2860.php

US Geological Survey (USGS): The page titled "Ice, Snow and Glaciers: The Water Cycle" outlines glaciers and how water moves through the cycle.

http://ga.water.usgs.gov/ Type the title of the page into the search function of the website

World Oceans Day: The Canadian non-profit organization takes positive environmental action including reducing use of water and toxic chemicals, as well as greenhouse gas emissions. Beginning in 2009, the day was officially recognized by the United Nations as June 8 each year.

http://www.worldoceansday.ca

World Wildlife Foundation Canada: One of the environmental organization's campaigns is oceans, where a number of issues are outlined.

http://www.wwf.ca/ Select the subheading Oceans.

EXTENSION ACTIVITIES

Questions for Pre-Viewing or Post-Viewing Activities

James Balog photographs ice. What could you photograph representing climate change that could make wonderful pictures?

Climate change is affecting many different parts of our world. List all the ways climate change is affecting our lives. Discuss the implications of melting glaciers at a local, regional and global level.

What is the correlation between weather-related disasters and CO2 emissions?

James uses the analogy of people denying they have cavities by going to different dentists until they find one that tells them they have no cavities, even if they do. Use another analogy to illustrate people who don't want to believe climate change exists.

How are these time-lapse photos so historically important? What does time-lapse photography provide to the project that two single framed photos cannot verify? Why is it important to continue to document melting glaciers?

Why do glaciers matter?

What role do the media play in the climate change issue?

James is doing everything he can to expose the truth about the melting glaciers in areas around the world. Who else needs to address this issue? What needs to be done to reduce climate change? Is it too late?

Do you think individual acts are effective tools for change? Research two suggestions on what we can do.

Do you think countries need to do more in reducing their carbon emissions? What are the options?

Why does society stay oblivious to major catastrophic events like melting glaciers? What other examples can you attribute our obliviousness?

What are the challenges of photographing in colder regions?

QUOTATIONS FROM THE FILM TO EXPLORE

- 1. "The story is in the ice, somehow." James Balog, photographer
- 2. "I had this idea, the most powerful issue of our time, was the interaction of humans and nature." James Balog
- 3. "Sometime, you go over the horizon and you don't come back." James Balog
- 4. "We as a culture, we are forgetting that we are actually natural organisms and that we have this very deep connection and contact with nature. You can't divorce civilization from nature, we totally depend on it." James Balog
- 5. "What I'm here to do tonight, is bring to you, tangible, noticeable evidence of the immediacy of climate change itself." James Balog in a TED talks lecture
- 6. "It's real. The changes are happening. They're very visible, they're photographable, they're measurable. There's no significant scientific dispute about that. And the great irony and tragedy of our time, is a lot of the general public thinks scientists are still arguing about that. Science is not arguing about it." James Balog

CULMINATING ACTIVITY: UN CLIMATE CHANGE SUMMIT ROLE PLAY

Learning Goals:

- We are learning to use the geographic inquiry process so that we can select, organize, interpret and analyze information from sources that are relevant to our investigation.
- We are learning to make connections between climate change and human activities in the world so that we can develop ideas for reducing our Earth's vulnerability to climate change. We are learning to use the geographic inquiry process so that we can select, organize, interpret and analyze information from sources that are relevant to our investigation.

Background Information:

Climate change is now affecting every country on every continent. It is disrupting national economies and affecting lives, costing people, communities and countries dearly today and even more tomorrow.

People are experiencing the significant impacts of climate change, which include changing weather patterns, rising sea level and more extreme weather events. The greenhouse gas emissions from human activities are driving climate change and continue to rise. They are now at their highest levels in history. Without action, the world's average surface temperature is projected to rise over the 21st century and is likely to surpass three degrees Celsius this century—with some areas of the world expected to warm even more. The poorest and most vulnerable people are being affected the most.

To address climate change, countries adopted the Paris Agreement at the COP21 in Paris on December 12, 2015. The agreement entered into force less than a year later. In the agreement, all countries agreed to work to limit global temperature rise to well below two degrees Celsius, and given the grave risks, to strive for 1.5 degrees Celsius.

Source: http://www.un.org/sustainabledevelopment/climatechange/

	u are going to join other countries at a UN conference. The purpose of this summit is to plan a new global deal for tackling mate change and take a vote on what should happen next.
For	rmat of the role play: (to be presented on:)
l.	Opening statements from the UN Secretary-General of the United Nations and UNFCCC Executive Secretary and then from the Council
2.	Annex I countries speakers: opening statement of one to two minutes from each speaker
3.	Annex II countries speakers: opening statement of two minutes from each speaker

- 5. Lobbyists: opening statement of two minutes from each speaker

Council congregates and announces decision

7. Closing statements

As a final assessment for the role play, you will use your research and your notes from the role play and type a report of between one and two double-spaced pages that introduces the topic, addresses all sides of the issue and concludes with your opinion.

Due:	. Make sure to	attach your	research fo	r your role	e to your	report.

Non-Annex I countries speakers: opening statement of two minutes from each speaker

Source to begin with: UNFCCC (http://unfccc.int/2860.php)

ACTIVITY RUBRIC: UN CLIMATE CHANGE SUMMIT ROLE PLAY

Knowledge/Understanding

Concepts	2.5 2.9	3.0 3.4	3.5 3.9	4.0 5.0	
Clear understanding of issues	Limited success in use of geographic terms and concepts	Some success in use of geographic terms and concepts	Moderate success in use of geographic terms and concepts	Employs geographic terms and concepts with a high degree of success	/5
Thinking/Inquiry					
Research	2.5 2.9	3.0 3.4	3.5 3.9	4.0 5.0	
Collection of Information	Information indicates limited research skills and does not include sufficient research on own topic	Information indicates moderately effective research skill on own topic	Information indicates effective research skills with most issues examined and considered	Information indicates excellent research skills with all issues thoroughly examined and considered	/5
Application					
Report	2.5 2.9	3.0 3.4	3.5 3.9	4.0 5.0	
Account in writing all sides of the debate, as well as a well-supported opinion (grammar, 1-2 typed pages)	Communicates in writing with limited effectiveness	Communicates in writing with some effectiveness	Communicates in writing with considerable effectiveness	Communicates in writing with a high degree of effectiveness	/5
Communication					
Debate	2.5 2.9	3.0 3.4	3.5 3.9	4.0 5.0	
In role play, overall communication skills are clear and to the point; well-supported points; emphasis, clarity and confidence	Overall points are limited/vague; hard to understand, very little emphasis	Points are somewhat effective, with a few details; had some confidence in speech	Points and overall aim is clear; some points supported	Excellent suggestions, and debating skills; research is used in speech	/5

Comments: Total: ____/20 = ____/100

EXAMPLES OF CURRICULUM EXPECTATIONS

COURSE	OVERALL EXPECTATIONS
Grade 7 & 8 Languages	 demonstrate an understanding of a variety of media texts. identify some media forms and explain how the conventions and techniques associated with them are used to create meaning. create a variety of media texts for different purposes and audiences, using appropriate forms, conventions and techniques.
Grade 7 Geography	 analyze some challenges and opportunities presented by the physical environment and ways in which people have responded to them. use the geographic inquiry process to investigate the impact of natural events and/or human activities that change the physical environment, exploring the impact from a geographic perspective. demonstrate an understanding of significant patterns in Earth's physical features and of some natural processes and human activities that create and change those features.
Grade 7 Science	 assess the impacts of human activities and technologies on the environment, and evaluate ways of controlling these impacts. investigate interactions within the environment, and identify factors that affect the balance between different components of an ecosystem. demonstrate an understanding of interactions between and among biotic and abiotic elements in the environment.
Grade 8 Science	 assess the impact of human activities and technologies on the sustainability of water resources. demonstrate an understanding of the characteristics of the Earth's water systems and the influence of water systems on a specific region.
Grade 9–12 English	 generate, gather and organize ideas and information to write for an intended purpose and audience. identify some media forms and explain how the conventions and techniques associated with them are used to create meaning. demonstrate an understanding of a variety of media texts.
Grade 9 Geography	 apply in everyday contexts skills, including spatial technology skills, developed through the investigation of Canadian geography, and identify some careers in which a background in geography might be an asset. analyze various interactions between physical processes, phenomena and events, and human activities in Canada. analyze characteristics of various physical processes, phenomena, and events affecting Canada and their interrelationship with global physical systems. describe various characteristics of the natural environment and the spatial distribution of physical features in Canada, and explain the role of physical processes, phenomena and events in shaping them. analyze issues relating to the sustainability of human systems in Canada.
Grade 9 Science	 assess the impact of human activities on the sustainability of terrestrial and/or aquatic ecosystems, and evaluate the effectiveness of courses of action intended to remedy or mitigate negative impacts. investigate factors related to human activity that affect terrestrial and aquatic ecosystems, and explain how they affect the sustainability of these ecosystems. demonstrate an understanding of the dynamic nature of ecosystems, particularly in terms of ecological balance and the impact of human activity on the sustainability of terrestrial and aquatic ecosystems.
Grade 10 Civics	 analyze key rights and responsibilities associated with citizenship, in both the Canadian and global context, and some ways in which these rights are protected. analyze a variety of civic contributions, and ways in which people can contribute to the common good. analyze a civic issue of personal interest and develop a plan of action to address it.

Grade 10–12 Media Arts	 demonstrate an understanding of the critical analysis process by examining, interpreting, assessing and reflecting on media art works. demonstrate an understanding of how media art works reflect personal and cultural identity, and affect personal, cultural and community values and their awareness of those values.
Grade 11 Geography	 assess quality of life in the selected region, including factors that contribute to quality of life and policies/ programs that aim to improve it. analyze issues associated with sustainability and stewardship of natural resources in the selected region. analyze the role and involvement of intergovernmental organizations in the selected region. explain how climate, including climate change, and natural hazards affect the selected region. analyze the role of physical processes and human practices in maintaining a sustainable natural environment. analyze the impacts of human activities on the Earth's physical processes and the natural environment. analyze the influence of physical processes and features on human activity. analyze impacts of physical processes and disasters on human and natural systems, locally, nationally and globally. assess the role and effectiveness of various options for reducing the impacts of disasters on human populations. describe how the Earth's natural systems change, and have changed, over various time scales, and explain some of the processes that cause these changes. analyze strategies for the protection of natural and cultural resources that are essential to tourism, and assess their effectiveness. analyze impacts of environmental conditions and concerns on the tourism industry. use a variety of spatial technologies to help them assess human activities and plan and promote the sustainable use of the natural environment, including natural resources, in their local community or area. use a variety of spatial technologies to analyze the impact of human activity on the environment in their local community or area and beyond, and identify possible solutions.
Grade 11 Media Studies	 demonstrate understanding of a variety of media texts. deconstruct a variety of types of media texts, identifying the codes, conventions and techniques used and explaining how they create meaning.
Grade 11 Politics	 identify and analyze a political issue, with the goal of developing a personal plan of action to address this issue. identify a goal associated with the selected issue and construct an action plan to achieve that goal. analyze and reflect on possible outcome(s) of their plan.
Grade 11 Science	 investigate environmental factors that can affect human health, and analyze related data. demonstrate an understanding of various environmental factors that can affect human health, and explain how the impact of these factors can be reduced. analyze selected current environmental problems in terms of the role human activities have played in creating or perpetuating them, and propose possible solutions to one such problem. demonstrate an understanding of the ways in which environmental factors can affect human health and how their impact can be reduced.

Grade 12 Geography	 analyze strategies and initiatives that support environmental stewardship at a national and global level, and assess their effectiveness in promoting the sustainability of the natural environment. assess the impact of population growth on the sustainability of natural systems. analyze issues relating to the use and management of common-pool resources. assess various strategies used for protecting natural spaces and species, locally, nationally and globally. assess impacts of human population settlement on natural spaces and species. analyze relationships between the spheres of the Earth and the characteristics of ecosystems. analyze challenges involved in reducing pollution from human activities, and assess the effectiveness of various methods of pollution reduction. evaluate impacts of various types of pollution on the natural environment and on human health. describe key ecological and biological processes, and explain how they are affected by human activities. assess a variety of strategies for resolving environmental and natural resource management issues, locally, nationally and/or globally. apply spatial technologies to assess and support the sustainable use of natural and human environments. apply, and explain the role of, spatial technologies in analyzing environmental patterns and trends and making decisions related to sustainability.
Grade 12 Law	analyze factors that influence the effectiveness of domestic and international environmental legislation.
Grade 12 Politics	 analyze how social, economic and geographic factors influence contemporary politics in and relations between various countries around the world. analyze the role of civic awareness and responsibility among citizens and non-governmental stakeholders in the national and international community. demonstrate an understanding of key challenges relating to various issues of national and global political importance and of the strategies and effectiveness of various non-governmental stakeholders, including NGOs, in addressing them. assess the importance of the contributions of individuals and other non-governmental stakeholders to national and global communities.

The Overall Expectations listed above are from the *Ontario Curriculum*. Complete course descriptions, including all Overall and Specific Expectations can be found at: http://www.edu.gov.on.ca/eng/teachers/curriculum.html