

Facilitator's Guide

# A Matter of Degrees

Encouraging discussions about climate change

**THE W!LD CENTER**

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# How to Use the Guide

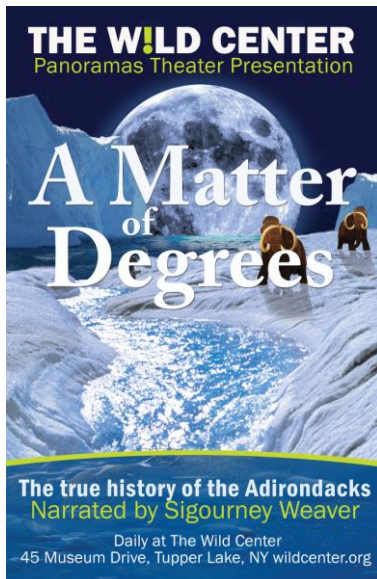
With the film *A Matter of Degrees*, this climate change resource was created for teachers, small group leaders, professional organizations, and anyone interested in sparking conversations about climate change. After viewing the film, leaders and teachers can use the guide to facilitate post-viewing discussions and lead participants in an interactive activity. For additional climate change resources and for more on the science behind climate change, see pages 20-21.

## General Guidelines for Facilitators

	Page #	Suggested Length
1. Teacher or facilitator: Review the entire packet, preview the film.		45 minutes total
2. Print and pass out pages 10, 15 and 16 to participants. If you want to review Weather versus Climate, print copies of page 8.	10, 15-16 8	10 minutes
3. Participants watch the film <i>A Matter of Degrees</i> while completing the optional film worksheet.	10	24 minutes or two 12-minute segments
4. Guide participants through filling out the first page of the MAP project.	15	15 - 20 minutes
5. Participants complete the MAP project as daily homework for one to two weeks.	16	5 minutes daily for one to two weeks
6. Lead a final wrap-up session for the MAP project.	14	30-45 minutes
7. Guide group through optional extension activities.	18	

Questions?  
Call The Wild Center at  
518-359-7800 and ask for the  
Education Department,  
or email us at  
[education@wildcenter.org](mailto:education@wildcenter.org).

# A Matter of Degrees



## Film Synopsis

*A Matter of Degrees* is a 24-minute film narrated by Sigourney Weaver, and was shot on location in Greenland and New York State's Adirondack Park.

*Beginning of film to minute 12:00*

Today's high is 64° Fahrenheit (F), with a low of 35° F. New Yorkers see huge temperature changes throughout the year, where even one 24-hour period can have a difference of 40° F or more. How important are a few degrees?

*A Matter of Degrees* takes us back in time to show us how small changes in climate can cause huge changes for living things. From one spot in the Adirondack Park in New York State, we see the cycle of destruction and renewal of life as the Earth experiences climate swings from warm and wet to an ice age, eventually stabilizing into the climate we are used to as modern humans. At the peak of the last ice age, the average global temperature was 9° F colder than it is today. Such a temperature difference, on a global scale, had huge consequences for all life in the world. Now, the pendulum is swinging in the other direction.

*Minute 12:00 to conclusion at 24:00*

We can look to modern glaciers, the melting remnants of the last ice age, to get an idea of the initial effects of warmer temperatures. Glaciers provide insight into the past, current, and possible future state of our planet. The gases trapped in ice clearly indicate that global average temperatures correlate closely with the level of carbon dioxide in the atmosphere; the higher the level of CO<sub>2</sub>, the warmer global average temperatures. Currently, atmospheric CO<sub>2</sub> is rising steadily, and global average temperatures are rising as well.

A warmer planet means significant changes. Sea levels will rise significantly, and scientists expect increased insect plagues, the spread of vector borne diseases, the loss of keystone species, and severe changes in ecological communities. Ultimately, life as we know it will change. Climate scientists agree that the cause of this unnaturally accelerated rate of change is the burning of fossil fuels and the destruction of CO<sub>2</sub>-absorbing forests.

A rapidly shifting climate profoundly affects the web of life. The knowledge about what is causing these changes gives us the power to address it. By looking to examples like the Adirondack Park, where people have been successfully working towards coexistence with the natural world for over 100 years, we can begin to secure a future for all life on this planet.

# A Matter of Degrees



## The Essential Story

“Studies showed that people weren’t seeing the impact a few degrees difference in global average temperature could have on the world. 9° Fahrenheit is not very significant in terms of one day’s weather, but it’s all it took to throw us into an ice age over 10,000 years ago. If the average global temperature is shifting now, we need to pay attention.”

Stephanie Ratcliffe  
Executive Director, The Wild Center

## About The Wild Center

The Wild Center is a not-for-profit organization located on 31 acres in Tupper Lake, NY, near the center of the Adirondack Park. As a science-based museum, The Wild Center is deeply committed to understanding and communicating how changes in the global climate impact life. Climate change initiatives like The Adirondack Youth Climate Summit, ADKCAP, the film *A Matter of Degrees*, and this Facilitator’s Guide are all inspired by our mission, and designed to bring the collaborative and coexisting model of the Adirondack Park to New York State and the rest of the world.

The Adirondack Park is an island amid a world of development. This 6 million acre state park houses great expanses of nature interspersed with small villages and communities. There may be no more important issue facing humankind than discovering better ways to coexist with the natural world, and there may be no better place to understand that effort than in the Adirondack Park.

[www.wildcenter.org](http://www.wildcenter.org)

### Mission

Ignite an enduring passion  
for the Adirondacks  
where people and nature  
can thrive together  
and set an example  
for the world

# About *A Matter of Degrees*

## From the Filmmakers

*Howard Fish, who heads up The Wild Center's exhibit team, and Jill Singer, an award-winning filmmaker of the Richard Lewis Museum Group, co-wrote A Matter of Degrees. Howard talks about how the concept for the film developed.*

"I was fascinated by how much places can change over time. Standing at a spot in the Adirondack Park, I realized that if I had been in this same spot at some distant epoch in the Earth's history I might have been gasping for air while standing on a perch higher than Mount Everest's summit. During other periods, I could have rolled under two miles of ice, or waded in a nice tropical sea. I wouldn't have had to move, just travel in time while the Earth morphed under different conditions in different eras.

We know that climate is one of the big forces behind all the changes that alter the Earth's surface. When climate shifts, the resulting ice or melting ice can, over time, move mountains. In a place like the Adirondack Park where the temperature range can be more than 120° F in a year, it is hard to understand that global average temperature could be a huge force that can result in whales swimming over what are mountains today. So that's how we came to make a movie that would use time travel to see that a few degrees can change everything.

We also had this idea that we could film the dynamism of the climate "live" – that we could go find the ice sheet that buried us, and show that the story of changes isn't complete, but is happening now, with the same potential for chaos."

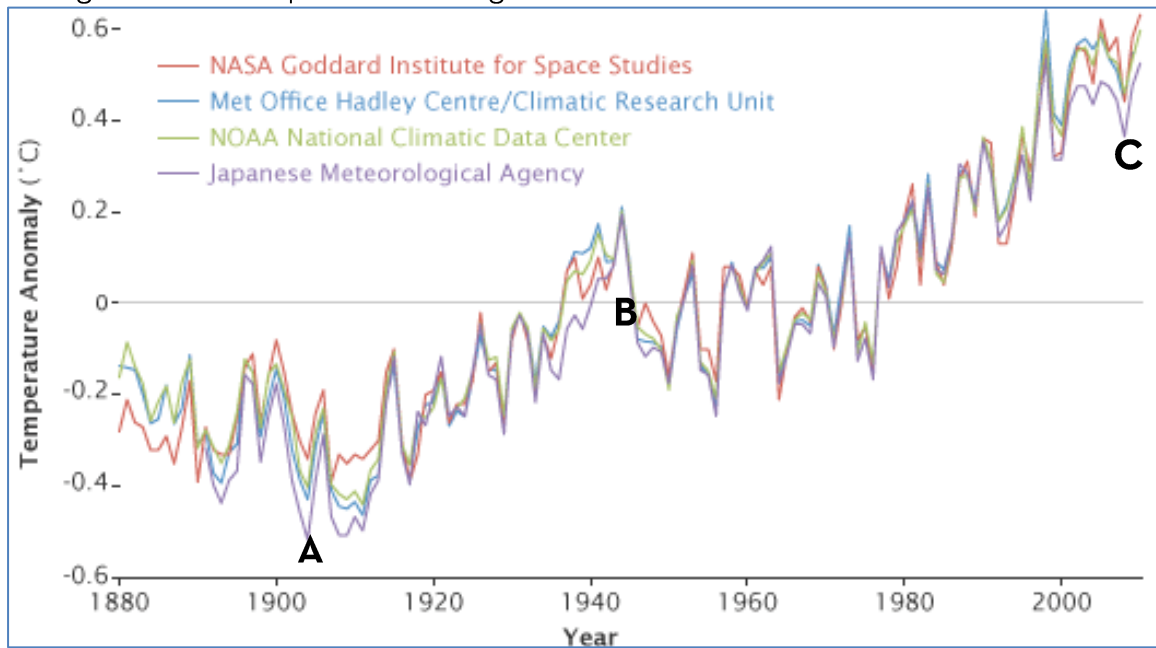
Jill Singer, the director who played a huge role in crafting the story, flew to the shooting site in Greenland and talked about the reality of walking on history as it moved under her feet. "I stood with scientists in Greenland and watched something happen that hasn't happened for thousands of years," said Singer. "I want people to feel the power of that story. One day I was looking at the ice-carved mountains of the Adirondack Park and then I was watching the collapsing, sprawling, ancient ice sheets of Greenland. Here was this huge shifting evidence of climate change that had once caused so much havoc, and it was on the move again at a faster speed than ever recorded.

We think most people know about the ice age and what it did. We wanted to use the knowledge they already had of ice ages, and then retell the story framed as an account of a few degrees of climate disruption. What a difference those few degrees made."

# Weather versus Climate

## Before we discuss climate change...

It is tempting to look outside and think that today's or even this particular year's weather either confirms or disproves climate change. While *A Matter of Degrees* does not directly address the differences between **weather** and **climate**, an understanding of these terms is crucial to critical thinking about climate change. As NASA phrases it, "climate is what you expect, like a very hot summer, and weather is what you get, like a hot day with pop-up thunderstorms." Weather describes atmospheric conditions at one point in time, while climate is the long-term weather patterns in a region.



Global Surface Temperatures Anomalies (deviations from normal values) from four independent sources, showing nearly identical warming trends.

Use the graph above to answer the following questions.

- What is the current temperature trend seen in this graph?
- How much warmer is Point **C** from **B**? **C** from **A**?
- How would you describe the climate in your region?
- Imagine a Point **D** in the year 2050. Where would **D** fall if this current trend continues? Describe how the climate might change in your region at Point **D**. How might that affect where you live from year to year, season to season?
- Think of a recent weather event that affected you and explain how it impacted your life. How will climate change affect the occurrence of weather events such as the one you picked? For example, Hurricane Irene in 2011 damaged and destroyed buildings and roadways, devastating many small towns along the way. Excessive flooding is predicted as a result of climate change in NYS and events like the aftermath of Irene are likely to increase.

# Viewing the Film

## Film Length

**24 minutes**

## Post-viewing Discussion

**25–45 minutes**

## Key Ideas

*The difference a few degrees have on global climate*

*Global climate change*

*Environmental effects of major climate shifts*

*Modern glaciers*

*Human impacts on climate*

*Climate change impacts on individuals and communities*

## Viewing Goals

- *Awareness of the effect of a few degrees change in global temperature*
- *Understanding of global climate issues and impacts of climate changes in our lives*

## Objectives

Participants will

- *think critically about climate change on an individual and global scale*
- *connect human behavior and environmental consequences*
- *explore climate change from a scientific perspective*

## Screening the Film

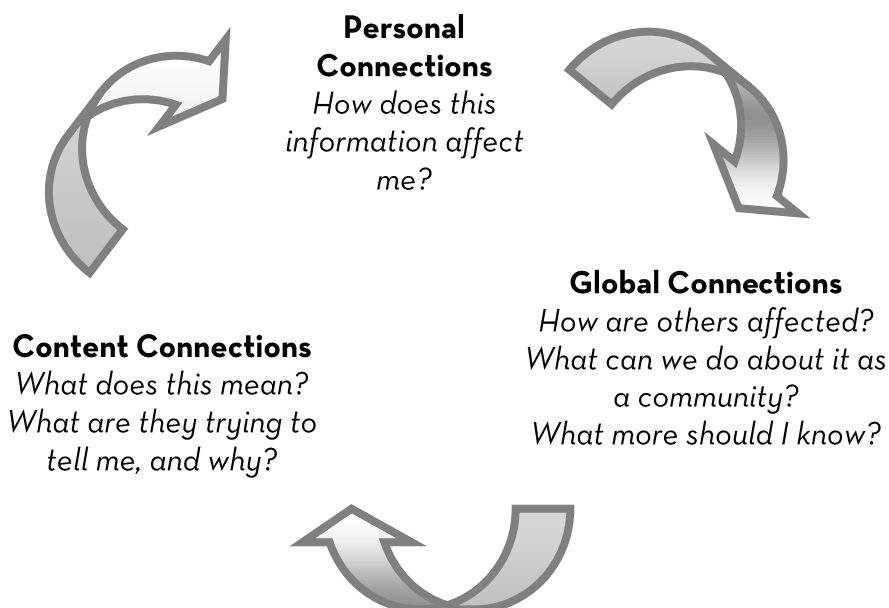
*A Matter of Degrees* can be watched in one showing or in two 12-minute parts. The synopsis on page 5 breaks down the content in two sections to help you decide how you want show to film to the group.

## Film Viewing Worksheet

- While watching the film, participants can fill out the worksheet on page 10. Page 11 is the answer sheet.
- If you want to show the film in two parts, from the start to minute 12:00 have participants answer questions 1–5. Questions 6–10 cover the second half of the film, minute 12:00 to 24:00.

## Using the Discussion Questions

The discussion questions are organized into the following categories:



# Film Worksheet

1. What was the climate like in New York State 125,000 years ago?
2. How did the shift of Earth's orbit around the sun affect the climate in the northern hemisphere?
3. What effect did the accumulation and moving of ice through New York State have on its wildlife and landscape?
4. As the retreating glaciers melted, the water forced some significant changes to the landscape. Describe one effect of the retreating glaciers.
5. What is the temperature difference between the Earth's average temperature at the peak of the last ice age and the current average temperature?
6. What is the annual rate of movement on Helheim Glacier? Over the past few years, has this rate increased, decreased, or remained constant?
7. What data are scientists finding from ice core samples on glaciers?
8. How does increased melt water on the surface of glaciers impact the rate of glacier movement?
9. What are the anticipated effects of an increasingly warmer global climate?
10. For how many years has the Adirondack Park served as a model of working towards coexistence with nature?

# Facilitator Answer Sheet

**1. What was the climate like in New York State 125,000 years ago?**

The climate was wetter and warmer.

**2. How did the shift of Earth's orbit around the sun affect the climate in the northern hemisphere?**

The shift led to cooling summer temperatures; cool enough that winter's snow stayed year-round.

**3. What effect did the accumulation and moving of ice through New York State have on its wildlife and landscape?**

The ice and subsequent glaciers moved south through the state, dragging huge boulders and scarring the landscape. Wildlife fled south of the moving glacier.

**4. As the retreating glaciers melted, the water forced some significant changes to the landscape. Describe one effect of the retreating glaciers.**

The melting, moving ice carved out the Finger Lakes, shaped the Palisades, and dropped sand and debris that formed Long Island. Melt water flowed back into the oceans and filled where it could on the land. Massive lakes filled, connecting the oceans to the land, and for 100's of years, sea animals like beluga whales swam in what is now the Adirondack Park.

**5. What is the temperature difference between the Earth's average temperature at the peak of the last ice age and the current average temperature? 9 degrees Fahrenheit**

**6. What is the annual rate of movement on Helheim Glacier? Over the past few years, has this rate increased, decreased, or remained constant?**

At the time of filming, the most recent data showed a rate of movement of 9 miles a year, a rate three times faster than previous years.

**7. What data are scientists finding from ice core samples on glaciers?**

These data show that over the past 800,000 years, atmospheric carbon dioxide levels were drastically lower than they are in modern times.

**8. How does increased melt water on the surface of glaciers impact the rate of glacier movement?**

The water collects in crevices that seep the water to the base of the glacier. There the water acts as a lubricant, allowing the ice to move even faster along the rock bed.

**9. What are the anticipated effects of an increasingly warmer global climate?**

Violent storms, droughts, floods, and other extreme weather events will occur. As the weather changes quickly, a series of animal extinctions is likely, although diseases and their vectors are likely to increase.

**10. For how many years has the Adirondack Park served as a model of working towards coexistence with nature?**

The Adirondack Park has been working to promote coexistence with nature for over 100 years.

# Discussion Questions

## Personal Connections

- To the whole group or with a partner, describe your impression of the film's content. Was any of the information new to you? What ideas or topics would you be interested in exploring in more depth?
- Describe some of the emotions you felt while watching the film. How do you feel when you think about global climate change? Why?
- What is your perspective on climate change? How did you arrive at that conclusion?
- What are some opinions you've heard people share about climate change?
- Have you made changes to your behavior in response to climate change? Why or why not?
- How will climate change affect you? How will it affect your favorite activities, seasons, foods, animals? How will it affect your favorite places, your hometown, and your state?
- Brainstorm a few actions that your school or community can do to address climate change. Does your school already have solar panels? Could you organize a green team to try to implement school or community-wide recycling?
- NYSERDA's ClimAID report (see resource guide) identifies agriculture as one area that will experience key climate impacts. Increased average summer temperatures, more pests and weeds, and changing precipitation patterns will impact this important industry for New York State workers and residents. How will these changes impact agriculture? How will changes in agriculture affect you?

## Global Connections

- If the average global temperature increased 9° F from what it is now:
  - How would coastal communities like New York City be affected? What impacts on ocean life, boreal habitats, or endemic island species would occur?
  - How would it affect your local region?
- What areas around the world do you think would be hit the hardest by effects of climate change within the next 100 years? What makes you think that?
- How does the United States currently acquire energy to maintain our standard of living? How do other developed countries do this? What about underdeveloped countries?
- What can communities do together to reduce carbon emissions?
- The European Commission for Climate Action helps the European Union stay on track with its projected climate change targets. Spend some time researching what other countries and organizations are doing to proactively respond to global climate change.
- The varying consequences of climate change will affect human populations unequally. For example, public health risks that increase from climate change, such as increased smog, wildfires, and pollens are more likely to be more dangerous to the elderly and children. Discuss other impacts and how they might vary based on region, demographics, and other variables.

# Discussion Questions

## Content Connections

### New York State, Then and Now

- Describe the effects of the ice's retreat on New York State's geography and environment. How did the climate shift affect wildlife? Plant communities? The shape of the landscape?
- What was the difference in the degrees Fahrenheit of Earth's average temperature during the last ice age compared to the Earth's current average temperature?
- The film begins at an oxbow on the Raquette River in Tupper Lake, NY. It also mentions the Finger Lakes, Palisades, and Long Island. Locate these on a map. How were these places affected by glaciers? What additional surrounding geographical features were impacted?

### Quotes

- Respond to the following quote from the end of the film. *"These bleak scenarios for the future are not the result of a natural climate shift. The overwhelming evidence is that the ancient fossil fuels we still use to power our activities are spilling carbon dioxide pollution into the thin shell of our atmosphere, overloading the natural system, trapping heat, displacing life."*
- At 20:31, the narrator asserts that the Adirondacks might serve as a model of people working *with* nature. What makes this state park so unusual, and how might it serve as an example as we look for solutions to fighting climate change?

### The Ice Age

- How did the last ice age begin?
- How does the presence of glaciers affect ocean levels?
- When and how did the Helheim Glacier form?
- How is increased surface water on the glacier related to its movement?

*The average global temperature during the peak of the ice age 10,000 years ago was 9°F lower than the current average global temperature. Now, global climate change is swinging the pendulum in the other direction. How would an increase of 9°F from the current average global temperature impact you?*



# My Action Plan Project

## Activity Goals

- Increase participant awareness of connections between behavioral decisions and the environment
- Empower participants with the knowledge that they can make a positive environmental impact

## Objectives

Participants will

- Identify regular personal behaviors that have positive and negative environmental consequences (3 each)
- Document specific behavioral changes for one or two weeks
- Research specific actions and their true impacts on a larger scale
- Share with the larger group some of what they have learned

## What is the M.A.P. Project?

See the M.A.P. worksheets on the next two pages.

Just like the navigational tool, a M.A.P. provides a starting point and ultimate achievable destination for each person. Participants will connect their behaviors and choices to environmental consequences by identifying actions that can positively or negatively affect the environment. They will set their own goals and spend one or two weeks monitoring their progress and actions.

After the one or two week project, participants can share what they practiced and discovered through their experience.

## Leading the Project

*Introducing the activity*

Emphasize the positive power everyone holds in decision making. This is an opportunity for participants to feel empowered by positive choices.

*Timing*

- 15 - 20 minutes to do the first page of the M.A.P. worksheet in class or at home
- 1 or 2 weeks, 5 minutes a day for their daily chart
- 30 - 45 minutes for project sharing-session at the end of the week(s)

## Wrapping up the Project (30 - 45 minutes)

At the end of the one to two weeks of the M.A.P. Project, individuals share their charts and what they found in their research on the annual impact questions. Consider asking the following questions:

- What made it difficult or easy to follow the action plan?
- Are those actions things you will continue doing?
- Were others curious about your actions? What were their reactions?
- How can you engage your community to rethink some choices?

Connect your choices to their environmental consequences by identifying and evaluating actions that can positively or negatively affect the environment.

# My Action Plan

## What do I already do?

Identify 3 things you do regularly that can have a positive environmental impact, like recycling.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

## What can I do differently?

Identify 3 things you do regularly that have negative environmental impacts, such as idling a car or leaving your computer on all day.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

## What if everyone did that?

Choose one action from each list above.

\_\_\_\_\_  
Positive Action

\_\_\_\_\_  
Negative Action

What would be the impact if your community (school, family, organization) also did the positive action you chose? Consider effects on issues of waste, pollution, and carbon dioxide.

What would be the impact if your community also did the action you picked from the second list? Consider effects on issues of waste, pollution, and carbon dioxide.

# What can I do differently?

# M.A.P.

From the first page of the worksheet, choose two behaviors you will do differently in an effort to decrease waste, pollution, or carbon dioxide levels. Document your efforts for one or two weeks.

Week 1	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Action 1:							
Action 2:							
Week 2	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Action 1:							
Action 2:							

## For each day of the week, you can document:

- Were you able to follow your action plan that day?
- How difficult or easy is following the behavior?
- Have you convinced anyone else to do what you're doing?

If your community (school, organization, family, town, etc.) reduced its carbon footprint the way you did during these 1 - 2 weeks, what impact would that have on the environment?  
Research tools that help you track your carbon footprint.

# Discussion Aids

*Participants will come to the table with various levels of previous knowledge and different opinions about climate change. Consider the following to help respond effectively to potential comments.*

While participants should direct the flow of the discussion, intervene if an individual dominates the discussion, argues disrespectfully, or engages in monologues. Regardless of what a person believes about global climate change, s/he should be encouraged to defend the position with facts. To do so successfully requires research and follow-up beyond the scope of the film's content but is achievable through the scores of free and readily available climate change material. Please see our resource section at the end of the guide for information.

## Challenges with Climate Change

Review some of these topics that might arise in a conversation about climate change. Consider how you or others might respond. Conversations focusing on these issues can provide valuable critical thinking skill exercises by forcing participants to research and defend their own positions. These topics also have the potential to steer conversations away from scientific facts. The [Key Terms](#) and [Resource Guide](#) on pages 19 - 21 provide additional information.

- How can we reduce our contributions to climate change if we don't have access to public transportation, green technologies, and other expensive or regionally unavailable resources?
- Many companies that make products producing emissions provide valuable jobs for communities.
- How is ozone depletion different from climate change?
- What is the difference between weather and climate?
- How much consensus is there among scientists about the extent to which human activity is impacting global average temperatures?
- "Environmentally friendly" alternatives to traditional energy sources can be harmful: ground water pollution from hydrofracking, bird and bat mortality from wind turbines, hazardous waste from nuclear plants, more energy going into ethanol than coming out.
- Aren't there other possible explanations to increased global temperatures than human activity?

[www.wunderground.com/climate](http://www.wunderground.com/climate) is a great new resource providing a scientific look at climate change. Click on their "Feeling Skeptical? Skeptical Science" page to see common misconceptions explained.

# Additional Curricula

## Pre-film and post-film activities

- Read and report on a current events article about climate change.
- Review one of the resources on pages 20 and 21 and write a 1/2 page annotated bibliography.
- Research types of fossil fuels and their impacts.
- Create a positive examples list - Have a brainstorming session to think of examples of individuals or communities creating a positive solution to addressing climate change.
- Calculate the carbon footprint of your school, town, or community.
- Create a video about climate change and its impacts on your community.
- Create a climate action plan for your school.
- Head outside. As a group, discuss how that area might change with climate change. Imagine yourselves in another part of the world and how climate change will impact regions differently.
- Learn about green technology. Investigate other schools and communities around the world that are recycling, installing solar panels, and working on other initiatives to lower carbon footprints.
- Research laws that cap carbon emissions. How do they vary from state to state and country to country?
- Using the ClimAID synthesis report, research one of the 8 factors identified and described in the report. The 8 topics are water resources, coastal zones, ecosystems, agriculture, energy, transportation, telecommunications, and public health. After your research, present to the group on what the report identifies as that topic's Key Climate Impacts, Adaptation Options, and Particularly Vulnerable Groups.
- Organize a regional Climate Change Youth Summit! You and your peers can coordinate with local schools and create a one or multi-day conference with guest speakers and workshops focusing on climate change. For an inspiring example, visit [www.wildcenter.org](http://www.wildcenter.org) to learn about the Adirondack Youth Climate Summit, a program so successful it inspired a similar summit in Finland!

### **ClimAID**

<http://www.nyserda.ny.gov/>

How will climate change affect farmers, residents, vacationers, and businesses in NYS? Search "ClimAID" and read the integrated assessment for effective climate change adaptation strategies in New York State. "ClimAID synthesis report" will bring you to the 60-page abbreviated report.

# Key Terms

Search “Glossary” on [www.noaa.gov](http://www.noaa.gov) and [www.epa.gov/climatechange](http://www.epa.gov/climatechange) for more detailed descriptions of these and many more terms.

## **Weather**

The state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc. at a given point in time (e.g., today's high temperature)

## **Climate**

The composite or generally prevailing weather conditions of a region, throughout the year, averaged over a series of years (e.g., the average high temperature for today's date)

## **“Global Warming,” “Climate Change,” and “Climate Disruption”**

Global warming refers to one aspect of climate change, the temperature. Climate is defined not simply as average temperature but refers to any distinct change in measures of climate lasting for a long period of time, including precipitation and wind patterns. Human-induced climate change has the potential to alter the prevalence and severity of extremes such as heat waves, cold waves, storms, floods and droughts, giving meaning to climate disruption. Though predicting changes in these types of events under a changing climate is difficult, understanding vulnerabilities to such changes is a critical part of estimating vulnerabilities and future climate change impacts on human health, society and the environment. Climate change and global climate disruption are both more accurate and urgent terms that better describe the overall impact these changes will show.

## **Greenhouse Effect**

Greenhouse gases are necessary for life to exist on Earth—they trap infra-red radiation in the atmosphere, and help keep the planet warm and in a state of equilibrium. Without this “Greenhouse Effect” the Earth's average temperature would be 60° cooler – uninhabitable for humans. But this natural greenhouse effect is being strengthened as human activities (such as the combustion of fossil fuels) add more of these gases to the atmosphere, trapping excessive heat and resulting in a shift in the Earth's equilibrium.

## **Carbon Footprint**

A measurement of the total greenhouse gas emissions caused directly and indirectly by a person, organization, event or product. Your footprint is largely affected by your travel methods, quantity of waste and how you deal with it, energy use, and food and material consumption.

## **The Ozone Hole**

Ozone is a natural greenhouse gas in the atmosphere, but the Ozone layer in the stratosphere shields the Earth from harmful UV Radiation. The Ozone Hole is a severe depletion of this shield that appears over Antarctica each spring. The hole is caused by a chemical reaction involving ozone and chlorine, primarily from human produced sources, cloud particles, and low temperatures.

## **The Intergovernmental Panel on Climate Change (IPCC)**

The IPCC is an intergovernmental, scientific body. It reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor climate related data or parameters. By endorsing the IPCC reports, governments acknowledge the authority of their scientific content. The work of the organization is therefore policy-relevant and yet policy-neutral, never policy-prescriptive.

# Resources

## Curricula

### Facing the Future

[www.facingthefuture.org](http://www.facingthefuture.org)

This site provides free, field-tested curricula focusing on global issues and sustainability, with lessons for all grade levels.

### Environmental Protection Agency

[www.epa.gov/education](http://www.epa.gov/education)

This site provides free resources about environmental education grants, teacher awards, student games, activities, and awards, and teacher lesson plans, webinars, and publications.

## Climate Change Science

### Environmental Protection Agency

[www.epa.gov/climatechange](http://www.epa.gov/climatechange)

This detailed, user-friendly site provides introductory and in-depth information, including a detailed glossary, climate change indicators, and a “what you can do” component.

### Intergovernmental Panel on Climate Change

[www.ipcc.ch](http://www.ipcc.ch)

The IPCC is an international scientific body established to provide a clear scientific view on the current state of knowledge on climate change and its potential environmental and socio-economic impacts.

### Center for Research on Environmental Decisions

<http://www.cred.columbia.edu/guide/>

CRED has developed The Psychology of Climate Change Communication, an invaluable guide for those spurring discussion on climate change. It provides ways to best reach your audience in an unthreatening, relevant way.

### NOAA's National Climatic Data Center

[www.ncdc.noaa.gov](http://www.ncdc.noaa.gov)

Current events and up-to-date scientific data and models on stations around the country monitoring climate change. Navigating the site can get technical.

### NASA Global Climate Change

[www.climate.nasa.gov](http://www.climate.nasa.gov)

Clear, accessible images and text share NASA data about signs of global climate change around the planet.

### United States Global Change Research Program

[www.globalchange.gov/resources/educators](http://www.globalchange.gov/resources/educators)

The document “Climate Literacy: The Essential Principles of Climate Sciences” promotes greater climate science literacy for all learners by providing an educational framework of principles and concepts.

### Carbon Footprint Calculators

[www.nature.org/greenliving/carboncalculator/](http://www.nature.org/greenliving/carboncalculator/)

For individuals and households

[www.cleanair-coolplanet.org/](http://www.cleanair-coolplanet.org/)

In-depth for communities and campuses

### Real Climate

[www.realclimate.org](http://www.realclimate.org)

Read commentaries from working climate scientists. The scientists aim to provide quick responses to developing stories and provide the context sometimes missing in mainstream commentary.

### Hot, Flat, and Crowded: Why We Need a Green Revolution and How it Can Renew America.

*Friedman, T.L. Picador Publishing, 2008.*

Friedman proposes that the solutions to global warming and the best methods to regain the United States' economic and political stature in the world are to embrace the clean energy and green technology industries.

### Deep Future: the Next 100,000 Years of Life on Earth.

*Stager, C. Thomas Dunne Books, 2011.*

While most discussions of the subject look only at the next century or so, Stager explores what happens after the current generation is gone from the scene.

### **Six Degrees: Our Future on a Hotter Planet**

*Lynas, M. National Geographic Society and HarperCollins Publishers, Ltd. 2008.*

Based on authoritative scientific articles, the latest computer models, and information about past warm events in Earth's history, this book outlines what to expect from a warming world, degree by degree.

### *New York State*

#### **NYS Department of Environmental Conservation Office of Climate Change**

[www.dec.ny.gov/about/43166.html](http://www.dec.ny.gov/about/43166.html)

New York State is working towards mitigating greenhouse gas emissions and providing ways we can help lessen the impact of climate change on individuals and communities.

#### **ClimAID**

<http://www.nyserda.ny.gov/>

How will climate change affect farmers, residents, vacationers, and businesses in NYS? Search "ClimAID" and read the integrated assessment for effective climate change adaption strategies in New York State.

#### **The Wild Center**

[www.wildcenter.org](http://www.wildcenter.org), 518-359-7800

As a science-based museum, The Wild Center is deeply committed to understanding and communicating how changes in the global climate, a major pillar supporting the natural world, will impact life. If you have questions about this facilitator's guide or *A Matter of Degrees*, please give us a call!

#### **Adirondack Youth Climate Summit**

[www.adkyouthsummit.org](http://www.adkyouthsummit.org)

AYCS is an annual two-day, youth-led conference focused on how climate change is affecting youth, educators, school administrators, and facility staff, and their future.

### **Climate Change in the Adirondacks: the Path to Sustainability**

*Jenkins, J. Cornell University Press, 2010.*

Through easy-to-understand graphics and text, Jenkins presents the scientific evidence of what the Adirondack Park and New York State can expect as it faces the impacts of climate change. Emphasis on feasible, realistic solutions for communities and individuals provides hope and empowerment.

#### **The Adirondack Atlas: a Geographic Portrait of the Adirondack Park**

*Jenkins, J. Syracuse University Press, 2004.*

With data from nearly every scientific realm, this comprehensive text provides the information for locals and those who have never before heard of the Adirondack Park to develop a deep appreciation and understanding for this unique region.

#### **Why the Adirondacks Look the Way They Do: a Natural History**

*Storey, M. Hamilton Printing Company, 2006.*

From geology to glaciers, woodlands and wildlife, Storey explores the natural history of the Adirondack Park. Timelines, photographs, and illustrations help share this ecological story.

### *Films*

#### **The Story of Stuff Project**

[www.storyofstuff.org](http://www.storyofstuff.org)

Through animated videos and interactive resources, this non-profit debunks myths and misunderstandings about the way we make, use and throw away Stuff.

#### **How it all Ends**

*You Tube Channel: wonderingmind42*

Chemistry and physics high school teacher Greg Craven presents an innovative and logical approach to risk assessment in the context of climate change.