

The Canada Science and Technology Museum
presents

**Weather Wise:
A Virtual Exploration Guide
to
Weather and Climate Change**

Section 1: About This Guide



Introduction

This Virtual Exploration Guide is written for Grades 4 to 7; it consists of four sections. There is a logical sequencing between the sections, but each stands alone and can be used independently. You can freely choose the sections that are most appropriate for your students and your classroom objectives.

What this Exploration Guide can do for you

We hear it everyday on the radio and television, and read it in the newspapers. One of the most pressing problems facing us today is the warming of the planet due to an increase in man-made greenhouse gases. This warming will cause many alterations to our environment, due to various climate changes. This Guide will bring to your students an understanding of what is becoming apparent today, why this is so and what will happen in the future. Through activities, web searches and worksheets, they will learn how we monitor weather, why the global temperature is increasing and what the consequences will be.

Blank worksheets and detailed explanations can be freely reproduced to use in your classroom. Our activities are modular and can be completed independently. Teachers may request an answer package for more detailed Activity Sheets by e-mailing virt_prog@technomuses.ca. Please allow at least a week for us to reply.



Navigating through the Exploration Guide

Each section can be downloaded as a separate Adobe PDF file, allowing you to select those you want to use. Alternatively, you can download the entire guide as a single Adobe PDF file. The content is identical in either case.

| Section | Topic |
|---------|--|
| 1 | Introduction (This Module) |
| 2 | Weather Weather elements Weather instruments Forecasting and the weather network |
| 3 | Global Warming Average temperature of the Earth over time The greenhouse effect and its enhancement Greenhouse gases and the link to fossil fuels |
| 4 | Climate Change and Our Responsibility Effects of climate change Consequences of climate change Alternative energy Personal choices |

Throughout the Exploration Guide, distinctive icons indicate features in the text. These help you find your way through the Exploration Guide quickly and efficiently.



Classroom activity



Discussion or essay topic



Deeper study



Site to visit

Curriculum Links

The Guide is cross-curriculum, introducing elements from various curriculum divisions: Mathematics, Social Studies, Geography, Language Arts, and Science and Technology.

Links to the Pan-Canadian Common Framework

Learning Outcomes Grades 4 to 6

| | |
|---|--|
| Science, Technology, Society and the Environment | 108 |
| Skills | 204; 205; 206; 207 |
| Knowledge | 300-13; 301-13; 301-14; 302-11; 303-30 |
| Attitudes | 410; 419 |

Learning outcomes Grades 7 to 9

| | |
|---|----------------------------|
| Science, Technology, Society and the Environment | 110-7; 113-1; 113-6; 113-9 |
| Skills | 209-5; 210-2; 210-6; 211-2 |
| Knowledge | 311-12 |
| Attitudes | 431; 432; 433; 435 |

Ontario Mathematics Curriculum

| | |
|---------------|-----------------------------------|
| Grades 4 to 5 | • Measurement |
| Grades 4 to 7 | • Data Management and Probability |

Ontario Social Studies Curriculum

| | |
|--|--|
| Grade 4: Canada and World Connections | • Canada's Provinces, Territories and Regions |
| Grade 5: Canada and World Connections | • Aspects of Citizenship and Government in Canada |
| Grade 6: Canada and World Connections | • Canada's Link to the World |

Ontario Geography Curriculum

| | |
|--|----------------------------------|
| Grade 7: The Themes of Geographic Inquiry | • Patterns in Physical Geography |
| | • Natural Resources |

Ontario Language Arts Curriculum

Grades 4 to 7

- Reading, Writing, Oral Communication, Media Literacy

Ontario Science and Technology Curriculum

Grades 4, 6, 7: Life Systems

- Habitats and Communities
- Diversity of Living Things
- Interactions with Ecosystems

Grades 5, 7: Earth and Space Systems

- Weather
- The Earth's Crust

Grades 5, 6, 7: Energy and Control

- Conservation of Energy
- Electricity

Quebec Curriculum

Environmental Awareness and Consumer Rights and Responsibilities:

- To encourage students to develop an active relationship with their environment while maintaining a critical attitude towards exploitation of the environment, technological development and consumer goods

Geography, History and Citizenship Education

- To interpret change in a society and its territory

Science and Technology

- To propose explanations for or solutions to scientific or technological problems
- To communicate in the languages used in science and technology

English Language Arts

- To read and listen to literary, popular and information-based texts
- To write self-expressive, narrative and information-based texts
- To use language to communicate and learn

Cross-Curricular Competencies

- To use information and communications technologies (ICT)
- To cooperate with others
- To communicate appropriately

Resource Information

Books on Weather

Cullen, Katherine. **Weather and Climate: The People Behind the Science**, New York: Facts on File, 2005. ISBN 0-816054-66-4

Davis, Barbara J. **Air and Weather**, Milwaukee: Gareth Stevens Pub., 2007. ISBN 0-836877-60-1

Elsom, Derek M. **Weather: An Accessible Guide That Really Explains the Elements**, London: Marshall Pub. 1998. ISBN 1-840281-58-8

Howell, Laura. **The Usborne Internet-linked Introduction to Weather & Climate Change**, London: Usborne, 2004. ISBN 0-794506-29-1

Jennings, Terry J. **Atmosphere and Weather**, North Mankato, MN: Smart Apple Media, 2006. ISBN 1-583407-25-1

Mehling, Randi. **Weather, and How It Works**, New York: Chelsea House, 2006. ISBN 0-791090-53-1

Stein, Paul. **MacMillan Encyclopedia of Weather**, New York: MacMillan Reference Books, 2001. ISBN 0-028654-73-7

Books on Climate Change

Hawkes, Nigel. **Climate Crisis. (Saving our World)**, London: Watts, 2003. ISBN 0-749650-96-6

Jennings, Terry J. **Changing Climates**, North Mankato, MN: Smart Apple Media, 2006. ISBN 1-583407-28-6

Silverstein, Alvin. **Weather and Climate**, Brookfield, Conn.: Twenty-First Century Books, 1998. ISBN 0-761332-23-5

Spilsbury, Louise. **Changing Climate: Living with the Weather**, Chicago, Ill.: Raintree, 2006. ISBN 1-410911-12-8

Unwin, Mike. **Climate Change**, Chicago, Ill.: Heinemann Library, 2007. ISBN 1-403482-16-0

Books on Global Warming

David Laurie. **The Down-to-Earth Guide to Global Warming**, New York: Orchard Book, 2007. ISBN 0-439024-94-5

Donnelly, Karen J. **Rising Temperatures of the Past and the Future**, New York: PowerKids Press, 2003. ISBN 0-823962-14-8

Lim, Cheng Puay. **Our Warming Planet**, Chicago, Ill.: Raintree, 2004. ISBN 0-739870-14-9

Morgan, Sally. **Global Warming**,
Chicago, Ill.: Heinemann Library, 2003. ISBN 1-403403-24-4

Parks, Peggy J. **Global Warming**,
San Diego, Calif.: Kidhaven Press, 2004. ISBN 0-737718-22-6

Silverstein, Alvin. **Global Warming**,
Brookfield, Conn.: Twenty-First Century Books, 2003. ISBN 0-761322-56-6

Books on Greenhouse Effect

Edmonds, Alex. **The Greenhouse Effect**,
Mankato, Minn.: Stargazer Books, 2005. ISBN 1-932799-85-0

Johnson, Rebecca L. **The Greenhouse Effect: Life on a Warmer Planet**,
Minneapolis, Minn.: Lerner Publications, 1993. ISBN 0-822525-09-7

Rockwell, Anne F. **Why Are the Ice Caps Melting?: The Dangers of Global Warming**, New York: Collins, 2006. ISBN 0-060546-69-7

Books on Temperature

Frisch, Joy. **Temperature**,
Mankato, Minn.: Smart Apple Media, 2003. ISBN 1-583401-59-0

Lafferty, Peter. **Heat and Cold**,
Tarrytown, NY: Benchmark Books, 1996. ISBN 0-761400-33-8

Rodgers, Alan. **Temperature**,
Chicago, Ill.: Heinemann Library Hardbacks, 2007. ISBN 0-431038-52-X

Wiese, Jim. **Heat and Temperature**,
Toronto, Ont.: ITP Nelson, 1997. ISBN 0-176057-82-X

Books on Transportation

Dowswell, Paul. **Transportation**,
Chicago, Ill.: Heinemann Library, 2002. ISBN 1-588102-16-5

Gilpin, Daniel. **Transportation Solutions**,
North Mankato, Minn.: Smart Apple Media, 2005. ISBN 1-583405-99-2

Herbst, Judith. **The History of Everyday Transportation**,
Minneapolis, Minn.: Lerner, 2006. ISBN 0-822524-96-1

Pollard, Michael. **Transportation**,
New York: Chelsea House Publishers, 1995. ISBN 0-791027-68-6

Richards, Jon. **Transport**
North Mankato, Minn.: Smart Apple Media, 2005. ISBN 1-593891-96-2

Steins, Richard. **Transportation Milestones and Breakthroughs**
Austin, TX: Raintree Steck-Vaughn, 1995. ISBN 0-811449-35-1

Useful Web Sites

Notice Regarding Internet Sites

These Internet links are provided as a convenience only. We have taken care to suggest web sites that are stable and are appropriate for education but we cannot guarantee the content of any sites not under the direct control of Canada Science and Technology Museum. These sites provide information for the activities presented in this Virtual Guide but performing subject searches will show up many more, also one of the objectives of this guide.

Since the Internet has a very dynamic nature, web addresses can change without warning.

Canada Science and Technology Museum- Meteorological apparatus
<http://www.sciencetech.technomuses.ca/english/collection/meteo.cfm>

Environment Canada Weather Radar
http://weatheroffice.ec.gc.ca/radar/index_e.html

Meteorological Service of Canada
http://www.msc.ec.gc.ca/index_e.cfm

National Radar Program
http://www.msc-smc.ec.gc.ca/projects/nrp/faq_e.cfm

Satellite images
http://www.weatheroffice.gc.ca/satellite/index_e.html

Envirozine — Information on Clouds
http://www.ec.gc.ca/EnviroZine/english/issues/66/feature1_e.cfm

Environment Canada — Great Lake Kids (video – Forecasting Your Weather)
<http://www.on.ec.gc.ca/greatlakeskids/glk-video-e.html>

United States Environmental Protection Agency
<http://www.epa.gov/climatechange/kids/greenhouse.html>

BBC News — Guide to Climate Change
http://news.bbc.co.uk/1/shared/spl/hi/sci_nat/04/climate_change/html/greenhouse.stm

NASA Exploration
<http://liftoff.msfc.nasa.gov/academy/space/greenhouse.html>

The Discovery of Global Warming
<http://www.aip.org/history/climate/co2.htm>

Environment Canada — Greenhouse Effect
http://www.msc.ec.gc.ca/education/scienceofclimatechange/understanding/greenhouse_gases/index_e.html
http://www.ec.gc.ca/climate/overview_greenhouse-e.html

Environment Canada — Frequently Asked Questions
http://www.weatheroffice.gc.ca/mainmenu/faq_e.html#satellite3



World Wildlife Fund — Climate Change in the Arctic

http://www.panda.org/about_wwf/where_we_work/europe/what_we_do/arctic/what_we_do/climate/index.cfm

CBC News

<http://www.cbc.ca/news/background/climatechange/>