To help compliment the Kingston Climate Action Plan, this resource has been created in conjunction with the City of Kingston, the Great Lakes Adaptation Assessment for Cities (GLAA-C) and Kingston, Frontenac and Lennox & Addington Public Health. It is intended to help teachers communicate to students the health-related impacts of climate change and explore measures that individuals can take to protect themselves.
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Climate change is one of the most significant global issues facing today’s generation. So what exactly is climate change? Climate change describes the shift of long term weather patterns, like temperature, humidity, wind, and precipitation, largely as a result of human activities. We have released so much carbon dioxide and other greenhouse gases that our planet’s atmosphere is now like a thick, heat-trapping blanket. By disrupting the atmospheric balance that keeps the climate stable, we are now seeing extreme effects around the globe.

Our region is not immune to climate change. Research shows that, by 2020, the climate for Kingston and surrounding areas will most likely resemble more southern climates like that of Syracuse, New York and, by 2050, the climate of Columbus, Ohio. This may sound like a good thing, but climate systems don’t normally change this quickly. Swift change will have major repercussions. Current infrastructure is not prepared to deal with major day-to-day temperature fluctuations. Increased rain and winds means we are at risk of more flooding and storm-related damage. Warmer winters and hotter summers will increase the likelihood of health problems related to heat and air quality and will increase the threat of certain diseases in Eastern Ontario, such as West Nile Virus, Eastern Equine Encephalitis, and Lyme disease transmitted through infectious insects, such as ticks and mosquitoes.

Climate change is happening. Now we must lower our individual greenhouse gas contributions to try to slow the change and prepare ourselves to adapt to coming changes as a community.

“It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change.”

Charles Darwin
Climate changes such as increased rainfall and warmer temperatures can influence the spread of various diseases by providing ideal conditions to allow germs (bacteria, viruses, and parasites) and bugs to thrive.

In our area, a particular concern is Lyme disease. Lyme disease is a serious bacterial illness spread by the bite of a tiny bug known as the black-legged tick (or deer tick). Just as a car helps to transport people from one place to another, the tick acts as the vehicle or “vector,” helping to carry the Lyme disease bacteria from one animal to another. When a tick bites an animal that has the Lyme bacteria, the bacteria make their way inside the tick to hitch a ride. When the tick feeds again, these bacteria can move inside the new target. If the bacteria get inside us, they can cause us to get sick. For most Canadians, the risk of getting Lyme disease is fairly low, but it is increasing. In the KFL&A area, approximately 1 in 5 ticks carry the Lyme disease bacteria.
The health effects

Initial symptoms of Lyme disease can appear within three days to several weeks after being bitten and may include a red bulls-eye rash in the area of the bite, fever, headache, muscle and joint pain. Lyme disease can be treated with antibiotics. When left untreated Lyme disease can cause serious problems to your heart, joints, and nervous system.

Ticks can only transmit the Lyme bacteria after being attached (feeding) on a human for more than 24 hours. Because of this delay, checking for ticks and prompt removal are key methods of preventing Lyme disease.

What you can do

- Walk in the centre of trails, away from long grass and wooded areas.
- When in grassy or wooded areas, cover up with long sleeves and pants tucked into socks. Wear light-coloured clothing to make ticks easier to spot.
- Use insect repellents.
- Check for ticks when you return from being outdoors. Check your body, clothing, and pets!
- If you find a tick, use tweezers to grasp the head of the tick as close as possible to the skin and gently pull straight out. DO NOT squeeze or try to burn the tick off. See your physician if the tick has been attached for longer than 24 hours, you may be given an antibiotic to prevent infection with Lyme disease.
Increased air pollution

Air pollution is primarily associated with pollutants released by motor vehicles, industrial processes, and the burning of fossil fuels such as gas, oil, coal, and wood. Climate change may influence the levels of air pollution due to modification in winds and temperature which can result in poorer air quality.
The health effects

Air pollution can:

- make it harder to breathe,
- irritate your eyes, nose, and throat,
- trigger episodes of breathing conditions such as asthma,
- and trigger episodes of heart conditions.

Young children are at increased risk for breathing problems and are more susceptible to air pollution. Healthy people may also experience symptoms such as irritated eyes, increased mucus production in the nose or throat, coughing, and difficulty breathing especially during exercise.

What you can do

- Check the daily Air Quality Health Index (AQHI) at http://www.ec.gc.ca/cas-aqhi and plan outdoor activities based on the forecasted health risk. The AQHI is a public information tool that helps Canadians protect their health on a daily basis from the negative effects of air pollution.
- Decrease your activities or move indoors if you are experiencing symptoms.
- Decrease your activities that contribute to air pollution. E.g. Walking or cycling to school, and turning off devices when not in use.
The thinning ozone layer

The ozone layer protects all life from over-exposure to the sun’s ultraviolet (UV) rays. UVA and UVB rays can penetrate the ozone layer and damage our skin and eyes, but most incoming ultraviolet radiation is absorbed by the ozone and prevented from reaching the Earth’s surface.

Ozone depletion increases the amount of UVB rays that reach the Earth’s surface. Thinning of the ozone occurs when the balance between ozone production and ozone destruction is tipped in favour of destruction. Human activity is the major contributing factor to this imbalance, mostly from releasing artificial chemicals.
The health effects

Health risks of over-exposure to UVA and UVB rays include sunburns, skin aging, eye damage, and skin cancers. Skin damage from UVR builds up, and over time causes the skin’s DNA to change, which increases the chance of developing skin cancer. Skin cancer is the most common type of cancer, and its incidence is increasing in Canada.

What you can do

Protect your skin and eyes:

- Limit time spent in the sun between 11:00 a.m. and 4:00 p.m. or whenever the UV index is 3 or more.
- Look for shaded areas to do outdoor activities.
- Wear a hat with a wide brim or with a visor and back flap.
- Wear clothing to protect as much of your skin as possible.
- Wear UVR protective sunglasses.
- Use sunscreen with SPF 30 or higher that gives protection from both UVA and UVB rays.
Over the past 60 years, Canada has warmed by 1.6° Celsius, a higher rate than in most other regions of the world. As the climate continues to change, extreme heat events are expected to increase in frequency, intensity, and duration.

**The Health Effects**

Extreme heat can impair the body’s ability to regulate its core temperature leading to heat illness and even death. In 2003, extreme heat resulted in 70,000 deaths in Europe while in 2010, 55,000 deaths in Russia were attributed to an extreme heat wave. Extreme heat can cause dehydration, fainting, heat cramps, heat exhaustion, heat stroke, and worsening of lung and heart conditions. These effects are of particular concern to the elderly, infants and young children, socially-disadvantaged groups, and those with chronic illness, and physical or intellectual impairments.
What you can do

- **Prepare**: Check the forecast and know locations where you can go to cool off. A tree-shaded area can be as much as 5°C cooler. Check the AQHI – air quality is worse during extreme heat.

- **Check on others**: Check-in with family or neighbours who may have trouble staying hydrated or getting to a cool location.

- **Stay hydrated**: Drink plenty of cool liquids, especially water. Drink before you feel thirsty – this is especially important for children.

- **Know the signs of heat related illness**.
  - Dizziness, fainting, headache, nausea, and vomiting, and extreme thirst.
  - Action: Move person to cool place and give liquids. Water is best. Seek medical help if condition does not improve.

- **Know the signs of heat stroke**.
  - The signs of heat illness with a body temperature of 40°C or higher; plus one of the following: loss of consciousness, confusion, or loss of sweating.
  - **Heat Stroke is an emergency!**
    - Action: Call 911 immediately. While waiting for help move the person to a cool place, apply cool water (not ice) to large areas of skin and clothing, and fan the person as much as possible.

- **Reschedule or find alternatives**: Play indoors in an air conditioned or cool space. Reduce activity duration or intensity.

- **Avoid sun exposure**: Use sun protection. Sunburned skin does not allow the body to get rid of excess heat.

- **Keep your home cool**: If you have air conditioning, set it to the highest comfortable setting. Prepare meals that don’t have to be cooked. Block the sun by closing blinds during the day. If safe, open windows at night to let in cooler air.
Emergency Preparedness

Extreme weather events are becoming more common in Ontario. Climate change and global warming have resulted in prolonged heat waves, torrential rain, windstorms, and drought. These climate change events are threatening human health and safety.

What you can do

To prepare children for climate change emergencies discuss emergencies specific to your region and what to do when they occur. Include children in making family and school emergency plans, and in preparing an emergency kit. An emergency kit should have enough supplies to support family and pets for at least three days immediately after or during an emergency.

The kit should be organized, easy to carry, and easy to find in case your family needs to evacuate the home. If there are many people living in a home, contents should be divided into multiple bags, making the kit easier to carry.
Basic Emergency Kit Items

- A bag that is easy to carry (e.g. backpack)
- Two litres of water per person per day
- Small water bottles
- Food that will not spoil (e.g. canned food)
- A manual can opener
- Flashlights and batteries
- A battery powered or wind up radio
- Extra batteries
- Extra keys for the car and house
- Cash
- Special needs items (e.g. medications)
- An emergency plan with in and out-of-town contact information
What Students, Schools, and Families can do to Reduce Their Carbon Footprint
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• Leave the car in the garage and walk, bike or take the bus.
• Turn off lights, TVs, video games and computers when not in use.
• Replace regular light bulbs with energy efficient light bulbs.
• Reduce your heating, wear a sweater.
• Install a water-saving showerhead and take shorter showers.
• Dry your clothes outside on the line rather than in the clothes dryer.
• Buy local and seasonal food to reduce energy use in transport and storage.
• Grow your own food.
• Turn off the tap when brushing your teeth.
• Buy items with minimal packaging whenever possible.
• Buy secondhand rather than new.
• Recycle everything you can. Buy recycled and recyclable products.
• Compost food scraps.
• Install rain barrels.
• Plant trees to help remove greenhouse gases from the air.
• Wash clothes in cold water.
• Write or draw on both sides of the paper.
• Save hot water by taking short showers instead of baths.
• Become an Ontario EcoSchool www.ontarioecoschools.org.
Additonal Resources

1. **Environment Canada.**
   A. Climate Change. Learn more about the science behind climate change, and Canada’s action on climate change.
   
   B. The Air Quality Health Index (AQHI). A public information tool to help protect your health from the negative effects of air pollution.
   http://www.ec.gc.ca/cas-aqhi/default.asp?Lang=En
   
   C. Kids Zone. Air Quality Health Index for kids.
   http://www.ec.gc.ca/cas-aqhi/default.asp?lang=En&n=3D802E46-1
   
   D. The UV Index and Ozone. Check today’s UV index and review sun safety practices.

2. **Health Canada**
   A. Keeping Children Cool!
   
   B. You’re active in the heat. You’re at risk! Protect Yourself from Extreme Heat.
   
   C. Sun Safety. Learn more about the health effects of ultraviolet radiation, sun safety practices, and extreme heat.
   
   D. Get Prepared. Know the risks in your region, make an emergency plan, and build a home emergency kit.

3. **Kingston Climate Action.** Visit the City of Kingston online to learn more about the Kingston Climate Action plan.
4. **KFL&A Public Health.** Visit your local public health website to learn more about extreme heat, Lyme disease and West Nile virus, and emergency preparedness.
   http://www.kflapublichealth.ca/

5. **Owls for Climate Change.** Inspiring Earth-friendly Living at an Early Age. The Halton Region Health Department has published three children’s picture books as part of its air quality education and awareness raising program.
   http://www.halton.ca/cms/One.aspx?portalId=8310&pageId=97139

6. **Eco Kids. Earth Day Canada.** This award winning environmental education site offers information and resources for teachers, students, youth, and communities.
   http://www.ecokids.ca/pub/index.cfm

7. **20/20 The Way to Clean Air Eco Schools Program.**
   http://www.cleanairpartnership.org/2020

8. **Air Quality and Climate Change Tools for Schools.**
   http://www.halton.ca/cms/One.aspx?portalId=8310&pageId=49417

9. **World Wildlife Federation (WWF). Schools for a Living Planet.** WWF has developed free, downloadable curriculum-linked lesson plans that focus on environmental conservation and building a sustainable future.
   http://schools.wwf.ca/