

Grade 8 Science Curriculum Links to Sustainability Education and Action

Topic A: Mix and Flow of Matter

What are fluids? What are they made of and how do we use them? What properties of fluids are important to their use?

Links to Place and Nature

- What are the properties of the air around us? Of water?
- How do these properties (e.g. density, viscosity, compressibility, etc) compare?
- What are the components of air?
- How are air and water related through the water cycle?
- How are we connected to other parts of the planet through air and water?
- How are we connected to other living beings through air and water?
- What are the patterns of air and water flow in our local area?

Links to Indigenous Perspectives

- What is the significance of air and water to Indigenous peoples?
- How are air and water connected?
- How does the flow of water and air connect communities?

Links to Climate Change

- What components of the atmosphere are responsible for the greenhouse effect?
- How does the fluid nature of air and water affect the dispersion of pollutants including greenhouse gases?



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Topic B: Cells and Systems

How can we make sense of the vast diversity of living things? What do living things have in common - from smallest to largest - and what variations do we find in the structure and function of living things?

Links to Place and Nature

- What is a system?
- What do all living things have in common?
- How are living things, including humans, connected through the carbon cycle? The water cycle?
- What living things are found in my schoolyard, neighbourhood, nearby natural area? What do they have in common? How are they different?

Links to Climate Change

- How can climate change affect human body systems (e.g. respiratory, etc)?
- How can climate change affect mental well-being?

Links to Indigenous Perspectives

- How are all living things connected?
- How did Indigenous peoples view their relationship with more-than-human beings?
- What is the significance of this relationship and the Indigenous concept of interconnectedness? Is it still relevant today?



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Topic B: Cells and Systems (cont'd)

How can we make sense of the vast diversity of living things? What do living things have in common - from smallest to largest - and what variations do we find in the structure and function of living things?

Links to City of Calgary Environmental and Climate Strategies

- **Our BiodiverCity: Calgary's 10-year biodiversity strategic plan (3)**: Our BiodiverCity aims to provide a framework for City staff to foster more resilient, biologically diverse open space and neighbourhoods that support positive outcomes for Calgarians, visitors, wildlife and plant communities. Additionally, the introductory sections are meant for everyone, to engage people with nature and biodiversity in the context of our city ("In brief" section)
 - Commitments (p.28):
 - Reduce direct pressures on biodiversity through managing appropriate access and use in areas rich in biodiversity and natural heritage
 - Conserve habitat function by supporting native and non-invasive locally adapted species
 - Recognize the financial, social and environmental cost of removing or modifying natural systems in developing Calgary and include consideration of these costs in municipal decision-making
 - Increase habitat diversity in private, public and institutional open space to support ecologically healthy neighbourhoods and aid appropriate access to and use of nature for citizens
 - Plan and manage Calgary parks and open space as a connected network of habitats and wildlife movement corridors, with the aim of reducing roadway collision threats and related human-urban wildlife conflict
 - Procedures (p.29-30):
 - Foster ecological literacy
 - Improve the city of Calgary's ecological functions
 - Instill biodiversity values across The City of Calgary
 - Integrate with wildlife, plants and natural heritage
- For more information about supporting biodiversity in Calgary, please visit **[Calgary's Biodiversity \(3\)](#)**.



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Topic C: Light and Optical Systems

What do we know about the nature of light? What technologies have been developed that use light, and what principles of light do they show?

Links to Place and Nature

- What examples of reflection and refraction can be found in my local environment?
- How do air, water, and other materials transmit, reflect, and refract light?
- How does a greenhouse work? What sources of light exist in nature (sun, moon, bioluminescence)?
- What is the importance of light to living organisms?
- How have different organisms adapted to light?
- What factors or phenomena (e.g. seasons, angle of sun in sky, clouds, smoke) affect the quality of outdoor light?

Links to Indigenous Perspectives

- What different forms of light were available to Indigenous peoples and how were they produced?
- How did Indigenous peoples make use of these forms of light?
- How did Indigenous peoples light their homes?

Links to Climate Change

- How does light travel through the atmosphere?
- How is it absorbed or reflected by the atmosphere and earth to cause global warming?
- What is the greenhouse effect and how does it cause global warming?
- What is the significance of albedo in global warming?
- How do clouds, smoke and other phenomena affect the transmission of light and global warming?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (2):** A key driver of climate change is increasing greenhouse gas emissions in the atmosphere and an enhanced greenhouse effect. Light energy can enter our atmosphere, but some heat energy is reflected back to Earth by greenhouse gases. The Climate Resilience Strategy has a target of decreasing greenhouse gas emissions emitted within Calgary by 80% below 2005 levels by the year 2050 (p.22).



Calgary



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Topic D: Mechanical Systems

How is energy transferred in mechanical devices? How do mechanical devices provide for controlled application of energy in ways that are efficient, effective and responsible?

Links to Place and Nature

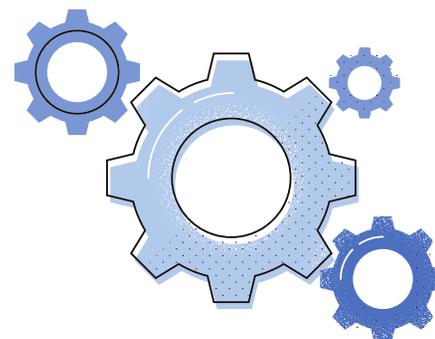
- What mechanical devices exist in our homes?
- How do they convert energy to do work for us?
- Where does energy to power these devices come from, how is it produced and transmitted?
- What are the environmental impacts of these different energy sources?

Links to Indigenous Perspectives

- How did Indigenous peoples harness the power of water, wind and sun and for what purposes?

Links to Climate Change

- What energy sources are used to power various mechanical devices?
- How many greenhouse gas emissions are associated with the production, transmission, and use of these different energy sources?
- How much energy use and greenhouse gas emissions are associated with various mechanical devices?
- What can we do to reduce greenhouse gas emissions associated with energy use?



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Topic E: Freshwater and Saltwater Systems

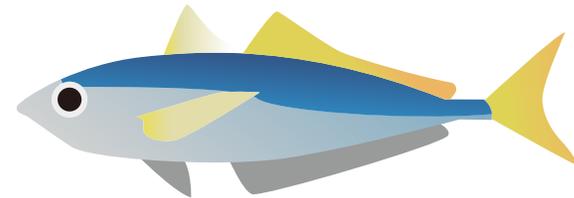
How do water, land and climate interact? What are the characteristics of freshwater and saltwater systems, and how do they affect living things, including humans?

Links to Place and Nature

- What fresh and salt water systems exist in my area?
- How did fresh and/or salt water systems contribute to the formation of notable landforms in my area?
- What was the importance of these water systems to the lives of our ancestors? To our current lives?
- What is the importance of water quality and water quantity to my community? To our health? To different sectors of the economy?
- What are the sources of drinking water for my community? How are these sources replenished?
- What does my community do to ensure high-quality drinking water?
- What is the importance of watershed management in ensuring a sustainable high-quality water supply?
- What threats exist to water systems and watersheds in my area?
- How can we help preserve water quality and quantity and the health of local aquatic ecosystems?

Links to Indigenous Perspectives

- See [Learn Alberta grade 8 sample lesson plan \(1\)](#) for this unit.
- What water systems are important to Indigenous communities in my area?
- What is the significance to Indigenous peoples of water as one of the four elements (earth, air, water, and fire)?
- Why is water considered sacred to Indigenous peoples?
- Why do many Indigenous communities have water quality issues? What factors contribute to these issues?



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Topic E: Freshwater and Saltwater Systems (cont'd)

How do water, land and climate interact? What are the characteristics of freshwater and saltwater systems, and how do they affect living things, including humans?

Links to Climate Change

- How can climate change impact freshwater and saltwater systems?
- How can climate change impact aquatic species living in fresh and salt waters?
- What can we do to minimize the negative effects of climate change on water systems?



Links to City of Calgary Environmental and Climate Strategies

- **Calgary Climate Resilience Strategy (2)**: Climate change has various impacts on living things, including on local freshwater ecosystems. Due to climate change we are experiencing, and will continue to experience (p. 65-72):
 - More snow in winter
 - Less rain in summer
 - More heat waves
 - Increased average annual temperature
 - More intense summer storms
 - Multi-year drought
 - Increase in pests, diseases, and invasive species due to changes in seasonality
 - Spring will arrive earlier, Summer will last longer, Fall will arrive later, and Winter will be shorter
 - This will have impacts on the lifecycles of plants in Calgary



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References

- (1) Alberta Education. (2020). Sample Lesson Plans: Science. Retrieved from LearnAlberta <http://www.learnalberta.ca/content/fnmilp/science.html>
- (2) City of Calgary. (2018). Climate Resilience Strategy: Mitigation & Adaptation Action Plans [PDF]. Retrieved from <https://www.calgary.ca/content/dam/www/uep/esm/documents/esm-documents/climate-resilience-plan.pdf>
- (3) City of Calgary. (2020). Calgary's Biodiversity. Retrieved from <https://www.calgary.ca/csps/parks/planning-and-operations/biodiversity.html>
- (4) City of Calgary Parks. (2015). Our BiodiverCity: Calgary's 10-year biodiversity strategic plan [PDF]. Retrieved from <https://www.calgary.ca/content/dam/www/csps/parks/documents/planning-and-operations/biodivercity-strategic-plan.pdf>

