



Alberta High School Environmental Curriculum Links

Science 20

**Developed by the
Alberta Council for Environmental Education**

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ACEE Alberta Council for
Environmental Education
ADVANCING ENVIRONMENTAL EDUCATION IN ALBERTA

INTRODUCTION & BACKGROUND

The purpose of these documents is to empower Alberta educators to integrate environmental and climate education into their classrooms. Each subject area is enriched with guiding questions that align with the Alberta curriculum, creating meaningful connections to nature and place-based learning, Indigenous knowledge systems and perspectives, and climate change across all units. Additionally, these documents offer related resources and activities with links that educators can use to gain further knowledge and incorporate into their lessons.

The curriculum link documents were carefully developed in collaboration with practicing teachers and an Indigenous consultant to ensure they are both practical and culturally responsive. These educators brought their classroom experience and insights to the project, helping to shape content that is directly applicable and impactful for students. The inclusion of an Indigenous consultant ensured that Indigenous knowledge systems and perspectives were thoughtfully and accurately integrated, providing a well-rounded and respectful approach to environmental and climate education. This collaborative process resulted in resources that are both relevant and enriching for educators across Alberta.

For additional resources and support, educators are encouraged to explore the [ACEE Resources Hub](#).



A NOTE FOR LINKS TO INDIGENOUS KNOWLEDGE SYSTEMS AND PERSPECTIVES

**CREATED IN COLLABORATION WITH KORI CZUY, PHD.
INDIGENOUS/RELATIONAL SCIENCE CONSULTANT**

The suggestions made and the activities recommended have been reviewed and considered with deep conversation, relationality, time, and respect. Kori recognizes that educators are required to introduce, include, and expand upon Indigenous Knowledges in addition to global ones, but also acknowledges the challenges of introducing these concepts in a good way. Both within this guide and in teaching practice, Kori recommends the following:

- First focus on the knowledges of the Land you are teaching on and relate the topics/subject to those lands.
- This also allows for local connections to more easily be created. All knowledges are connected to a Land, and originate from humans being in deep relationship with those Lands.
- All Indigenous knowledges should be cited both orally and written. Reference the Knowledge Keeper/Elder as well as which land they are connected with.
- This ensures relationality and allows for continued connections to that Land. This type of citation, although it seems strange at first when speaking it, also allows for authenticity of knowledge and protocols.
- When possible, teach about concepts in context, outdoors. Make the learning tangible and inquiry based, experiencing phenomena in real-time when possible. This is essential to grounding learners to a greater understanding of place.
- Example: can you contextualize where water is sourced from by visiting the main source, or a feeder source?

Across the curriculum, there is language around commodification, extraction, and a lack of reciprocity and connection with the natural world. This continues to reinforce the idea that everything on Earth that is not human is for humans to use without consequence, rather than a gift that must be acknowledged. Some suggested alternate terms are as follows:

- Conservation --> finding balance
- Solutions --> responses to
- Preserving/ preservation --> balance of the natural world
- Preservation is nearly impossible to achieve in the natural world, like conservation
- Exist --> thrive
- New species --> non-native or human-introduced
- Protect --> sustain
- Products/ resources --> gifts
- Produced --> harvested
- Emulating --> learning
- Invented --> created or originated for people (especially if the “invention” was influenced from plant or animal knowledge)

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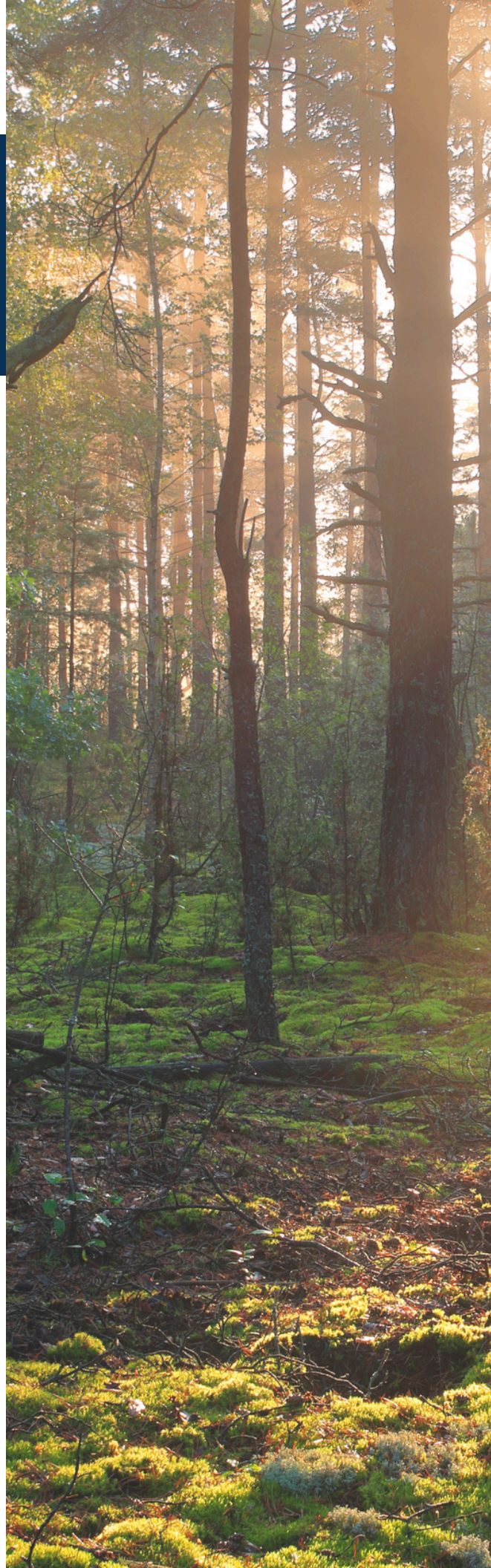
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SCIENCE 20



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ADVANCING ENVIRONMENTAL EDUCATION IN ALBERTA

UNIT A

Chemical
Changes

UNIT B

Changes in
Motion

UNIT C

The Changing
Earth

UNIT D

Changes in Living
Systems



SCIENCE 20: UNIT A

Chemical Changes

Links to Nature & Place

1. What are hydrocarbons used for in Alberta?
2. How can we close the loop on consumer demands for chemical substances?
3. Discuss the relationship between the continued utilization of fossil fuels and the release of carbon dioxide into the atmosphere.
 - a. How does this increased carbon dioxide concentration contribute to the lengthening of wildfire seasons in Alberta?
 - b. What are the chemical and environmental processes involved?
4. Discuss the benefits and challenges of different alternative energy sources to reduce Alberta's dependence on fossil fuels.
5. How will we source the minerals needed to meet the demands of alternative energy, such as those required for electric vehicles (EVs), solar power, battery storage, etc.?
 - a. How do we ensure that energy production sites do not disproportionately affect marginalized communities or lead to environmental degradation in sensitive areas?

Links to Indigenous Knowledge Systems & Perspectives

1. How have Indigenous Peoples used fossil fuels without disrupting the natural cycles of the land?
2. What is an Indigenous knowledge of energy cycles? How might this impact how we view energy and cycles of matter, climate change, and re-think how humans extract from the Earth?
3. What is the "Gifting Economy"? How do you participate in it? How can you?



SCIENCE 20: UNIT A

Chemical Changes

Climate Related Questions for Exploration

1. How does the production and use of hydrocarbons affect climate change?
2. What sustainability challenges are present in using hydrocarbons in energy production?
3. How have mining practices changed, and what effects will mining have in Alberta?
4. Have our chemical practices led to a more circular approach to resource management, or is it still linear?

Resources & Activities

1. Future Energy Systems: Hydrocarbons
2. Investigate and analyze your municipality's approach to transitioning to sustainable energy sources. After gathering information, analyze the strategy to determine its strengths and potential areas for improvement. Consider factors such as environmental sustainability, social justice, economic viability, and community engagement.
 - a. Example: Edmonton Energy Transition Strategy.
3. Listen to/read this essay from Robin Wall Kimmerer:
 - a. How might this shift in thinking change the way we understand energy cycles in human lives?



SCIENCE 20: UNIT B

Changes in Motion

Links to Nature & Place

1. What technologies used today have been influenced by the natural world (e.g. biomimicry)?
2. How does our reliance on various infrastructures to move around our world alter the natural world positively and negatively?
3. How do the forces exerted by wind impact the distribution of pollutants in the atmosphere?
 - a. Discuss the implications for air quality and climate. Think about the movement of smoke during wildfires.
4. Explain how the changes in precipitation patterns affect the momentum of flowing rivers and streams.
 - a. What are the potential consequences for ecosystems and human infrastructure?

Links to Indigenous Knowledge Systems & Perspectives

1. How have Indigenous Peoples been inspired from the Land? How has this innovation inspired many technologies and innovations today?



SCIENCE 20: UNIT B

Changes in Motion

Climate Related Questions for Exploration

1. How have green technologies used changes in forces to generate energy?
2. How have climate change and non-renewable resource concerns influenced technology development?
3. How have green technologies become more accessible in the past few decades?
4. How can changes in the velocity of ocean currents due to climate change affect weather patterns and marine ecosystems?
5. Discuss the impact of vehicle idling on the environment and climate. Using the concepts of force, energy, and motion, explain how reducing idling times and improving transportation efficiency can help mitigate these impacts. Include specific examples of how physics principles apply to real-world solutions for reducing vehicle emissions.

Resources & Activities

1. [Alberta Capital Airshed: How to Improve Air Quality](#)
2. [Alberta Capital Airshed Webinar: Reducing Needless Idling](#)
3. [Biomimicry is Real World Inspiration](#)
4. [Biomimicry Toolkit](#)
5. [Canada's Green Future](#)
6. [Environment Canada: Weather and Air Quality Poster](#)



SCIENCE 20: UNIT C

The Changing Earth

Links to Nature & Place

1. What evidence of changes to the land can you identify in your community?
2. What role do riverbanks play in recording the history, and telling the story of the land?
3. What trends have we seen in extreme weather event, and what impact do these trends have on the Earth?

Links to Indigenous Knowledge Systems & Perspectives

1. How can there be more collaboration and connection between scientists/researchers and Indigenous People and their land?
2. When examining “current theories”, are Indigenous knowledge systems included? What theories and methodologies from Indigenous Peoples exist alongside Western and European ways of thinking?
3. How have Indigenous scientific knowledge systems defined geological time?
4. How would working with Indigenous Peoples bring an understanding of the land that is different from Western perspectives of geological change/time?
 - a. How can these worldviews support one another instead of working against each other?
5. How can Indigenous Scientific knowledge help us learn about indicators of climate change?



SCIENCE 20: UNIT C

The Changing Earth

Climate Related Questions for Exploration

1. What evidence is there that climates are changing?
 - a. What can be done to slow the rate of change?
2. Explain the relationship between climate change and the frequency and intensity of natural hazards such as earthquakes, tsunamis, and landslides.
 - a. How might changing climate conditions exacerbate these events?
 - b. What trends have been observed during events, and what potential impacts might these trends have on the Earth in the future?
3. Describe the relationship between plate tectonics and climate change.
 - a. How do tectonic processes influence ocean currents and atmospheric circulation patterns?
4. Discuss the link between past mass extinction events and changes in Earth's environment and climate.
 - a. How did these events alter global ecosystems, and what lessons can be learned for mitigating current environmental challenges?

Resources & Activities

1. [Climate Change in Canada](#)
2. [The Royal Society: Climate Change: Evidence and Causes](#)
3. [The Way We Green: Classroom Conversations](#)
4. [WWF: Is climate change increasing the risk of disasters?](#)



SCIENCE 20: UNIT D

Changes in Living Systems

Links to Nature & Place

1. Describe the cycling of matter and flow of energy through a local ecosystem. How has climate change impacted this?
2. How have conservation efforts improved or corrected impacts from human activity?
3. How do natural areas/ green spaces/ protected areas in urban areas contribute to healthy ecosystems? What other benefits do these spaces have?
4. Discuss the impact of changing wildfire seasons and their timing on habitats in Alberta.
 - a. How are ecosystems adapting to longer and more intense fire seasons, and what are the ecological consequences for biodiversity and habitat resilience?

Links to Indigenous Knowledge Systems & Perspectives

1. How might the Mikmaw concept of “Two-eyed seeing” help scientists and everyone better understand the causes of and responses to climate change?
2. How does the Western understanding of nature/ the land differ from that of Indigenous Peoples? How can learning from Indigenous Peoples reframe the understanding and causes of and responses to climate change?



SCIENCE 20: UNIT D

Changes in Living Systems

Climate Related Questions for Exploration

1. How have ecosystems, and the organisms within them , adapted because of the rapidly changing climate?
 - a. Discuss the challenges species face that cannot adapt quickly enough to rapid climate changes. What are the implications for biodiversity and ecosystem dynamics?
2. Explain how climate refugees, both plant and animal species, respond to habitat loss and seek more favorable climatic conditions.
3. Discuss the role of biotechnology in addressing food security challenges in Alberta, particularly in the context of increasing droughts, heat waves, and the emergence of new pests.
 - a. How can genetically modified crops contribute to sustainable agriculture practices under these changing environmental conditions?
4. Discuss the ethical considerations and socio-economic implications of biodiversity conservation efforts in the context of global climate change.

Resources & Activities

1. [Climate Change in Canada](#)
2. [Canadian Geographic Climate Change Educator Resources](#)
3. [Climate Reality Project: Climate Adaption vs. Mitigation](#)
4. [Garden Projects](#)
5. [The Way We Green: Classroom Conversations](#)



GET SUPPORT FROM ACEE

ACEE is committed to supporting teachers across Alberta by developing curriculum links between climate, sustainability, and our environment to the AB Programs of Study.

The ACEE team has specialized professional development offerings to enhance your classroom teaching experience. All workshops can be adapted to your location, desired length, and goals.

In addition to our workshops, the ACEE team offers personalized consultation services to help you integrate curriculum linked environmental education into your programs or classrooms.

To learn more:
abcee.org

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