Grade 7 Science Curriculum Links to Sustainability Education and Action

Topic A: Interactions and Ecosystems

How do human activities affect ecosystems? What methods can we use to observe and monitor changes in ecosystems, and assess the impacts of our actions?

Links to Place and Nature

- What natural ecosystems exist in our area?
- How does energy flow through these ecosystems?
- How do humans use, interact, and impact these ecosystems?
- How do our local ecosystems provide services for humans?
- What can we do to ensure the health of our local ecosystems?

Links to Indigenous Perspectives

- How do Indigenous peoples in my area view their relationship with Mother Earth and other living beings? How does this view differ from the dominant Western worldview?
- How do Indigenous stories of creation emphasize the notion of connectedness between humans and other (biotic and abiotic) components of ecosystems?
- How does Indigneous education emphasize harmony and balance between humans and the non-human world? Why is this concept so important to Indigenous peoples?

Links to Climate Change

- How does climate change affect our local ecosystems (e.g. forests, grasslands, wetlands)?
- How can we help our ecosystems be more resilient in the face of climate change?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (3):** Climate change is impacting our 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 life cycles of species in nature that depend on each other, for example birds migration patterns being altered, and pollinators emerging before plants are ready to be pollinated (see pages 66 and 67 of the Climate Resilience Strategy for more detail).

Grade 7 Science Curriculum Links to Sustainability Education and Action

Topic B: Plants for Food and Fibre

How do we produce useful plant products? What techniques do we use, what knowledge are these techniques based on, and how do we apply these techniques in a sustainable way?

Links to Place and Nature

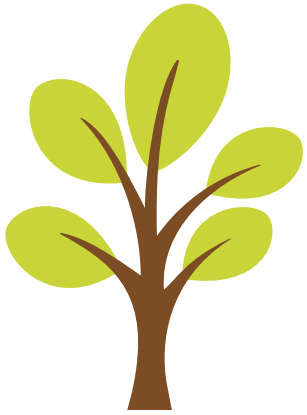
- Which plants are grown or used locally for food or fibre production?
- What types of fibers are derived from plants?
- What are the different uses of these different plant products?
- Who are they used by?

Links to Indigenous Perspectives

- See **Learn Alberta gr. 7 sample lesson plan (1)** for this unit.
- What plants did Indigenous peoples in my area depend on, and for what uses?
- How did they acquire this knowledge of plants?
- How did Indigenous peoples ensure these plants were used in a sustainable way?
- How did Indigenous peoples manage plant communities (e.g. forests, grasslands) for their benefit?

Links to Climate Change

- How will climate change impact the type of food that can be grown and the amount of land available for food production?
- What does a sustainable and resilient food production system look like?
- How does climate change affect the production of wood fibre?
- What can we do to build greater resilience into our food and fibre production systems?



Grade 7 Science Curriculum Links to Sustainability Education and Action

Topic B: Plants for Food and Fibre (cont'd)

How do we produce useful plant products? What techniques do we use, what knowledge are these techniques based on, and how do we apply these techniques in a sustainable way?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (3):** It is important to have a great understanding of the mitigation value of the natural environment in Calgary.Natural assets include wetlands, river banks, trees, and other green infrastructure that provide similar services to hard infrastructure. In addition to providing a critical role in preparing for climate change, trees and other green infrastructure help by sequestering carbon dioxide and reducing building energy use through cooling and shading in summer and lessening heat loss in winter (p.50).
  - **Climate Mitigation Action Plan (3), Program 9: Green Spaces and Natural Areas to Support Mitigation (p.51):** Actions in this Program aim to coordinate efforts across multiple City Business Units to develop processes to conserve and understand the mitigation properties of The City's natural assets in conjunction with the climate change adaptation work.
  - **Adaptation Action Plan (3), Program 6: Natural Assets Management (p.84-85):** Natural infrastructure can serve two different purposes: 1) everyday service provision (e.g. park space, water conveyance), 2) adaptation to climate change (tree canopy shading, absorption of stormwater).
- **imagineCALGARY (2): 100-year goals: Food (p.2) -** Food sources derive from sustainable practices that provide us with a high quality, healthy, affordable and secure supply of food. **Land and soil (p.3) -** Fertile soil is vital to maintaining life. Calgarians are responsible stewards of land, maintaining the life supporting processes integral to healthy, intact ecosystems. We use and share our land wisely and equitably. **Targets By 2036 (p.5&9):**
  - Calgarians support local food production
  - Calgary maintains access to reliable and quality food sources.
  - 100 per cent of Calgary's food supply derives from sources that practice sustainable food production
  - Sustainable urban food production increases to five per cent.
  - The consumption of urban- and regionally produced food by Calgarians increases to 30 per cent
- **Calgary Food Action Plan (4):** This plan builds on community-led efforts to create a healthy, equal and sustainable food system. Its goal is for every Calgarian to have access to local, healthy and environmentally friendly food

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Topic C: Heat and Temperature

What heat-related technologies do we use to meet human needs? Upon what scientific principles are these technologies based? What implications do these technologies have for sustainable use of resources?

Links to Place and Nature

- How do we use energy to maintain comfortable living conditions?
- Where does the energy we use come from and how is it produced?
- What are the impacts of energy use on the environment?

Links to Indigenous Perspectives

- How did Indigenous peoples in my area keep warm or stay cool traditionally?
- What are some unique features of their dwellings that served to maintain a comfortable ambient temperature?

Links to Climate Change

- How does energy production and use contribute to climate change?
- What amount of my home's energy is used for heating?
- How can I reduce greenhouse gas emissions related to energy use at home and school?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (3):** Energy use in buildings is the largest opportunity for GHG reductions in Calgary. From heating to cooling, cooking to lighting, our buildings provide many energy intensive services. Natural gas and electricity used in Calgary's residential, commercial, and institutional buildings make up almost 65% of total GHG emissions generated in our community (p.33).
  - **Climate Mitigation Action Plan (3), Program 1: Energy Performance Standards in New and Existing Buildings (p. 34-35):** Energy performance standards refer to the minimum energy performance requirements that are regulated for new and existing buildings. Actions with this Program include supporting the development of new building codes and investigating and enable new incentives and financing mechanisms for improved energy performance.
  - **Climate Mitigation Action Plan (3), Program 2: Energy Consumption Information (p.36-37):** Many people are unaware of how much energy their everyday activities require. By making energy consumption information more readily available and easily understood, we help provide the tools to make better decisions about how energy is used in specific buildings, and we also allow better comparisons between buildings.
  - **Climate Mitigation Action Plan (3), Program 3: Renewable and Low-Carbon Energy Systems (p.38-39):** On-site renewable energy systems and district energy systems are important strategies to transition away from fossil fuels. Actions within this Program relate to enabling the implementation of onsite renewable and low-carbon energy systems, and to supporting community ownership of renewable energy generation

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Topic D: Structures and Forces

How do structures stand up under load? What forces act on structures, and what materials and design characteristics contribute to structural strength and stability?

Links to Place and Nature

- What natural structures are associated with locally occurring plants and animals?
- What materials are used in local structures of the built environment like buildings, roads, bridges, etc? Where do these materials come from and how are they produced?

Links to Indigenous Perspectives

- How were different traditional Indigenous homes built and how did their designs and materials make them stable and offer shelter from the elements?

Links to Climate Change

- How might climate change affect municipal structures like roads, bridges, and buildings?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (3):** In Calgary, we can expect more short duration high intensity storm events, heavier winter storms, more heat waves and high wind events due to climate change (p. 65-72). The City of Calgary is preparing for these events by strengthening our city infrastructure (roadways, rail, water infrastructure, etc.) to account for these climate projections (p. 81).
  - **Adaptation Action Plan (3), Program 5: Design Standards and Practices (p.83):** Several of the climate risks for Calgary impact how infrastructure or buildings need to be designed. Some examples include:
    - more intense rainfall that exceeds current stormwater
    - infrastructure capacity and can temporarily flood buildings and roadways;
    - major river floods, like 2013, that can destroy
    - riverbanks and bridges;
    - increased temperatures and extreme heat that
    - can deform infrastructure; and
    - stronger winter storms that can increase roof
    - snow loads or knock out power

Grade 7 Science Curriculum Links to Sustainability Education and Action

Topic E: Planet Earth

What do we know about Earth - its surface and what lies below? What evidence do we have, and how do we use this evidence in developing an understanding of Earth and its changes?

Links to Place and Nature

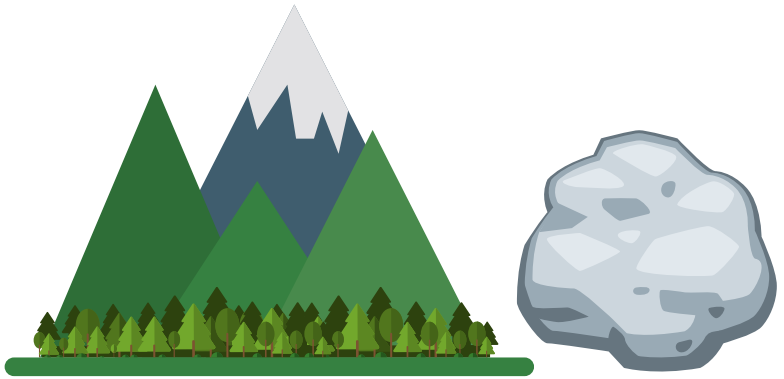
- What are the elements of Planet Earth that make it unique for supporting life?
- How does the rock cycle work?
- What evidence of the rock cycle (e.g. weathering, erosion) exists in our schoolyard, neighbourhood and community ?
- What rock formations underlie my community? How is my community affected by plate tectonics?
- What types of earth materials are used by humans in my area?
- How were they formed? What are they used for?

Links to Indigenous Perspectives

- How do Indigenous peoples view their relationship with Mother Earth?
- Why is Mother Earth considered sacred and deserving of our respect?
- What landforms are significant to Indigenous peoples in my area?
- How were they created? Why were they significant?
- How did Indigenous peoples in my area use earth materials?

Links to Climate Change

- What are global warming and climate change?
- What are causing these phenomena?
- How is global warming changing our planet's major systems?
- How do these changes compare to changes that have occurred in the past?
- What evidence do scientists rely on to understand these changes?
- How does extraction of earth materials by humans contribute to climate change?
- What earth materials play a significant role in climate change and why?



Grade 7 Science Curriculum Links to Sustainability Education and Action

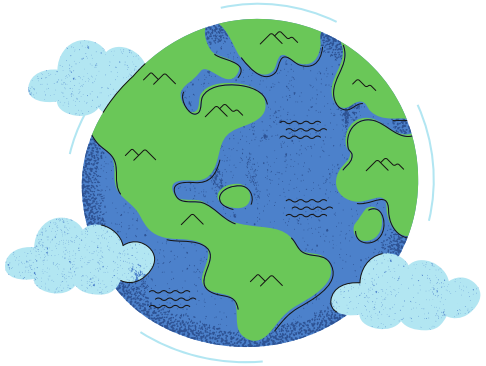
Topic E: Planet Earth (cont'd)

What do we know about Earth - its surface and what lies below? What evidence do we have, and how do we use this evidence in developing an understanding of Earth and its changes?

Links to City of Calgary Environmental and Climate Strategies

- **Climate Resilience Strategy (3):** Climate change has become one of the defining issues of our time, given the effect communities across Canada and the world continue to experience, from more extreme heat waves to increased winter storms and flooding, to advanced invasive species and vector borne diseases. In response to these changes, The City of Calgary is focusing on developing policies, programs, infrastructure designs, and leadership strategies to increase the climate resilience of natural and built systems. The amount and rate of climate change is posing new challenges, and climate science now allows communities to anticipate a range of new and more extreme weather conditions, and therefore take action before the worst impacts are incurred (p.64). Pages 65 to 72 of the Climate Resilience Strategy details climate impacts anticipated within Calgary

- The City is taking action to prepare for climate-related impacts, and also reduce our contribution to the cause of climate change. Visit **calgary.ca/ClimateProgram (5)** to learn more.



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