Environmental Science 28

South East Cornerstone School Division

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Table of Contents

Overview

The purpose of this document is to provide an introduction to the Environmental *Science 28 (2017)* course and supplementary resource packages that were developed by teachers representing Southeast Cornerstone School Division #209.

If a student is being considered for *Environmental Science 28 (2017)*, or any other Altered Education course of study, the student and the parents/caregivers of the student must be consulted prior to being enrolled in an Altered Education Course of Study. Consult *Policy and Procedures for* Alternate Education *Course of Study* for further information.

Introduction

Science is a required area of study in Saskatchewan's Core Curriculum. Students graduating with an Altered Education certificate, require *Science 18* in order to meet graduation requirements.

Using this Resource Package

This resource package is divided into eleven themes that will guide student learning and support meeting *Environmental Science28 (2017)* learning outcomes.

Some outcomes are addressed in more than one of the suggested lessons within a learning theme; therefore, teachers need not use all of the suggested lessons. Teachers may request an electronic version of this course package from their school division office so that they can modify the instructional documents to meet diverse needs.

Adaptive Dimension

The Adaptive Dimension refers to the concept of making adjustments to any or all of the following variables: learning environment, instruction, assessment and resources. Adjustments to these variables are intended to make learning meaningful and appropriate and to support student achievement. Tomlinson (1999) states, "Differentiation is an organized yet flexible way of proactively adjusting teaching and learning to meet kids where they are and help them to achieve maximum growth as learners" (p.14). In the Saskatchewan context, differentiation is addressed through the Adaptive Dimension which enables all teachers to respond to student diversity, including their strengths and needs, interests, backgrounds, life experiences and motivations.

Within the context of the Adaptive Dimension, curricular outcomes are not changed; adaptive variables are adjusted so that the curricular outcomes can be achieved.

- regards teachers as professionals who have the authority and the responsibility to make adaptations to the learning environment, instruction, assessment and resources to meet the needs of all students;
- encourages dialogue among professionals concerning the most appropriate support and effective means of responding to individual differences within the classroom;
- supports the understanding that decisions about adaptations are best made by professionals working with students on daily basis;
- does not change curricular outcomes; and,
- promotes environments that cultivate collegiality and interprofessional collaboration fostered through the leadership of school administrators.

Whenever possible, students should learn a regular curricula and be supported through the Adaptive Dimension. Some students may not be able to complete a particular regular provincial course even though adaptations to resources and assessments, instruction, and environment have been made. This may require the development of an Alternate Education course (e.g., *Environmental Science 28*) to meet student needs to which the Adaptive Dimension may be applied.

Adaptations include, but are not limited to:

- Electronic text and various forms of technology
- Peer helper, scribes, readers, and tutors
- Access to a computer for written assignments (e.g., use of word prediction software, speech to text software, text to speech software, spellchecker, idea generator, etc.)
- Alternatives to written assignments and tests to demonstrate knowledge and understanding (e.g., oral presentations, conversations, observations, hands on activities, and individually adapted assignments, etc.)
- Advanced organizers/graphic organizers and/or teacher notes to assist with classroom presentations
- Extend time to complete assignments or test
- Pre-teaching and re-teaching key vocabulary or concepts; multiple exposure to materials.

Aim and Goals

The aim of K-12 science education is to enable all Saskatchewan students to develop scientific literacy. Scientific literacy today embraces Euro-Canadian and Indigenous heritages, both of

which have developed an empirical and rational knowledge of nature. A Euro-Canadian way of knowing about the natural and constructed world is called science, while First Nations and Métis ways of knowing nature are found within the broader category of Indigenous knowledge.

Diverse learning experiences based on the outcomes in this curriculum provide students with many opportunities to explore, analyze, evaluate, synthesize, appreciate and understand the interrelationships among science, technology, society and the environment **(STSE)** that will affect their personal lives, their careers and their future.

Goals are broad statements identifying what students are expected to know and be able to do upon completion of the learning in a particular area of study by the end of Grade 12. The four goals of K-12 science education are to:

- **Understand the Nature of Science and STSE Interrelationships** – Students will develop an understanding of the nature of science and technology, their interrelationships and their social and environmental contexts, including interrelationships between the natural and constructed world.
- **Construct Scientific Knowledge** – Students will construct an understanding of concepts, principles, laws and theories in life science, in physical science, in earth and space science and in Indigenous knowledge of nature and then apply these understandings to interpret, integrate and extend their knowledge.
- **Develop Scientific and Technological Skills** – Students will develop the skills required for scientific and technological inquiry, problem solving and communicating, for working collaboratively, and for making informed decisions.
- **Develop Attitudes that Support Scientific Habits of Mind** – Students will develop attitudes that support the responsible acquisition and application of scientific, technological and Indigenous knowledge to the mutual benefit of self, society and the environment.

Inquiry

Inquiry learning provides students with opportunities to build knowledge, abilities and inquiring habits of mind that lead to deeper understanding of their world and human experience. Inquiry is more than a simple instructional method. It is a philosophical approach to teaching and learning, grounded in constructivist research and methods, which engages students in investigations that lead to disciplinary and interdisciplinary understanding.

Inquiry builds on students' inherent sense of curiosity and wonder, drawing on their diverse backgrounds, interests and experiences. The process provides opportunities for students to become active participants in a collaborative search for meaning and understanding.

Outcomes and Indicators

Outcomes are statements of what students are expected to know and be able to do by the end of a grade or secondary level course in a particular area of study. Therefore, all outcomes are required. The outcomes provide direction for assessment and evaluation, and for program, unit and lesson planning.

Critical characteristics of an outcome include the following:

- focus on what students will learn rather than what teachers will teach;
- specify the skills and abilities, understandings, knowledge and/or attitudes students are expected to demonstrate;
- are observable, assessable and attainable;
- are written using action-based verbs and clear professional language (educational and subject-related);
- are developed to be achieved in context so that learning is purposeful and interconnected;
- are grade and subject specific;
- are supported by indicators which provide the breadth and depth of expectations; and,
- have a developmental flow and connection to other grades where applicable.

Indicators are representative of what students need to know and/or be able to do in order to achieve an outcome. When teachers are planning for instruction, they must comprehend the set of indicators to understand fully the breadth and the depth of learning related to a particular outcome. Based on this understanding of the outcome, teachers may develop their own indicators that are responsive of students' interests, lives and prior learning. These teacher-developed indicators must maintain the intent of the outcome.

The outcomes and indicators in this Alternate Education course have been adapted from the renewed *Environmental Science 20* outcomes and indicators. The alternate outcomes and indicators are also identified in each of the resource packages that accompany this course. Further information about learning contexts and the Foundations of Scientific Literacy is available in the *Environmental Science 20* curriculum document.

Legend for Outcomes and Indicators (Health Science)

Learning Contexts to Support Outcomes

CP	Cultural Perspectives

DM	Decision Making
SI	Scientific Inquiry
TPS	Technological Problem Solving

Foundations of Scientific Literacy

A	Attitudes
K	Scientific Knowledge
S	Safety
STSE	Science, Technology, Society, and the Environment

Outcomes at a Glance

Career Exploration
ES28-CE1 Identify environmental science related career paths in Saskatchewan, Canada and the world.

Student-Directed Study (Optional Unit)
ES28-SDS1 Explore one or more topics of personal interest relevant to *Environmental Science 28* in depth.

The Nature of Environmental Science
ES28-ES1 Discuss the methods, mindsets and purposes of environmental science.

Atmosphere and Human Health
ES28-AH1 Explore the impact of human activities on indoor and outdoor air quality and the need to minimize risks to human health.
ES28-AH2 Examine the effects of a changing climate on society and the environment.

Human Population and Pollution
ES28-HP1 Outline technologies and processes used for managing resource use, waste generation and pollution associated with a growing human population.

Aquatic Systems
ES28-AS1 Recognize the function and observe the condition of freshwater aquatic systems such as rivers, streams, lakes, wetlands and watersheds.
ES28-AS2 Explain the need to maintain healthy water for humans and the environment.

Terrestrial Ecosystems
ES28-TE1 Discuss the role of soil in terrestrial ecosystems.
ES28-TE2 Identify the role plants play in an ecosystem, including ways in which humans use plants.

ES28-TE3 Recognize the need for intact habitat to support animal populations and biodiversity.

Career Exploration	
All outcomes contribute to the development of all K-12 science goals.	
Outcomes	**Indicators**
ES28-CE1 Identify environmental science related career paths in Saskatchewan, Canada and the world. [CP, DM]	a. Generate a list of occupations that require a background in environmental science through research and/or participation in events such as a career fair or job shadow. (K, S) b. Examine the roles, responsibilities, educational qualifications and personal and professional qualities common to people involved in environmental-science related jobs. (S, A) c. Research a chosen career, using criteria such as: i. the training program, including on the job training ii. the work they are trained to do iii. the types of facilities in which they are employed iv. hours/shifts worked v. current wages received in Saskatchewan vi. physical and mental stresses experienced vii. workplace hazards and safety considerations viii. other professionals they interact with ix. your personal suitability for this career (K, S, A, STSE) d. Communicate research findings related to environmental science occupations through a display, brochure, video, presentation software, website or orally. (K, S, A, STSE)

Student-Directed Study- Optional Unit	
All outcomes contribute to the development of all K-12 science goals.	
Outcomes	**Indicators**
ES28-SDS1 Explore one or more topics of personal interest relevant to *Environmental Science 28* in depth. [CP, DM, SI, TPS]	a. Carry out an experiment following established scientific protocols to investigate a question of interest related to one or more of the topics of *Environmental Science 28*. (S, A, K, STSE) b. Assemble and reflect on a portfolio that demonstrates an understanding of an environmental science topic of interest to the student. (S, A) c. Share the results of student-directed research through a

	display, presentation, performance, demonstration,song, game, commercial, fine art representation, video or research paper. (S) d. Use a provided tool (e.g., rubric, checklist, self-evaluation form or peer-evaluation form) to assess the process and products involved in a student-directed study. (S, A)

The Nature of Environmental Science	
All outcomes contribute to the development of all K-12 science goals.	
Outcomes	**Indicators**
ES28-ES1 Discuss the methods, mindsets and purposes of environmental science. [CP, DM]	a. Reflect upon how one's connection with the environment is influenced by personal experiences, cultural understanding and theory of environmental sustainability. b. Examine how sustainability of the environment impacts our environment, economics and social justice. c. Engage in place-based learning to gain a deeper understanding and appreciation of the environment. (S, STSE) d. Recognize essential characteristics of First Nations and Métis worldviews regarding the environment, such as the importance of the four elements (i.e., earth, water, wind and fire), a sense of interconnectedness with the environment and respect for Mother Earth. (STSE, K) e. Recognize environmental science as a newly developing field that integrates knowledge, common theories, common modules and processes from other scientific disciplines such as; ecology, weather and climate, biology, geology, and human geography to investigate human impacts on the global environment- focusing specifically on Saskatchewan opportunities for developing technology (e.g., wind, solar, carbon capture and geothermal). (K, STSE) f. Explore the difference between the green revolution (agriculture) and the environmental revolution (stewardship). (K, STSE) g. Outline how green and environmental revolutions are instrumental in the global environmental movement. (K, STSE)

Atmosphere and Human Health	
All outcomes contribute to the development of all K-12 science goals.	
Outcomes	**Indicators**
ES28-AH1 Explore the impact of human activities on indoor and outdoor air quality and the need to minimize risks to human health. [SI, DM]	a. Identify how human activities and technologies have influenced air quality. (S) b. Recognize the role of the stratospheric ozone layer and investigate its depletion as a contributor towards human health issues such as cancers and cataracts. Identify the importance of understanding the UV index and its role in determining human activities. (STSE, K) c. Understand the importance of using a personal protective device or substance (e.g., sunscreen, mosquito repellent or protective clothing) in protecting a person from an Environmental factor. (STSE, S, A) d. State common sources and investigate the production of industrial and photochemical smog/ pollution and identify measures that can be undertaken to diminish their effects on human health. (K, STSE, A) e. Describe the sources of indoor air pollutants (e.g. particulate matter, radon, mold and allergens). (K, STSE) f. Identify ways of ensuring indoor air quality remains safe, and what steps can be taken to improve it if deemed unsafe. (K, STSE, A) g. Recognize the relationship between human population density and human health. (S, STSE)
ES28-AH2 Examine the effects of a changing climate on society and the environment. [CP, DM, SI]	a. Examine the types of questions that scientists attempt to answer with respect to Earth's climate and past, present and potential future climate changes. (STSE, A) b. Investigate the Arctic as an indicator region of climate change, including the impact on traditional lifestyles of northern peoples, given the general vulnerability to climate change effects at northern versus equatorial latitudes. (K, STSE) c. Identify the contributions of Indigenous knowledge in policy decisions related to climate change. (K, STSE) d. Recognize how climate models simulate important aspects of past and present climate and climate change. (K, STSE,S) e. Recognize the effects of climate change on the earth system (i.e., geosphere, hydrosphere, atmosphere and

	biosphere). (K, STSE) f. Investigate the potential impacts of climate change on the agriculture, energy, forestry, transportation and/or tourism sectors in Saskatchewan. (K, STSE, S)

Human Population and Pollution	
All outcomes contribute to the development of all K-12 science goals.	
Outcomes	**Indicators**
ES28-HP1 Outline technologies and processes used for managing resource use, waste generation and pollution associated with a growing human population. [CP, DM, SI]	a. Outline the environmental impact of human population changes with respect to resource use, waste generation and pollution. (STSE, K) b. Assess the importance of food security and access to medicine to support a growing human population. (K) c. Investigate the waste generated throughout the life cycle of a product. (STSE, S) d. Investigate the role of community agencies and industries to support reducing, reusing, and recycling resources in Saskatchewan (e.g., SARCAN, rubber recycling, batteries and composting).(K, STSE, A)

Aquatic Systems	
All outcomes contribute to the development of all K-12 science goals.	
Outcomes	**Indicators**
ES28-AS1 Recognize the function and observe the condition of freshwater aquatic systems such as rivers, streams, lakes, wetlands and watersheds. [CP, DM, SI]	a. Identify and understand abiotic factors (e.g., turbidity, temperature, dissolved oxygen and particulates) of an ecosystem (S, STSE, A) b. Examine the diversity of life in a specific aquatic ecosystem, classifying aquatic biota, assessing biodiversity and investigating a water quality index and/or algal productivity. (K, S) c. Understand how an integrated watershed management approach can address issues (e.g., water supply, drainage, storm water runoff, habitat protection and water rights) that affect water quality and the health of all living things including humans within a watershed. (S) d. Investigate local water sources, water quality, treatment systems and community use. (K) e. Describe the benefits of riparian zones and wetlands (e.g.,

	marshes, swamps, bogs and fens) in protecting water resources. (K)
ES28-AS2 Explain the need to maintain healthy water for humans and the environment. [SI, DM]	a. Recognize that only a very small percentage of global water is available for consumption. (K) b. Recognize that there are health challenges such as the spread of disease, mercury in fish, blue-green algae and *E. coli* in drinking water that result from changes to the condition of aquatic systems. (STSE, K) c. Identify that there are water quality standards such as the *Saskatchewan Surface Water Quality Objectives* and the *Canadian Water Quality Index* and legislation such as the *Canada Water Act* and the *International River Improvements Act*. (STSE, K) d. Examine how individuals, organizations (e.g., watershed associations), First Nations and government agencies (e.g. Saskatchewan Water Security Agency) work to ensure clean and abundant water through producing water regulations and allocation policies. (K, STSE) e. Discuss technologies such as-desalinization plants, water treatment plants and home water filtration systems, which are designed to maintain and improve water quality. (K, STSE, A) f. Understand the importance of source water protection for a community`s drinking water. (STSE, A, S)

Terrestrial Systems	
All outcomes contribute to the development of all K-12 science goals.	
Outcomes	**Indicators**
ES28-TE1 Discuss the role of soils in terrestrial ecosystems. [SI, DM, CP]	a. Recognize how the breakdown of parent material through various processes (e.g., weathering, erosion, deposition and decomposition of organisms) results in soil with varying properties (e.g., color, texture, structure and pH). (K) b. Research causes and consequences of soil degradation (e.g., wind and water erosion, salinity and desertification) and mitigation strategies (e.g., conservation tillage, contour farming, grassed waterways and shelterbelts) used to reduce the loss of topsoil. (A, K) c. Examine how phenomena such as erosion, desertification and soil pollution, whether natural or human-caused, affect soil productivity and food production. (STSE) d. Investigate how composting systems work to maintain and

	improve soil quality. (S, STSE)
ES28-TE2 Identify the role plants play in an ecosystem, including the ways in which humans use plants. [SI, CP, DM]	a. Discuss the many roles of plants including their roles as providers of ecological goods and services as well as natural capital. (K) b. Examine the significance (e.g., medicinal, spiritual, nutritional and shelter) of plants, including tobacco, in First Nations and Métis cultures. (K, STSE) c. Explain how plant morphology and physiology determines the role of plants in an ecosystem (e.g., anchoring soil, filtering air and water, providing shelter for other organisms and providing organic matter to the ecosystem). (K) d. Explain the role of plants in reducing greenhouse gases, as well as potential impacts of climate change on plant growth and distribution. (STSE) e. Examine the types and yields of agricultural and/or horticultural crops grown in Saskatchewan. (STSE, K) f. Differentiate among various agriculture practices (e.g., industrial, traditional, subsistence, sustainable agriculture, organic farming, urban agriculture, local food and community supported agriculture). (STSE) g. Recognize the advantages and disadvantages of forestry practices (e.g., selective cutting, clear cutting, shelter wood system and integrated resource management). (STSE) h. Examine the impact of agriculture or forestry on a natural ecosystem. (S) i. Grow plants for purposes such as food, diversity (with native plants), medicine and habitat restoration. (S, STSE)
ES28-TE3 Recognize the need for intact habitat to support animal populations and biodiversity. [SI, CP, DM]	a. Explain the need for habitat protection and restoration in terms of biodiversity (e.g., genetic diversity, species diversity and habitat diversity) and resilience within ecosystems. (K) b. Describe examples of First Nations and Métis people's contributions in recognizing the effects of natural and human-caused changes to habitat on historical migration patterns of animals in Saskatchewan. Discuss the implications of invasive species on ecosystems in Saskatchewan (STSE, A, K) c. Explain the roles of individuals, governmental and non-governmental organizations such as the Saskatchewan Prairie Conservation Action Plan, Ducks Unlimited and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and legislation such as the *Species at Risk Act*

	(SARA) in protecting and maintaining habitats and biodiversity. (A) d. Relate an organism's specific adaptations and behavior to its niche in an ecosystem. (K) e. (Optional) Identify how human activities such as agriculture, mining, oil and gas development, forestry, urbanization and recreation might impact to an animal's range and habitat. (K) f. (Optional) Evaluate the importance of a keystone species in a specific terrestrial ecosystem. (S)

Resources

Saskatchewan Curriculum; The Future Within Us. (2017). *Environmental science 20 resources*. Retrieved April 2017 from https://www.curriculum.gov.sk.ca/webapps/moe-curriculum-BBLEARN/index.jsp?view=resources&lang=en&subj=science&level=environmental20

General Resources:

Aurum Science Website Resources: http://www.aurumscience.com/env_science.html

Environmental Science: Toward a Sustainable Future. (2011). Toronto, ON: Pearson Education Inc.

Essential Atlas of Ecology. (2005). Barron's Education Series Inc.

Discovery Education- http://www.discoveryeducation.com/

Gizmo's- World's largest library of math & science simulations https://www.explorelearning.com/

Gombatz, E.G., (2007). Waste Management: At the Source Managing Our Waste Series. San Diego CA. Classroom Complete Press

Keepers of the Earth: Native society's and environmental Activities for Children: Fifth House Ltd. 1998

Nature Conservancy of Canada www.natureconcervancy.ca/en/

Pearson Saskatchewan Science 7. (2014), Toronto, ON: Pearson Canada Inc.

Pearson Saskatchewan Science 5. (2014). Toronto, ON: Pearson Canada Inc.

Pearson Science 8. (2014). Toronto, ON: Pearson Canada Inc

Rosen, S. (2000). Science Workshop Series: Earth Science, Oceans and Atmosphere. Pearson Education Inc., Globe Fearon

Saskatchewan Environmental Society: http://environmentalsociety.ca/resources/teachers/

Saskatchewan Environmental Society, Our Story, (2017, February 2) Retrieved from http://environmentalsociety.ca/about/story/

SaskPower (2017, February 2) Retrieved from http://www.saskpower.com/our-power-future/our- electricity/supply-options/

Resources by Theme:

Water Resources:

- Ducks Unlimited: Wetland Ecosystems Habitats, communities and the diversity of life http://www.ducks.ca/assets/2012/06/Grade4-6teacher.pdf
  ***Ducks Unlimited- Wetlands Ecosystems 3
- Wetland Ecosystems Evolution, diversity and sustainability of ecosystems http://shuswapwatershed.ca/teacherguide/A-Teaching%20Aids/Wetlands%203%20Teachers.pdf
  - Student Activities- file:///E:/Environmental%20Science%2020/Aquatic%20Systems/WetlandEcosystems3SG.pdf
  - Teacher Guide- file:///E:/Environmental%20Science%2020/Aquatic%20Systems/WetlandEcosystems3TG.pdf
- Safe Water Drinking Water Foundation- http://www.safewater.org/
- **Conventional Water Treatment: Coagulation and Filtration**: https://www.youtube.com/watch?v=KMP9-49I1U4
- **Chlorination**: https://www.youtube.com/watch?v=1Ve-ks-fU3M
- **Reverse Osmosis**: https://www.youtube.com/watch?v=w3_8FSrqc-I
  - https://www.youtube.com/watch?v=aVdWqbpbv_Y
- **Winnipeg Water Treatment Plant Tour**: https://www.youtube.com/watch?v=20VvpASC2sU

Atmospheric System Resources:

- Global Ozone Project - Web Resource Notes: file:///E:/Environmental%20Science%2020/Atmospheric%20Systems/Lesson9%20Ozone%20Depletion.pdf
- Particulate Matter Matters! file:///E:/Environmental%20Science%2020/Atmospheric%20Systems/Particulates%20Resource.pdf
- Environmental Health Concerns and Toxic Chemicals where you live, work and play https://toxtown.nlm.nih.gov/
- Ozone Videos
  - https://www.youtube.com/watch?v=tcG-0D1VE0M
  - https://www.youtube.com/watch?v=6QyI3Yo1sf4
  - https://www.youtube.com/watch?v=k2kpz_8ntJY

Population Resources:

- 7 Billion: National Geographic http://video.nationalgeographic.com/video/news/7-billion/ngm-7billion?source=relatedvideo
- World of 7 Billion- Resources/Activities http://www.worldof7billion.org/teacher-resources/wall-chart/
- Current World Population http://www.worldometers.info/world-population/
- Population Education https://www.populationeducation.org/tags/environmental-science
- Population growth, box by box. Ted Talk https://www.ted.com/talks/hans_rosling_on_global_population_growth

- The Human Population https://prezi.com/pdj0pfnss5le/the-human-population/
- Population Institute of Canada http://populationinstitutecanada.ca/

Terrestrial Ecosystems:

- Soil Erosion: file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/erosion.pdf
- Essential Nutrients. Master 1.1- file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/Notes%20for%20Essential%20Nutrients%20Lesson.pdf
- Technology in Agriculture file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/Technology_in_Agriculture.pdf
- Plant Science Classroom Material for High Schools in Saskatchewan file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/SK_HS_Intro.pdf
    - In Search of Essential Nutrients file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/SK_HS_Lesson1.pdf
    - Properties of soils file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/SK_HS_Lesson2.pdf
    - Plant soil interactions file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/SK_HS_Lesson3.pdf
    - Plant nutrient deficiencies file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/SK_HS_Lesson4.pdf
    - Fertilizers and the environment file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/SK_HS_Lesson5.pdf
    - Nourishing the Planet in the 21st Century file:///E:/Environmental%20Science%2020/Terrestrial%20Ecosystems/SK_HS_Lesson6.pdf

Career Expl. Outcome:

- Career Job Bank- Explore Careers- https://www.jobbank.gc.ca
- SaskCareers https://saskcareers.ca/
- My Blueprint https://myblueprint.ca
- Career Cruising https://public.careercruising.com

Glossary

Abiotic factors are the nonliving components of the environment.

Adaptation is a responsive strategy in which it is accepted that an event with potential impacts on the environment is expected to occur and plans are made to adjust to the impacts.

Adaptations are heritable traits that increase the likelihood of an individual's survival and reproduction.

Anomalous means different than what is normal or expected.

Anthropocentric means a human- centered view of our relationship with the environment.

Anthropogenic climate change refers to climate change that result from human actions.

An **aquatic ecosystem** is an ecosystem that exists in a body of water such as the ocean, lakes, ponds, rivers and wetlands.

Bio-centric means a view of our relationship with the environment that considers the effects of actions on all living things in the environment.

Biodiversity is the total of all organisms in an area, taking into account the diversity of species, their genes, their populations and their communities.

A **biogeochemical cycle**, or nutrient cycle, is the path of a nutrient through an ecosystem.

Biological indicators are species that can be used to monitor the health of an environment or ecosystem.

Biotic factors are the living components of ecosystems.

Climate change is a change in the average weather that a given region experiences, including all features associated with the weather such as temperature, wind patterns and precipitation.

The **competitive exclusion principle** states that two species competing for the same resource cannot coexist at constant population values, if other ecological factors remain constant.

Cultural perspectives is the learning context that reflects a humanistic perspective which views teaching and learning as cultural transmission and acquisition.

Denitrification is a multi- step chemical process in which nitrates in the soil are reduced by denitrifying bacteria and ultimately released to the atmosphere.

Desertification is the degradation of once- fertile rangeland or tropical dry forest into non- productive desert.

Eco centric means a view of our relationship with the environment that considers actions in terms of their damage or benefit to the integrity of biotic and abiotic factors in the environment.

Ecological goods and services are the benefits to all living organisms that arise from the ecological functions of healthy ecosystems.

Ecoregions are large areas of land or water that contain a geographically distinct assembly of natural communities that share a large majority of their species and ecological dynamics and share similar environmental conditions.

An **ecosystem** is the biotic communities and associated abiotic components that interact in a defined geographic area.

Ecozones are the broadest biogeographic divisions of earth's land surface and have roughly the same land features, climate and organisms throughout them.

Energy flows are the passage of energy in a one-way direction through an ecosystem.

An **environmental impact assessment** is an assessment of the positive and negative environmental consequences of a plan, policy, program or project prior to the decision to proceed with the action and results in an environmental impact statement.

Erosion is the removal of material from one place and its transfer to another by the action of wind or water.

Eutrophic means a water body that is rich in phosphates, nitrates and organic nutrients that promote a proliferation of plant life, especially algae.

Feedback loops are circular processes in which a system's output serves as the input to that same system.

Fertilizer is a substance that promotes plant growth by supplying essential nutrients such as nitrogen or phosphate.

Food security means to have an adequate, reliable and available food supply to all people at all times.

Greenhouse gases are gases, including water vapour, carbon dioxide, methane, nitrous oxide, chlorofluorocarbons and tropospheric ozone, that absorb infrared radiation.

Integrated pest management is a combination of pest control methods that keep the size of a pest population low enough to prevent substantial economic loss.

Integrated watershed management is a combination of the best waste management techniques into a consolidated program to deal effectively with solid waste.

Invasive species are species foreign to a region that spread rapidly if free of predators, parasites or resource limitations that may have controlled their population in their native habitat.

A **keystone species** is a species that has a disproportionate effect on its environment relative to its biomass.

Marine ecosystems include salt marshes, intertidal zones, estuaries, lagoons, coral reefs, the deep sea and the sea floor.

Mitigation is a responsive strategy in which efforts are made to prevent or minimize the anticipated results of environmental change.

Natural capital is Earth's resources and processes that sustain living organisms.

Net primary productivity is the rate at which all the plants in an ecosystem produce net useful chemical energy.

Nitrification is the conversion of ammonium ions by bacteria into nitrite ions and then into nitrate ions.

Nitrogen fixation is the process by which nitrogen gas combines with hydrogen to form ammonium ions which can be taken up by plants.
Non-point source pollution is pollutants that enter bodies of water over large areas rather than being concentrated at a single point of entry.

Oligotrophic means a water body that has low-nutrient and high-oxygen conditions.

Photochemical smog is brown-air smog caused by light-driven reactions of primary pollutants with normal atmospheric compounds.

Place-based learning refers to the learning of traditional knowledge, processes and practices from living in a particular place.

Plant morphology is the study of the physical form and external structure of plants.

Plant physiology is the study of the functioning of plans.

Point source pollution is water pollution that can be traced to a specific spot.

Pollination is an interaction in which one organism transfers pollen from one flower to the ova of another, fertilizing the female flower, which subsequently grows into a fruit.

The **precautionary principle** is a practice that involves making decisions about adopting a new technology or chemical product by assigning the burden of proof of its safety to its developers.

A **riparian zone** is the interface between land and a river or stream.

Scientific inquiry is the learning context that reflects an emphasis on understanding the natural and constructed world using systematic empirical processes that lead to the formation of theories that explain observed events and that facilitate prediction.

Scientific literacy is an evolving combination of the knowledge of nature, skills, processes and attitudes students need to develop inquiry, problem-solving and decision-making abilities to become lifelong learners and to maintain a sense of wonder about and responsibility towards the natural and constructed world.

Soil is the uppermost layer of Earth's crust, which supports terrestrial plants, animals and microorganisms.

Soil degradation is damage to soils, typically through loss of organic matter or moisture, or loss of soils, typically through erosion.

Soil productivity is the capacity of soil, in its normal environment, to support plant growth.

Solubility is the amount of a substance that dissolves in a given quantity of solvent at specified conditions of temperature and pressure to produce a saturated solution.

STSE decision making is the learning context that reflects the need to engage citizens in thinking about human and world issues through a scientific lens in order to inform and empower decision making by individuals, communities and society.

STSE, which stands for science, technology, society and the environment, is the foundation of scientific literacy that is concerned with understanding the scope and character of science, its connections to technology and the social context in which it is developed.

Sustainability is the ability to meet humanity's current needs without compromising the ability of future generations to meet their needs.
Sustainable agriculture is an agricultural method that maintains soil productivity and a healthy ecological balance while having minimal long-term effects.

A **system** is an assemblage of parts and their relationship forming a functioning entity or whole.

Technological problem solving is the learning context that reflects an emphasis on designing and building to solve practical human problems.

Temperature is a measure of the average kinetic energy of particles in matter; it is measured in degrees Celcius (°C).

The **tragedy of the commons** is an economic theory of a situation within a shared-resource system in which individual users acting independently and rationally according to their own self-interest behave contrary to the common good of all users by depleting that resource.

Wetlands are lands that shallow fresh water covers for at least part of the year.

A **worldview** is the fundamental cognitive orientation of an individual or society encompassing the entirety of the individual or society's knowledge and point of view.