

Follow the Drop game and Improving Water Quality Through Agricultural Innovation (Video 2)

This resource is intended for teachers. It outlines how the Alberta WaterPortal’s video *Improving Water Quality Through Agricultural Innovation* and online interactive game *Follow the Drop* align with the curriculum presented in Alberta Education’s Programs of Study.

<p>Curriculum Links</p> <p>What courses from Alberta Education’s Program of Studies are applicable to this video?</p>	<ul style="list-style-type: none"> • Grade 8 Science – Freshwater and Saltwater Systems • Grade 9 Science – Environmental chemistry • Science 20 – Unit B – Ecosystems and Population Change • Science 30 – Unit B – Chemistry and the Environment • Career and Technology Studies (CTS) - Cluster D: Natural Resources (Agriculture and Environmental Stewardship) • Social Studies 10 • ENS 115: Resource Management • ENS 1040: Living with the Environment • ENS 1115: Resource Management • ENS 2010: Water Management 1 • ENS 2030: Ecological Economics • ENS 2040: Environmental Health and Safety • ENS 3040: Energy & the Environment • ENS 3110: Integrated Resource Management • ENS 3120: Water management 2 • Sci 9 Environmental Chemistry • Sci 10: Energy Flow in Global Systems
<p>Key Concepts</p>	<p>Water Quality Concepts</p> <ul style="list-style-type: none"> • Water quality impacts all users in a given watershed. • Human disruptions to aquatic ecosystems impact water quality and quantity. • Precipitation amounts in a given year impact water quantity and quality. • Different land and water uses impact water quality and quantity. • Harmful materials can be transferred through the air, water and soil which can impact waterbodies.

	<ul style="list-style-type: none"> • Individual and shared actions can foster environmental stewardship. <p>Industry Changes to Water Quality</p> <ul style="list-style-type: none"> • Industry practices impact water quality. • Consumer practices and industrial processes require regulations to protect the environment and manage risks. • Substances released into the land or water in high concentrations have an impact. Dilution can mitigate the impacts. • Society is becoming increasingly reliant upon chemical substances for life. These chemicals and their by-products can also adversely affect the environment and living systems. • There are risks and benefits of using chemical processes in meeting human needs. <p>Technology Impacts on Water Quality</p> <ul style="list-style-type: none"> • Science and technology have both intended and unintended consequences for humans and the environment. • Current practices and technologies affect water quality. Science and technology can help solve water quality and quantity problems, issues and questions. <p>Water Cycle and Quality Concepts</p> <ul style="list-style-type: none"> • The water that originates in the Bow River Watershed is used by municipalities and for food and energy production, and it supports the ecosystems along its length. Each of these uses impacts water quality. • Water quality is largely determined by the contaminants from the many different human activities and natural processes in the watershed. • The amount of water in the Bow River changes a lot through the course of the year, with the highest levels reached during the spring and summer melt.
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	<ul style="list-style-type: none"> • Because of the water cycle, most of the water taken out of the Bow River for use is eventually returned through precipitation. • If a water user group innovates their processes to improve water quality, every other user group in the Watershed benefits. The opposite is also true: if a user group doesn't strive to protect water sources, all other users are impacted.
<p>Objectives</p>	<ul style="list-style-type: none"> • Students will investigate the various uses of water in Alberta and how these uses impact water quality. • Students will explore some of the technologies associated with water and look at the impact that these technologies have on water quality. • Students will learn some of the ways the agriculture industry in Alberta minimizes the impacts on water quality.
<p>Glossary of Terms</p>	<p>Watershed: An area having a common outlet for its surface water runoff. The land area within a basin/watershed drains water to a single body of water, such as a stream, river, or lake.</p> <p>Headwaters: Upper tributaries of a stream or river, considered the source of that stream/river.</p> <p>Acid Rain: Rainfall made sufficiently acidic by atmospheric pollution that it causes environmental harm, typically to forests and lakes. The main cause is the industrial burning of coal and other fossil fuels, the waste gases from which contain sulfur and nitrogen oxides, which combine with atmospheric water to form acids.</p> <p>Rain Shadow: A dry area on the leeward side of a mountainous area (away from the wind). The mountains block the passage of rain-producing weather systems and cast a "shadow" of dryness behind them.</p>

	<p>Sediment: a soft substance that is like a wet powder and consists of very small pieces of a solid material that have fallen to the bottom of a liquid.</p> <p>Potable: Safe to drink.</p> <p>Tributary: a river or stream flowing into a larger river or lake.</p> <p>Evaporate: Turn from liquid into vapor.</p> <p>Transpiration: when water escapes through plant leaves as a gas</p> <p>Turbine: a machine for producing continuous power in which a wheel or rotor is made to revolve by a fast-moving flow of water, steam, gas, air, or other fluid.</p> <p>Cistern: a tank for storing water, especially one supplying taps or as part of a flushing toilet</p> <p>Evapotranspiration: the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants. Transpiration is when water escapes through plant leaves as a gas.</p>
<p>Classroom and Online Activity Suggestions</p>	<ul style="list-style-type: none"> • Create a poster showing some of the industrial uses of water in Alberta. • Brainstorm actions individuals can take to ensure they are protecting water quantity and quality. • Conduct research into potential careers that focus on improving water quality. • Give a presentation on how one user group can impact water quality in the Nexus and how this impacts other users. • Interpret data from water quality tests, such as pH, BOD, dissolved oxygen and organic compounds. Analyze alternatives to the use of chemical technologies; e.g., bioremediation for contaminated soil,

	<p>biological controls for pests, biodegradable products(AI–SEC2).*</p> <ul style="list-style-type: none"> • Research and develop a land reclamation strategy for a disturbed area, as a solution to environmental damage to a waterbody (e.g., open-pit mine, garbage dump, school yard reclamation).* • Research and identify environmental health and safety issues relevant to one of Alberta’s industries and explain how industrial, personal and environmental uses affect water resources.* • Give a presentation on how industrial, personal and environmental practices may affect the water resource at local, regional and global levels, including the use of chemical fertilizers and pesticides, irrigation and draining practices, overgrazing and animal wastes, or residential and commercial heating and cooling.*
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*Indicates Activity was amended from the CBE Program of Studies.