

# Groundwater: Vital but Vulnerable

## Reading Non-fiction Text

**Subject/Grade:** Science 11 & 8      **Lesson Title:** Groundwater: Reading Nonfiction Text

### Stage 1: Identify Desired Results

**Outcome(s)/Indicator(s)**

#### Environmental Science 20

**ES20-AS2: Assess the importance of maintaining healthy water for humans and the environment.**

**a)** Analyze emerging 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)

**f)** Analyze the impacts of point source and nonpoint source pollution on humans and aquatic systems. (STSE, K, A)

**g)** Research the sources, effects, and management and mitigation strategies of contaminants such as pathogens, organic matter, heavy metals, sediment, heat, petrochemicals and inorganic chemicals such as pesticides in aquatic and/or marine ecosystems. (STSE, A)

**j)** Research advances in technologies such as desalination plants, water treatment plants and home water filtrations systems, which are designed to maintain and improve water quality. (K, STSE, A)

#### Grade 8 Water Systems

**WS8.1 Analyze the impact of natural and human-induced changes to the characteristics and distribution of water in local, regional, and natural ecosystems. [CP, DM]**

**a)** Construct visual representations of the world distribution of water, and the distribution of water in Saskatchewan, including watersheds, lakes, rivers, streams, river systems, wetlands, groundwater, saline lakes, and riparian areas.

**f)** Identify possible personal, societal, economic, and environmental consequences of natural changes and humans practices and technologies that pose threats to surface and/or groundwater systems in Saskatchewan (eg. vegetation removal, water and sewage treatment plants, timber harvesting, over-application of fertilizers, agricultural and urban irrigation, impervious groundcover, land alterations, mining, introduction of invasive species, shoreline erosion, fluctuating lake levels, flooding, draining and/or channeling of surface water features and damming of rivers).

**g)** Research a specific human practice or technology that may pose a threat to surface and/or groundwater systems in Saskatchewan and explain how different groups in society (e.g., landowner, consumer, business

owner, recreational user, fishing, government official, and farmer) may have conflicting needs and desires in relation to the practice or technology and how those decisions or actions of different stakeholders may or may not be addressed by scientific or technological knowledge.

**English Language Arts Grade 6-8**

**Outcome:** CR6-8.1 View, listen to, read, comprehend, and respond to a variety of texts that address identity, social and efficacy.

**Outcome:** CR6-8.2 Select and use appropriate strategies to construct meaning before, during and after viewing, listening, and reading.

**Outcome:** CR6-8.3 Use pragmatic, semantic/lexical/graphophonic, and other cues to construct and confirm meaning when viewing, listening, and reading.

**Outcome:** CR6-8.4 View and demonstrate comprehension and interpretation of visual and multimedia texts with specific features (e.g., circle graphs) and complex ideas including visual components of media such as magazines, newspapers, websites, reference books, graphic novels, broadcast media, videos, and promotional materials.

**Outcome:** CR6-8.7 Read independently and demonstrate comprehension of a variety of specialized information texts including non-fiction books, grade-level instructional materials, articles, reports, reference materials, instructions, advertising, promotional materials and websites.

**Outcome:** CR6-8.8 Read Grade 7 appropriate texts to increase fluency and expression.

**Key Understandings: ('I Can' statements)**

I can... apply important skills when reading non-fiction text to help me understand and interpret information and illustrations/ diagrams.

I can...summarize and share important ideas from a non-fiction text and illustrations/diagrams.

I can... create my own scientific questions that could guide further research.

**Essential Questions:**

What are some strategies you could use to help you understand and interpret a non-fiction reading?

What are some strategies you could use to help you understand and interpret a non-fiction illustration/diagram?

What do you find interesting on the panel?  
 What do you think is important and why?  
 What other questions do you still have?

**Teacher Background**

Reading non-fiction text is an important skill that many students, even so-called “good” readers, find difficult. Identifying features of nonfiction text that alert the reader to important information, separating out important ideas from interesting details, and interpreting information from diagrams or illustrations are all essential to getting the most out of nonfiction reading.

**Distilling Important Ideas from Interesting Details**

Textbooks are arranged in a predictable format. Information is presented in a logical and sequential fashion; important concepts are stressed. Paragraphs begin with a topic sentence, continue with a group of supporting sentences, and end with a sentence that restates the topic and captures the main idea. Each paragraph elaborates one main idea. Teachers can make copies of textbook reading on the Overhead.

Ironically, identifying important information in exciting, well-written expository text can be troublesome, because compelling details may grab the imagination and lead readers astray. The most important ideas in well-written nonfiction are often deeply embedded in rich detail. Distinguishing what's important from what's interesting can mean walking a pretty thin line. Sometimes the interesting ideas are the most important but not always. Practicing sifting, sorting and separating out important ideas from interesting details helps readers determine the essence of an authentic nonfiction piece.

### **Interpreting Information from Illustrations**

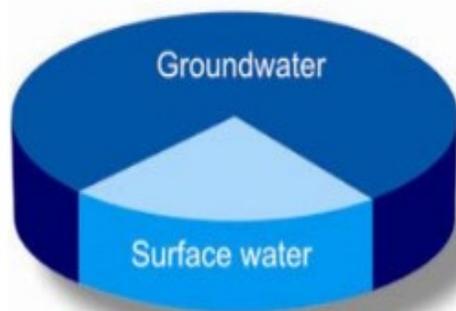
In nonfiction material, illustrations represent information not always included in the text. In fiction, illustrations usually support the text rather than add new information. Students need to learn how to read and interpret illustrations found in nonfiction in order to access new information.

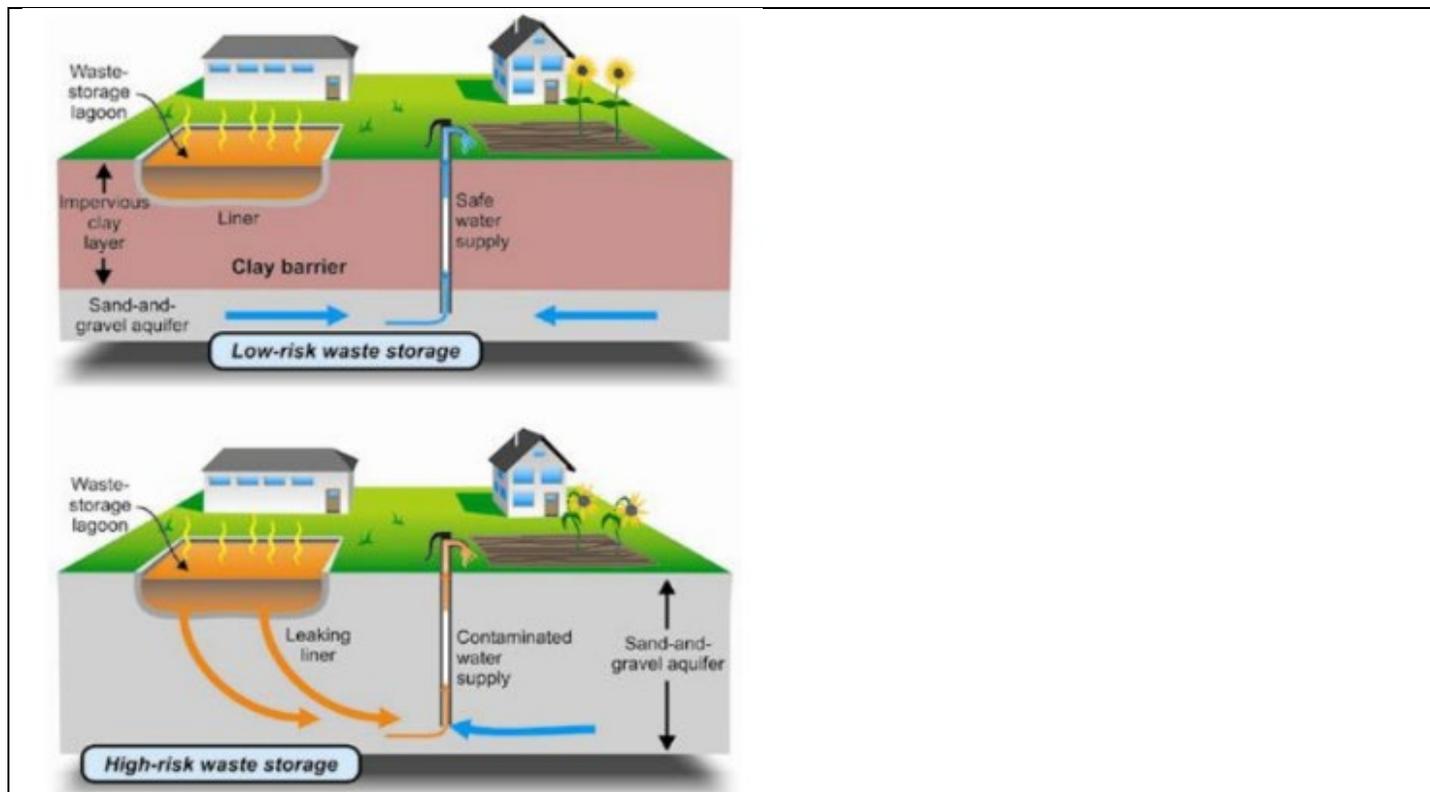
### **Helping students read illustrations**

Choose an illustration. Cover up the print on the page and ask the students to look carefully at the page and tell what they saw. Chart these findings. Draw students attention to specific aspects of the illustrations and tell what else they see. Review the statements and eliminate anything that is not a fact. After confirming and deleting specific statements uncover the print and read it to them. Did the students notice anything about what they learned from the illustrations and what they learned from the printed information?

**Pictures:**

### ***Where Saskatchewan communities get their water***





## Definitions

**Groundwater:** water held underground or within the spaces between soil.

**Aquifer:** an underground layer of rock that has small openings and cracks that allows water to pass through. This is called a permeable layer, a layer of rock that allows water to pass through. For example, sand and gravel are permeable. They have small openings and spaces within the rock that allows water to travel within.

**Saline:** very salty water. Deeper groundwater is generally more saline and therefore less useful.

**Desalinize:** is the process by which the salt is removed from saline water so that the water can be safely consumed.

**Potable:** safe to drink.

**Recharge:** is the process by which surface water (such as rainwater) moves downward into the ground into an aquifer thus increasing the amount of groundwater in the aquifer.

**Water table:** is the level below the surface of the ground where water can be found. The soils and rocks are fully saturated with water.

**Pollution plume:** an area of air, water or soil containing pollutants that traveled from a single source.

## Stage 3: Build Learning Plan

**Set (Warm-up, Focusing the Learning):** Time: 5-7 min  
 Review nonfiction features with students:  
 The features of nonfiction reading alert the reader to important information. Students need to be taught

### Materials/Equipment:

- Copies of poster panel
- Student record sheet
- Highlighters
- Rulers

to pay attention to these signposts:

- Fonts and special effects. Titles, headings, boldface print, colour print, italics, bullets, captions, labels and the like signal importance in text.
- Textual cues. Nonfiction writing often includes verbal cues that signal importance: for example, for instance, in fact, in conclusion, most important, but, therefore, on the other hand, and such as.
- Illustrations and photographs. Illustrations play a prominent role in enhancing reader comprehension. Colourful pictures and photographs capture attention.
- Graphics. Diagrams, cutaways, cross sections, overlays, distribution maps, word bubbles, tables, charts, graphs, and framed text graphically inform nonfiction readers of important information.

### Development

1. Have students look at the panel and identify the fonts and special effects that they see. They should indicate these on the paper using sticky notes, highlighters, underlining, or some other form of identification. Encourage students to make marginal notes as to what the special effects are highlighting.
2. Have students use a different method than in step 1 to identify verbal cues that signal importance in the text. Make notes on the sheet using stickies or the margin to identify what the important information is that the cues point to.
3. Have students identify the purpose of any illustrations, photographs and graphics on the panel. This information should also be written on the panel sheet.
4. Using the notes from their panel sheets, students should re-read the panel and complete the student record sheets. In pairs or small groups, students can compare their responses and their questions.

### Learning Closure:

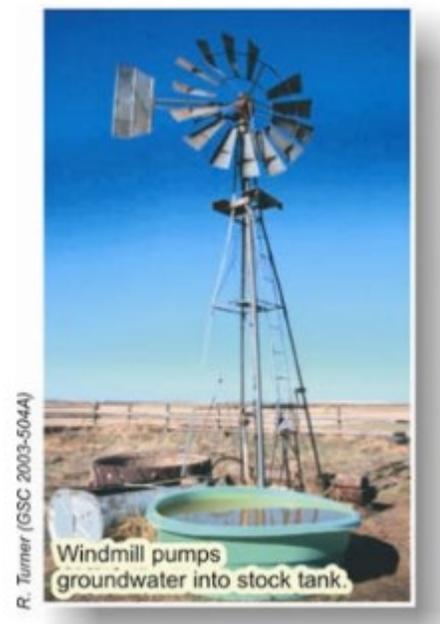
**Time:** 10 min

Groups can report to the whole class to generate a master sheet on the overhead or chart paper summarizing the important and interesting information and the questions that were generated.

- Sticky Notes

### Possible Adaptations/ Differentiation

- This activity could easily be used as an engage lesson for each panel on the poster. Younger students may all work on a certain panel. Older students may do a jigsaw activity.
- Great scaffolding activity for reading non-fiction text.
- Students may read aloud to each other, take turns reading, or read silently.
- A teacher may read aloud to a group of students.



### Stage 4: Determine Evidence for Assessing Learning

#### Assessment:

- \* Use a checklist or rating scale to record observations of student reading behaviour during the first part of activity.
- \* Use a group participation assessment tool during the small group portion of the activity.
- \* Make anecdotal observations of student participation and understanding during small group and reporting activities.
- \* Respond to students' written work on panel and on record sheet.

#### Extensions

- 1) Students could use the questions generated to explore the Groundwater topic further and then create their own "panel" that would answer one of those questions.
- 2) Students could also explore the waste storage facilities in their own area to see if it is high risk or low risk and suggest lower risk alternatives if appropriate.
- 3) Students could create a glossary with images, definitions and examples of key terms from the panel.

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Look at the Digital Geological Highway Map of Saskatchewan (*GeoExplore Saskatchewan*) website for further information and a deeper understanding of the local context:

Main Website

<https://skgeolhighwaymap.maps.arcgis.com/apps/MapSeries/index.html?appid=a845cbb370f7401597806887318e2676>

For more background information related to this lesson check out

- Main tab "Water and Drainage"

Name: \_\_\_\_\_

**Title of Panel:**

**What's Interesting?**

**What's Important?**

**What did I find out from the diagrams, illustrations, and / or photographs?**

**What other questions do I have about this topic after reading the panel?**