

[Lesson # 7: Setting the Stage](#)

Topic:	<b>Data Gathering: Data Sheet &amp; Planning the Field Study</b>
<p>Science 14 Program of Studies outcome(s):</p> <p>Science, Technology and Society (STS) and Knowledge</p>	<p>Students will:</p> <p>2. Analyze a local ecosystem in terms of its biotic and abiotic components, and describe factors of the equilibrium</p> <ul style="list-style-type: none"> <li>• define ecosystems in terms of biotic and abiotic factors (<i>e.g., common plants and animals, latitude, altitude, topography</i>)</li> <li>• - describe how various abiotic factors influence biodiversity in an ecosystem (<i>e.g., climate, substrate, temperature, elevation</i>)</li> <li>• <a href="https://education.alberta.ca/media/3069383/pos_science_14_24.pdf">https://education.alberta.ca/media/3069383/pos_science_14_24.pdf</a></li> </ul>
Skills	<p><b>Initiating and Planning:</b></p> <p>Ask questions about relationships between and among observable variables and plan investigations to address those questions</p> <ul style="list-style-type: none"> <li>• Identify questions to investigate arising from practical problems and issues</li> <li>• Define questions and problems to facilitate investigation</li> <li>• Select appropriate methods and tools for collecting data and information to solve problems</li> </ul> <p><b>Performing and Recording:</b></p> <p>Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data</p> <ul style="list-style-type: none"> <li>• Carry out procedures, controlling the major variables</li> <li>• Estimate measurements</li> <li>• Use tools, technology and apparatus safely</li> </ul> <p><b>Analyzing and Interpreting</b></p> <p>Analyze qualitative and quantitative data, and develop and assess possible explanations</p> <ul style="list-style-type: none"> <li>• Identify strengths and weaknesses of different methods of collecting and displaying data</li> <li>• Identify new questions and problems that arise from what was learned</li> </ul> <p><b>Communication and Teamwork</b></p> <p>Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results</p> <ul style="list-style-type: none"> <li>• Receive, understand and act on the ideas of others</li> <li>• Communicate questions, ideas, intentions, plans and results, using lists, notes in</li> </ul>

	<p>point form, sentences, data tables, graphs, drawings, oral language and other means</p> <ul style="list-style-type: none"> <li>• Work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise</li> <li>• Evaluate individual and group processes used in planning, problem solving, decision making and completing a task</li> </ul>
Attitudes	<p>Most of the Attitude Outcomes stated in the Program of Studies are included into each of the <i>Wading in for Water</i> lessons. This includes; Interest in Science, Mutual Respect, Scientific Inquiry, Collaboration, Stewardship, and Safety. Please refer to the specific outcomes</p> <p>· <a href="https://education.alberta.ca/media/3069383/pos_science_14_24.pdf">https://education.alberta.ca/media/3069383/pos_science_14_24.pdf</a></p>
Planning ahead	<ul style="list-style-type: none"> <li>• Have all of the possible collection equipment available for students to pack up and have ready by the end of class (see list)</li> <li>• At the end of class have the data sheet completed and each group has one copy.</li> <li>• Visit the location a day or two ahead, to ensure conditions are as expected, and there are no safety concerns</li> <li>• If needed, find an extra adult to accompany the group (i.e. Lab Technician, a Teacher's Aide, Administrator, fellow Teacher).</li> </ul>
Type of lesson	<p>Discussion Field study preparation and data sheet generation</p> <p><b>NOTE:</b> A Sample Data Sheet is found <a href="#">here</a></p>
Word Wall	Listed in <a href="#">Appendix A</a>

**NOTE:**

Ensure that you have met all of your School District's criteria for student safety and risk management for off-site field studies.

**GATHER MATERIALS:**

See [Appendix D](#)

## Getting Started

<p>Topic opener “hooks”</p>	<p>Intro/ Hook ideas: Is it okay to put microbeads of plastic into personal care items (shampoo, body soap, face scrubs, toothpaste, etc.)?</p> <ul style="list-style-type: none"> <li>• Watch the short video for students to get a background before discussing (time: 2:12) <a href="http://storyofstuff.org/plastic-microbeads-ban-the-bead/">http://storyofstuff.org/plastic-microbeads-ban-the-bead/</a></li> <li>• In 2015 The Canadian government decided that microbeads be banned by 2018. Is this an adequate timeline?</li> </ul> <p>Teacher reference: <a href="https://www.ec.gc.ca/ese-ees/default.asp?lang=En&amp;n=ADDA4C5F-1">https://www.ec.gc.ca/ese-ees/default.asp?lang=En&amp;n=ADDA4C5F-1</a> and <a href="https://www.ec.gc.ca/ese-ees/default.asp?lang=En&amp;n=ADDA4C5F-1">https://www.ec.gc.ca/ese-ees/default.asp?lang=En&amp;n=ADDA4C5F-1</a></p>
<p>Lesson Sketch</p>	<ul style="list-style-type: none"> <li>• Discuss the following terms: ecosystem, biotic factors, abiotic factors, and biodiversity and how they relate.             <ul style="list-style-type: none"> <li>○ An ecosystem is composed of living (biotic) and non-living (abiotic) things, and depending on the abiotic factors, the quantity of organisms (biodiversity) can vary: the more different species present, the greater the biodiversity</li> </ul> </li> <li>• Predict various biotic and abiotic factors in the aquatic ecosystem to be visited next class. Give students ~5 minutes to brainstorm independently, then write down the list on the board, together as a class most factors will likely be covered (see example biotic/abiotic factors at the end of this lesson). This list will be a great jumping off point for putting together the data sheet.</li> </ul> <p>How do abiotic factors influence the biotic factors? Does it matter if:</p> <ul style="list-style-type: none"> <li>○ An area is north/south facing? Yes, north facing gets more shade, and likely to have more trees, while a south facing slope is more likely to be drier and be covered in grass (<a href="https://albertaep.wordpress.com/tag/provincial-park/#jp-carousel-3261">https://albertaep.wordpress.com/tag/provincial-park/#jp-carousel-3261</a>)</li> <li>○ A great example is which side of the street melts first in the spring. Different organisms will feed, sleep, and hunt in these varying conditions.</li> <li>○ Higher/lower elevation? Yes, higher elevations are usually cooler, and have harsh conditions such as lack of soil, high winds, etc. Consider Banff or Jasper, where there are a few trees clinging to the rocks with exposed roots and windswept, versus the valley down below where the wolves, bears, deer and elk like to feed <a href="http://www.pc.gc.ca/eng/pn-np/mtn/securiteenmontagne-mountainsafety/accidents/~/_/media/pn-np/mtn/securiteenmontagne-mountainsafety/accidents/2010/2010-08-07(4).ashx?w=590&amp;h=786&amp;as=1">http://www.pc.gc.ca/eng/pn-np/mtn/securiteenmontagne-mountainsafety/accidents/~/_/media/pn-np/mtn/securiteenmontagne-mountainsafety/accidents/2010/2010-08-07(4).ashx?w=590&amp;h=786&amp;as=1</a></li> <li>○ Warmer/cooler by 10 degrees in the summer? Yes, warmer conditions allow for a variety of different species that cooler climates cannot support. This is also a good place to consider how primary industries like farming might be affected by climate change. Warmer temperatures may allow for more agriculture in the northern parts of our province, but of course there are other factors, such as water sources, precipitation, etc. Also, could that mean that agriculture would be less feasible in the south over time? There are lots of unknown factors.</li> <li>○ More/less precipitation? Yes, Drumheller and Medicine Hat have less annual precipitation than Red Deer and Rocky Mountain House and as a result, biodiversity may be impacted. For instance, what species are more adapted to drought conditions?</li> </ul>

- Time and again, a change in non-living things (abiotic factors) may impact the living things (biotic factors). **Biodiversity** refers to the variety of species found in an ecosystem or habitat ... there could be great variety in different areas, but the specific components may be different.
- Class activity: Using the biotic/abiotic factors, put together a data sheet. This should be a guided activity where specific questions should be asked. What information is important? Time of day? Cloud cover? Why? (see [example data sheet](#)). Additional Teacher resource: Alberta Parks Downloadable Data Sets: <https://www.albertaparks.ca/albertaparksca/library/downloadable-data-sets/>
- Each group will need one copy of this data sheet for the beginning of next class. Hand in the data sheet, so having lost or misplaced copies does not impact the entire group.
- Discuss the importance of:
- Scientific method, in this case, the importance of sharing results with others, so if other people wanted to conduct a similar study, they would get the same results. If different results are found, either the procedure was not correct, or the results were not reliable, thus the importance of robust data and confidence in drawing conclusions.
- Accuracy and precision. Short video (time: 2:36): <https://www.youtube.com/watch?v=8CI5CeIT7hU>
- This is why each group will be collecting data. To make sure we are accurate and precise in sharing our results. What if one group has very different results? Maybe their equipment is not working correctly, or was recorded wrong. Then we know this information collected can be either removed, or tried again.
- Pack up the data collection equipment that have been agreed to be taken to the collection site (see attached equipment list in [Appendix D](#)). Set this equipment aside someplace safe and secure, so it is labelled and ready to go at the beginning of next class.
  - Ensure that all students know their role, and come to class on time.
  - **Reminder:** students who do not attend will leave a large amount of work for their group members.
- **Safety First: Refer to your school/department/district regulations**  
Practice handling the equipment - continued from last class (could be demos, where things get passed around)
  - Chemistry Station
    - soil/water pH (strips/meter)
    - Nitrogen/phosphorous/magnesium/ hardness
    - Dissolved oxygen
    - Temperature
  - Plant and animal identification station
    - identification sheets/books such as:
      - a) Alberta Aquatic Animal Identification Guide: <https://www.albertaparks.ca/media/3287/AquaticGuide.pdf>
      - b) Aquatic Plants of Alberta: <http://alms.ca/wp-content/uploads/2016/11/ALMS-Aquatic-Plant-Book-1st-Edition-Nov-2016.pdf>
      - c) Alberta Wetlands Discovery Field Guide: <http://ftp.public.abmi.ca/home/publications/documents/375>

	<p style="text-align: right;"><a href="#">Williams 2015 AlbertaWetlandDiscoveriesFieldGuide ABM L.pdf</a></p> <ul style="list-style-type: none"> <li>• Other             <ul style="list-style-type: none"> <li>◦ Wind speed meter</li> <li>◦ Water flow rate - calculations (could be as simple as measuring a length and then timing how fast a leaf passes in that stretch (speed = distance time)).</li> </ul> </li> <li>• <b>Remind students to dress according to the weather and conditions (rubber boots, warm sweater, sunscreen, hat, etc.)</b></li> </ul>
Closing ideas	<p>Snails in Banff: The Banff Springs Snail is <u>only</u> found in Banff National Park, where the natural hot pools are located. They are on the Canadian Endangered Species list. Teacher resource: <a href="http://www.pc.gc.ca/eng/nature/eep-sar/itm3/eep-sar3a.aspx">http://www.pc.gc.ca/eng/nature/eep-sar/itm3/eep-sar3a.aspx</a></p> <ul style="list-style-type: none"> <li>• Banff Hot Springs Snails Recovery, Parks Canada Video (time 7:58): <a href="https://www.youtube.com/watch?v=HS19tMVPg8g">https://www.youtube.com/watch?v=HS19tMVPg8g</a></li> <li>• A large concern is when tourists want to “get off of the beaten path” and sneak into hot pools to enjoy. Unfortunately, there is a high risk of stepping on these tiny creatures, and also the residue from products such as hand cream, conditioner, sunscreen, and perfume can wash off in the water, and kill the snails. A tourist was fined \$4,500 in 2015 for entering the pools Teacher resource to the news article: <a href="http://calgaryherald.com/news/local-news/man-who-swam-in-endangered-snail-pool-gets-4500-in-fines">http://calgaryherald.com/news/local-news/man-who-swam-in-endangered-snail-pool-gets-4500-in-fines</a></li> </ul>

Notes: