The Lost Seal of Antarctica

**SUMMARY:**

This lesson provides students with the opportunity to explore the differences in climate and ecosystems within Antarctica and between Antarctica and their local area. Students will locate and graph data to compare average temperatures, radiation and snowfall. Students will also demonstrate their knowledge of ecosystems of Antarctica by labeling a map.

*[TAGS: Antarctica, Dry Valleys, The Lost Seal, Ecosystems, Graphing]*

**KEY CONCEPTS:**

* Heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
* Resource availability affects organisms in an ecosystem.
* Data can be collected in a variety of ways depending on objectives.
* Data can be formatted in a variety of ways, including charts, graphs and maps.
* Mathematical concepts are integral to the understanding and interpretation of data.

**OBJECTIVES:**

* Observe and identify how the climate of Antarctica (and the Dry Valleys) is different from students’ local climate.
* Record data that shows the differences between two locations in Antarctica and students’ local area in average temperature, radiation and snowfall.
* Demonstrate knowledge of ecosystems of Antarctica
* Recognize the continent of Antarctica and its latitude of 70-90° south
* Recognize the southern ocean as well as the circumpolar current that surrounds the continent

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**MATERIALS:**

* Computers with internet access (one per small group)
* Student research guide
* Copies and transparencies of sample climate graphs and temperature/precipitation data.
* Resources for local climate.
* Climate graphs - three copies for each student, transparencies
* Temperature and radiation data for the local area - one copy per student
* Temperature and radiation data for two Antarctic stations - one copy for each group (see link to data)
* Wall map of the world
* Outline maps of Antarctica & transparency (see resources)
* Colored pencils

**PROCEDURE:**

1. Give students a blank outline map of Antarctica and ask them to choose five words that they think best describe Antarctica and write them on the map.
2. Teacher will read “The Lost Seal” and show video clips (#1-3)
3. Discuss why the seal was lost and how the Dry Valleys ecosystem is different from the rest of Antarctica.
4. Show interview with scientist Adam Wlostowski (University of Colorado) and powerpoint about Antarctica. Ask them what they usually think when they hear the word “desert”, what images does it bring to mind? Finally ask, “What is the world’s largest desert?” (Though many may suggest the Sahara, it can also be argued that the distinction could go to the interior of Antarctica, which receives only a couple inches of precipitation each year.) (Enrichment: share information/video on sublimation/evaporation of snowfall in Dry Valleys.)
5. Review the five words students first wrote, share in partners/small groups and then as a class, writing words on the whiteboard or constructing a class Wordle. (http://www.wordle.net/create). Discuss differences from original list.
6. Provide students with a blank map of Antarctica. (see resources) Have students fill in key information, including types of organisms and landmarks, paying special attention to the differences in the ecosystems of the Dry Valleys and the rest of Antarctica such as: the Antarctic Circle, the Antarctic Ocean, the geographic South Pole, the Indian Ocean, McMurdo Station, Palmer Station, the Ross Ice Shelf, the South Pacific Ocean, and the Weddell Sea.
7. In partners/small groups, hand out the climate data for the latitude, average monthly temperatures, radiation of Palmer Station (Antarctica), Lake Hoare (Dry Valleys of Antarctica), and their local area. Point out these locations on the Antarctica maps they just labeled. Ask students to brainstorm what factors affect the local climate. Discuss these factors. Point out that seasonal differences are important features of the climate.
8. Have each student construct graphs comparing the data from the two stations in Antarctica as well as their own area. Use instructions on attached sheet. Share and discuss information on graphs.
9. Ask the class to suggest potential definitions for the term climate. Discuss these and attempt to reach consensus on a definition. Compare and contrast climates shown on the graphs. Discuss what factors might determine the pattern of temperature and radiation for each location.
10. As a final activity, have a large outline map (see resources) of Antarctica ready and have students write short phrases or words that they have learned about the place we call “700 South”. Place this on a bulletin board in the room. Then, as your study proceeds, new facts will be learned that can be added to the mural. (All facts might be written on colored cards or use colored markers to add color to your mural.)
11. For a fun extension that may be used to assess student understanding of climate, pose the question, “What would be your ideal climate?” Have them write a narrative describing the temperature and precipitation that would occur throughout the year. Next, have them create a graph displaying their ideal climate. Finally, have them identify where in the world this climate might exist.

**ASSESSMENT:**

* **Performance—**what will students do during the lesson to demonstrate understanding?

 --Discussion of Antarctica descriptions

 --Presentation/discussion of graphs and maps

* **Product:** what will students produce to demonstrate understanding?

--Participation in group and class discussions

--Graph comparing temperatures and radiation (heat from sun)

--Completed map of Antarctica

* ***Assessment rubrics that you would use in the classroom are also helpful***

**ADDITIONAL RESOURCES:**

**The Lost Seal:**

<https://www.youtube.com/watch?v=7NnjDF7yVmI> Lost Seal Video #1

<https://www.youtube.com/watch?v=aq8MKPHWrQQ> Lost Seal Video #2

<https://www.youtube.com/watch?v=n2Wccs_ATIE> Lost Seal Video #3

<http://mcmlter.lternet.edu/lostseal/photo_video.html> (images/maps)

<http://mcmlter.lternet.edu/lostseal/history.html> (more information about the lost seal)

**Antarctica Maps:**

<http://www.worldmapsonline.com/images/OutlineMaps/Antarctica.jpg> (blank outline map)

<http://tea.armadaproject.org/activity/tremblay/AntarcticaMap.gif> (teacher labeled map)

**Antarctica Videos:**

<https://youtu.be/VwADGPfjerI>

<https://www.youtube.com/watch?v=7V26wCXi9fc>

**Dry Valleys Information:**

<http://www.mcmlter.org/>

<http://www.ldeo.columbia.edu/edu/polareducation/Activities/DryValleyssm.pdf>

**Climate Research:**

Local Area: http://www.usclimatedata.com/

Lake Hoare, Antarctica: <http://www.mcmlter.org/> (Go to “Data”, then “Real Time”, then “Meteorology” and select “Lake Hoare RT”)

Palmer Station, Antarctica: <http://oceaninformatics.ucsd.edu/datazoo/data/pallter/datasets>

<http://www.coolantarctica.com/Antarctica%20fact%20file/antarctica%20environment/vostok_south_pole_mcmurdo.php>

[**http://www.weatherbase.com/weather/weather.php3?s=90098**](http://www.weatherbase.com/weather/weather.php3?s=90098)

**Antarctica Ecosystems:**

<http://www.pbslearningmedia.org/resource/ipy07.sci.life.eco.antarcticecosys/antarctic-ecosystem/>

[http://www.enchantedlearning.com/school/Antarctica/quiz](http://www.enchantedlearning.com/school/Antarctica/quiz/) (Assessment)

<http://www.enchantedlearning.com/school/Antarctic/> (Activities)

<https://www.eduplace.com/ss/maps/pdf/world_cont.pdf> (Outline map)