

Human Life on Antarctica

Integration: Social Studies; Science

Grade Levels: 4-6

Time: 2-3 class periods

Materials:

- Map of Antarctica with research stations (available: National Geographic Society)
- Quart size jar(s)
- Paper cups
- Food coloring
- Eyedropper
- Water
- Ice
- Research materials (books, encyclopedias, internet, etc.)

Objectives:

Students will:

1. Explain the presence of research stations in Antarctica.
2. Identify the types of scientists who work in Antarctica.
3. Give examples of the influence of Antarctica on the rest of the world.

Lesson:

1. Ask students if there have always been people living in Antarctica. (There were no people living in Antarctica when exploration began in the 19th century.)

EXTENSION: This can follow or precede a discussion of the native people of the area in which the students live.

2. Ask students if any people live in Antarctica today. Tell them that many people, mostly scientists, live in Antarctica in research stations.
 - a. Several countries have set up stations where they send scientists to conduct scientific experiments. There are about 45 stations.
 - b. Some of the stations are run by the U.S., the United Kingdom, Australia, New Zealand, Russia, France, Argentina, South Africa, Norway, and India.
 - c. Most people stay in Antarctica for the summer only; however, there are some stations that operate year-round.
 - d. There are approximately 4000 people living in Antarctica during the summer months and about 1000 during the winter.

- Along with the scientists are support staff who include medical personnel, people who cook, people who build the buildings, etc.
3. Have students identify the following stations on the Map of Antarctica and which country operates each.
 - a. McMurdo
 - b. Scott
 - c. Amundsen-Scott
 - d. Mawson
 - e. Vostok
 4. Explain the details of living at a station.
 - a. Ask students what problems people have to face when they build the stations. (stations must be built to withstand the wind and the cold of Antarctica.)
 - b. Ask students what they think the scientists eat. (The menu is what you would expect at home. However, since food and supplies are only delivered every six months there is not much fresh food. The food is frozen or freeze-dried)
 - c. Ask students what the people living in the stations wear. (When they are indoors they wear what people wear everywhere. The stations are heated. When they are outside, they must wear layers of clothing to protect themselves from the cold.)
 - d. Ask students how do the people get to Antarctica. (They arrive with their supplies on ships, airplanes or helicopters. There are runways built on the ice.)
 - e. Ask students how the people at the stations communicate with others in Antarctica and around the world. (The scientists use telephones, satellites, radios, and computers to communicate.)
 5. Tell students that the scientists at the Antarctic stations are studying many different things. For this reason, there are many types of scientists at the station. Ask students if they know what each of the following scientists studies.
 - a. Geologist: someone who studies the rocks and the land formations.
 - b. Glaciologist: someone who studies the ice and its movement.
 - c. Biologist: someone who studies animal or plant life.
 - d. Botanist: someone who specifically studies plants.
 - e. Oceanographer: someone who studies the ocean and the organisms that live there.
 - f. Meteorologist: someone who studies the weather.
 - g. Aeronomist: someone who studies the atmosphere.

EXTENSION: Students can research what each type of scientist is studying in Antarctica.

6. Ask students “Why do you think so much research is taking place in Antarctica?”
 - a. Possible answers include:
 - Scientists do not know a lot about Antarctica.
 - Scientists want to learn things so that they can use what they learn in other parts of the world.
 - Scientists want to understand how Antarctica affects the rest of the world.

7. Inform students that what occurs in Antarctica has an effect on many other parts of the world. For example, the hole in the ozone layer over Antarctica is studied because it is important to people's health. Without ozone, too much UV radiation from the sun would reach the earth.
8. Tell students that another important topic that scientists are studying in Antarctica is ocean ventilation. Ask for suggestions of what ocean ventilation may be. Tell students that the oceans affect the atmosphere. Antarctica is important in this process.
9. Conduct a mini-lecture on ocean dynamics.
 - a. Ask students if they think that the water found in the deep parts of the ocean is warm or cold. (cold) Why? (solar radiation does not reach it).
 - b. Tell students that this cold water is kept from reaching the surface of the ocean by a layer of warm water.
 - c. Warm water is lighter than cold water; therefore it floats on top. The cold water underneath is unable to pass the warm water.
10. Demonstrate the dynamics of the water or have small groups of students perform the activity.
 - a. Fill a small jar or cup with water and add an ice cube to cool it.
 - b. Add a few drops of food coloring (a dark color) to the cold water.
 - c. Fill a clear, quart jar with hot water from the faucet.
 - d. With an eyedropper held beneath the surface of the water, add a stream of colored, cold water to the warm water and observe the behavior of the colored water.
 - The colored water should sink to the bottom because it is heavier.
 - e. Repeat the experiment with a quart jar of cold water.
 - The colored water should mix with the water in the jar because they are the same temperature.

ALTERNATIVE: Allow students to perform the demonstration in groups.

11. Tell students that Antarctica has an important role in allowing the cold water from the deep ocean to reach the surface.
 - a. Ask students what they think happens as ocean water from around the world moves toward Antarctica (the closer the water gets the cooler it gets at the surface).
 - b. Ask students what they think happens to when the warm layer becomes cooler (the colder water below begins to mix with it just like the second jar of water. The once colder water reaches the surface.
12. Explain to students that the water temperature of the ocean is warmer than the air temperature near Antarctica. When the water reaches the surface it begins to warm the air. With so much water doing this, the temperature in the Southern Hemisphere

actually rises. This is very important to the climate of the whole world. This process helps keep the temperature stable across the world.

13. Tell students that the colder, deeper water contains a lot of nutrients that ocean life needs to survive. When this colder water is allowed to reach the surface near Antarctica, the nutrients are brought to the surface as well. This is important for animals living near Antarctica and across the Southern Hemisphere
14. Ask students to write a synopsis of what they have learned about the Antarctic research stations and Antarctica's importance.

EXTENSION:

- Have students look up what research is being conducted at a specific station.
- Have students write an essay about what career they would like to explore when they grow up.

Assessment:

Teachers will assess:

1. Student's ability to explain what takes place and who resides at Antarctic research stations.
2. Student's comprehension of the dynamics of the ocean around Antarctica.
3. Student's ability to explain how Antarctica influences the rest of the planet.
4. Student's ability to synthesize information.