



3-5 Life Science

3-5 Nature and History of Science

Southern Nevada Regional Professional Development Program

Mojave Desert Unit-Climate and Weather



INTRODUCTION

According to the Clark County website in 2006 - 1,912,654 people lived in Clark County. As desert dwellers, it is important for our students to develop an understanding and appreciation of the environment in which they live. Learning about our environment is a crucial part of our daily lives. We depend on all organisms, both plants and animals, to survive from day to day.

WHERE'S THE SCIENCE?

The Mojave Desert is one of four deserts located in North America. In Nevada, it is situated south of the Great Basin desert, which is a cold desert and north of the Sonoran desert which is a hot desert. Therefore, the Mojave is considered both a cold desert (in the north) and a hot desert (in the south). It is also referred to as a high desert because the elevation ranges from 2,000 - 5,000 feet above sea level. It receives very little rainfall averaging 2.2 to 2.5 inches per year, thus making it a dry desert. So the Mojave is a high, dry, cold desert in the north and a dry, hot desert in the south.

The Mojave Desert encompasses 25,000 square miles. It occupies southeastern California and parts of Arizona and Utah as well as parts of southern Nevada. In Nevada, the Sierra Nevada Mountains serve as its western border while the Colorado River serves as its eastern border.

The Sierra Nevada Mountains act as a rain shadow for the Mojave Desert. Moist air from the Pacific Ocean travels up the eastern side of the Sierra Nevada range and is then turned back by the cold mountain air. Thus the Mojave receive very little rainfall. The rain that does make it over the mountains also evaporates in the hot dry desert air before it has a chance to reach the ground. During the summer (July - September) the Mojave Desert experiences large thunderstorms in various locations. These thunderstorms release a large amount of rainfall in a short time in a concentrated area causing flooding.

Throughout late fall and in the early spring the wind is a common feature in the Mojave. Winds are known to gust at speeds of up to 75 miles per hour or more at times.

MATERIALS

- A large model notebook (optional)
- Small individual thermometers
- Large outdoor display thermometer
- Clear plastic cups 9oz.
- Chart paper
- Rain gauge (can be purchased at any Wal-Mart)
- Anemometer www.deltaeducation.com
- Small bag of sand and clay
- One small plastic basin per group
- Photographs of various environments (desert, arctic, rainforest)
- Science Notebook (1 per student)
- Small sentence strips for word cards

PROCEDURES

Mini Unit: Climate



Lesson One: Environments

1. Introduce the term “**environment**”. Ask the students what they think this term means. Allow students time to think about the term and discuss it with a partner or in small groups. Ask students to share with the whole group what they think the term environment means. Chart responses.
2. Next, show students photographs of various environments: meadow, mountain, arctic, ocean, rainforest and desert. Allow students to discuss the similarities and differences between the various environments. Post the photographs and chart their responses under each.
3. Return to the term **environment** and explain that some of the properties they listed above are **environmental factors** of an environment. Highlight the environmental factors on the class chart. Introduce the definition of **environment** as everything that surrounds us and influences an organism. While **environmental factors** are parts of an environment that can be living or non-living. Furthermore there is a relationship between a number of environmental factors and how well organisms grow. For example, plant growth depends on the amount of rainfall.
4. Write the terms **environment** and **environmental factor** on the board and ask the students to discuss what these terms mean to

them. Share out and create a class definition for both terms and add to the board.

5. Pass out blank science notebooks to the students and instruct them to label the front cover “The Mojave Desert”. It might be helpful to make a large science notebook to use as a model for the students. Simply fold chart paper in half to create one.
6. Ask the students to turn to the first page in their science notebooks and label it “Table of Contents” at the top. Under the title they should enter the first subheading “Climate and Weather”.
7. Instruct the students to turn to the second page in their science notebook and fold back to back, folding it in half, creating a section divider. They should label this page “Climate and Weather”.
8. Finally, ask the students to turn to page three in their science notebook and label the top “Vocabulary”. They should add the terms **environment** and **environmental factor** to this page and add the class definition from the board. After everyone has completed setting up their science notebook, discuss adding a sketch, picture or icon to the class definition. Have them discuss their ideas with a partner, then share out ideas with the entire class. Ask the students to add the icon to their vocabulary page.
9. Collect science notebooks. Review the terms; write both on word cards include an icon or picture, and post on the science word wall. For more information or suggestions on how to set up a science notebook see the Nature and History folder, “Setting up a Science Notebook” lesson and/or video.

Lesson Two: Climate

1. Invite the students to the group area, pass out the science notebooks and ask the students to review the vocabulary from the last lesson with a partner. Discuss with the entire class.
2. Ask the students to identify the type of environment they live in (desert). Pose the following question: “What makes an environment a desert?” Chart student responses.

3. Explain to the students that the climate of an environment is affected by the weather conditions. Review basic weather conditions: Temperature, Rainfall, and Wind.
4. Tell the students that you have weather data from last year for their area. The data displays the temperature and amount of rainfall for each month during the previous school year. Visit the National Weather Service at <http://www.nws.noaa.gov/> under climate to retrieve this information.
5. Share the data for the month of August of the previous year and ask students what they can conclude from the data. Share out and chart.
6. Divide the students into groups or pairs and pass out the weather data from the previous months (Sept.-July) to each group. **Note:** Each group should receive data from a different month.
7. Explain to the students that their job is to look over the data and then to create a way to organize and display the temperatures and amount of rainfall for the month they are assigned. They should also note any conclusions that they can make from the data.
8. As students work move from group to group assisting and clarifying understanding of the assigned task.
9. Once students have completed a rough draft of their work, review the information and correct any misunderstandings. Next, give the group a large sheet of chart paper to transfer their information to.
10. Once all the groups have finished their assignment, post the charts in chronological order beginning with September and ask each group to share out their findings with the class.
11. When the groups are finished presenting, explain to the students that the term **climate** describes the average or usual weather in a region. Looking at our weather data from last year, what conclusions could we draw from our data about the climate of the Mojave Desert? Chart responses.
12. Instruct the students to turn to page five in their science notebook and label the page “Climate of the Mojave Desert”. They should then record any conclusions that they can make from the data on display and from the group discussion. They should also

add the term “climate” to their vocabulary page and write a definition in their own words and also include an icon, picture or sketch of the term.

13. Take a digital photo of each of the group charts and tell the students to save some space on page five to glue in the picture later. When you pass out copies of the photos, have the students glue them into their science notebook on page five and add any conclusions they made about their group chart.
14. Write the word “climate” on a word card and add an icon suggested by the class. Post the term on the science word wall.
15. Close the lesson by collecting the science notebooks and explain to the students that they will be recording the weather throughout the school year so that they can compare this year’s weather with last year.

Lesson Three: Reading a thermometer

Safety reminder: Do not use mercury thermometers.

1. Tell the students that today they will be investigating the heat energy that is given off from the Sun by measuring the temperature of the air.
2. Introduce the **thermometer** by holding up the large outdoor thermometer. Explain to the students that they will use this tool in their investigation. Tell the students that the red liquid inside the thermometer is alcohol. When the temperature is cool, the liquid condenses and lowers, recording a low temperature. When the temperature is warm, the liquid expands and rises, showing a higher temperature.
3. Pass out small individual thermometers to each student. Have the students read the temperature on their thermometer and record it on a blank sheet of paper. Next, ask the students to place their thumb on the red bulb at the base of the thermometer and observe what happens. Share observations and record temperatures. Pass out cups with cold water and instruct the students to place their thermometers in the cold water and watch the red liquid until it

stops moving. They should then read the temperature and record it on their sheet of paper as well.

4. Discuss observations from the above investigation.
5. Hold up the large outdoor thermometer and explain to the students that when a **meteorologist** (a person who studies the weather) reports the temperature, they are reporting the temperature of the air outside. Tell the students that you are going to go outside and record the temperature of the air. Take the students outside and have a volunteer hold the large thermometer up while the class observes the red liquid until it stops moving. Ask someone to read the temperature.
6. Return to the classroom and discuss the terms temperature, thermometer, and meteorologist with the students. Write the terms on the board and have the individual student groups come up with a definition for each one. Share out and add to the board. Write the terms on word cards and add an icon, picture or sketch and post on the science word wall.
7. Pass out science notebooks and have the students add the terms to their notebook on the vocabulary page they previously set up. Make sure they include a definition in their own words and add an icon, picture or sketch as well.
8. They should then turn to the next blank sheet in their science notebook and label it “Temperature”. Ask the students to sketch a thermometer on the page and to record what they learned about using thermometers today.
9. Tell the students that from now on when you pick them up every morning at the start of the school day, you will take the large class thermometer out and ask them to read the temperature. Then, when you return to the classroom, you will add the temperature to a class chart. At the end of each month have the students use the data from the chart to create a graph and discuss conclusions they can make from the monthly temperature data. **Note:** Be sure to take the temperature around the same time and at the same location every day.

10. Close the lesson by reading a section from a nonfiction selection about thermometers. The Delta Science Reader *Weather Instruments* has a useful section titled, “How Do We Measure Air Temperature?” (see additional resources)

Lesson 4: Reading a Rain Gauge

1. Review the terms thermometer, temperature, and meteorologist from the previous lesson.
2. Hold up a rain gauge and ask the students if they know the purpose of this science tool. Tell them that another condition of the atmosphere that meteorologists observe and record is the amount of water in the atmosphere.
3. Demonstrate how to use the lines on the rain gauge to measure the amount of rainfall by pouring various amounts of colored water (use food coloring) into the rain gauge and asking different students to identify how much water is in the rain gauge. Close the demonstration by explaining to the students that the Mojave Desert receives about 2.2 to 2.5 inches of rain per year. Fill the rain gauge to that amount. Next, show students a map of Nevada and point out the city Reno. Tell the students that Reno receives about 7.5 inches of rain per year and fill another rain gauge with that amount of liquid. Allow the students to compare the two rain gauges.
4. Pass out science notebooks to the students and ask them to turn to page seven and title the page “Measuring Rain”. They should then draw a sketch of a rain gauge and describe how meteorologists use a rain gauge to record rainfall.
5. Tell the students that you will place the rain gauge in a secure location and if it rains they will record any rainfall received for the remainder of the school year.
6. Read a section from a nonfiction selection about the rain or rain gauges. The Delta Science Reader *Weather Instruments* has a useful section titled “How Do We Measure Precipitation?” (See additional resources).
7. Discuss the above reading selection with the students. Then instruct them to add any new learning to their science notebook.

Extension:

You may want to post a large picture of a rain gauge on the wall and whenever it rains add the amount of rainfall to the rain gauge by coloring it in. Repeat throughout the school year so the students are able to visually observe how little rainfall we receive.

Lesson Five: Summer Thunderstorms and Floods

1. Post a picture of a flood (www.floodsafety.com/media/video) and ask students to discuss what is happening in the photo.
2. Explain to the students that when an area receives a large amount of rainfall in a short period of time it may lead to flooding, especially in the desert where water isn't easily absorbed into the hard ground surface.
3. Show students the short introduction video clip from the above mentioned website. Afterward, have the students discuss in small groups what they learned about flooding from the video. Share out whole group.
4. Simulate a flood using sand, clay, a small plastic basin, and a small cup of water with a hole in it. Have students spread sand and clay across the bottom of the basin. Then fill the cup with water and hold it above the basin allowing the water to pour into the basin. Record observations on page eight in their science notebooks.
5. Next spread the sand and clay again across the bottom of the basin and this time instruct the students to pour the water from the cup into the basin simulating a flood. Discuss and record observations on page nine of their science notebook.

Extension: Visit the Clark County Regional Flood District website at <http://www/ccrcd.org> for more activities.

Lesson Six: Measuring the Wind

Note: This lesson needs to be completed on a windy day.

1. Open today's lesson by reviewing with the students what they have learned so far about our desert climate.

2. Next, ask them if there is any other type of regular weather condition that occurs in the Mojave Desert that we have not yet discussed? (wind) Tell them we have not discussed the wind which is part of our regular weather pattern from year to year.
3. Ask the students to describe the wind. “Can you see the wind?” “Can you feel the wind?” “How do you know when the wind is blowing?”
4. Take the students outside to a shady location where they can feel the wind. Have the students close their eyes and ask them if they can feel the wind. Ask them, “What is wind?” (Moving air)
5. Tell the students that meteorologists also measure and record the wind. Hold up an **anemometer** and explain to the students that this is a tool to measure how fast the wind is blowing. Hold up the anemometer and let it spin in the wind as the students observe. Explain that a counter keeps track of the number of times the anemometer spins. The faster it turns, the stronger the wind is blowing.
6. Return to the classroom and pass out a copy of the Beaufort scale. Explain how meteorologists use the scale to estimate wind speed. This wind scale was developed in 1805 by Sir Francis Beaufort of England. Create a simple class wind scale that the students can use. For example: 0 = no wind, 1 = light breeze, 2 = moderate breeze and 3 = strong breeze.
<http://www.spc.noaa.gov/faq/tornado/beaufort.htm/>
7. Discuss the class wind scale. Ask the students to turn to page ten in their science notebook and title the page “Measuring the Wind”. They should then draw a sketch of the anemometer and describe how to use it to measure the actual wind speed.
8. Read a section from a nonfiction selection about the wind or anemometers and discuss. The Delta Science Reader *Weather Instruments* has a useful section titled “How Do We Measure the Wind?” (see additional resources)
9. Close the lesson by having the students return to their science notebooks and record any new understandings.

Lesson Seven: The Desert Climate

Note: This lesson needs to be repeated at the end of every month throughout the school year.

1. At the end of each month have the students summarize the weather data that was collected (temperature, wind and amount of precipitation) in their science notebooks.
2. Have the students share with their groups how they organized the data and allow time for discussion.
3. Close the lesson by asking the students to return to their science notebooks and record what they learned about the weather for that month.
4. Ask the students to share with a partner what they learned about the weather for that month. Collect science notebooks.

Extension:

1. At the end of the year divide the students into small groups and assign each group a month from the school year (Sept. –June).
2. Each group will be responsible for organizing; summarizing and presenting the weather data from the month assigned using their information from their science notebook.
3. Post the data in chronological order, by month, and have each group share.
4. Ask the students what conclusions they can make about the climate in the Mojave Desert based on the data they collected this year. Share out and discuss whole group.
5. Pass out science notebooks and ask the students to record what they have learned about the Mojave Desert climate in their science notebooks.

Vocabulary

Anemometer - instrument used to measure wind speed

Climate - the typical or average weather in a region

Environment - everything that surrounds and influences an organism

Environmental factor - one part of the environment, an environmental factor can be non-living, such as: water, light, temperature, or chemicals; or living, such as a plant or an animal

Meteorologist - a scientist who studies the weather

Rain gauge - instrument used to measure the amount of rain

Thermometer - a tool that is used to measure temperature

Additional resources

http://www.blueplanetbiomes.org/mojave_desert.htm

www.desertusa.com

www.floodsafety.com/media/video

Weather Instruments ISBN 1-59242-260-8 Delta Science Readers

Desert Seasons A Year in the Mojave Ruth K. A. Devlin, Stephens Media Group, PO Box 1600, Las Vegas, NV 89125-1600

Safety Reminder

Do not use mercury thermometers

Nevada State Science Standards

N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method. E/S

N5A2 Students know how to compare the results of their experiments to what scientists already know about the world. I/L

N5A3 Students know how to draw conclusions from scientific evidence. E/S

N5A4 Students know graphic representations of recorded data can be used to make predictions. E/S

N5A5 Students know how to plan and conduct a safe and simple investigation. E/S

N5B2 Students know technologies impact society, both positively and negatively. E/S

N5B3 Students know the benefits of working with a team and sharing findings. E/L

E5A4 Students know the role of water in many phenomena related to weather (e.g. thunderstorms, snowstorms, flooding and drought). E/S

E5A5 Students know air is a substance that surrounds us, takes up space, and moves around us as wind. E/S