Red Rock Canyon National Conservation Area
Environmental Education

Field Program
Ranger version
Water We Doing Here
Revised 1/10/01

This field program will take place primarily at the Red Spring picnic area. Students will need to be prepared for a bag lunch and a short ½ mile hike.

Grade: Four

Theme: Red Rock Canyon's topography creates a specialized water cycle that is important for providing clean water for the Las Vegas Valley.

Goal: Through demonstration of the water cycle and discussion of the importance of water quality, students will discover the complex, interdependent community of Red Rock Canyon.

Objectives: Students will be able to name and illustrate the water cycle.
Students will name two plants and two animals that live in or depend on Red Rock Canyon water cycle to survive.
Students will describe how Red Rock Canyon contributes to providing clean water to the Las Vegas water cycle.
Students will describe where the Las Vegas area gets its water.

Vocabulary: **Aquatic**- living or growing in water
Effluent- any mater that enters the environment from a specific source: the term generally refers to waste water from a sewage treatment or industrial plant.
pH - a measure that indicates the relative acidity or alkalinity of a substance
Precipitation - depositing moisture in the form of rain, snow, hail or dew.
Condensation - water moving from a gas or vapor to a solid state.
Evaporation- change from a liquid or solid into vapor.
Accumulation - a gradual collection of (water) or other liquids
Percolation- drain or filter through small holes or spaces
Transpiration- moisture moving from liquid to vapor through a barrier such as through leaves of a plant.

Background information: The water of Red Rock Canyon supports a complex, interdependent community that includes plants, animals, and early humans. Water plants like algae and pondweed support animals such as plankton, insects, crayfish and snails. These in turn support larger animals like toads, dragonflies, and Raccoons. What can live here and how well it can thrive is influenced by various factors that contribute to contribute to the ability of water to move through the water cycle. The quality of the water is also important since specialized forms of life found in the riparian areas cannot tolerate even small changes in their habitats.
Since humans are also a part of the community of live depending upon water, its quality and availability are important to us too. Moreover the changing uses of Red Rock Canyon to suit human needs and impacts on it have influenced the populations of native and non-native species that live in and around it.

Key points:

- There is a wide variety of life, both plant and animal that depend upon Red Rock Canyon.
- Some members of this community are very specialized and easily impacted by changes to the volume, temperature, pH and general availability of water.
- The springtail snail and several endemic plants presents an excellent case study of native species which have been impacted by human alterations to the natural system (e.g. development of trails and recreational sites, and by competition from introduced species e.g. horses, burros, and goldfish).
- Red Rock Canyon staff is studying ways to formulate efforts to save the snail and other riparian species.
- The students, their families, and their community depend upon water removed from underground aquifers as well as from Lake Mead. Much of this "ground water" comes from unseen sources and is recharged through areas such as Red Rock Canyon where high mountains create barriers for wind and therefore increased precipitation.
- This recharging can take up to 600 years and is a factor in providing clean drinking water.
- It is important to keep the "ground" clean and provide areas for water to seep back into the natural cycle so that we can have healthy, diverse ecosystems.

Materials:
Poster of Ground Water cycle
Map of Nevada with mountains highlighted (or raised relief Map of Nevada)
Photographs or specimens of various desert animals and plants
(optional photographs of before and after photos of Red Rock Area)
ground water model
two large buckets
60 plastic spoons
10 clear plastic cups
5 lbs of play sand

Activities:

Introduction to Red Rock Canyon (20 minutes total)

Ranger meets group and divides them into two equal sized groups (ideally no more than 30 per group)

Groups rotate between Friends Room for "Follow the Water Cycle" and a general introduction to the history of water in Red Rock Canyon and its influences. (10 minutes for each)

Introduction to Red Rock Canyon
The groups using the exhibit area should be given a brief introduction to why Red Rock Canyon is a National Conservation Area. The listen wand system may be used (in case of inclement weather). The "history of water" should include the geologic history, adaptations of animals and plants, and cultural history influences. The presenters may also use the raised relief model to show the various spring and creek sites and watersheds.

Follow the Water cycle (Friends Room)
Review water cycle using poster pointing out evaporation, condensation, precipitation, accumulation.

Where does Red Rock Canyon fit into this cycle?

United States Map and Map of Nevada (or raised relief map)
Discuss Rain Shadow effect of Mountains that creates desert.
Predict where rainfall will be greatest in Red Rock Canyon / Las Vegas (in front or behind mountains)
Once this rain falls on the mountains what happens to it?
Emphasize accumulation in the rock due to **Percolation**
What happens to the water next?

Red Springs Picnic Area
Give the students a chance to use the bathroom. One ranger may ride on the bus to Red Spring Picnic Area. Have the bus park outside the picnic area before the gates and have the students hike into the area from there. (Students with special needs may be taken to lower lot and half the group starts from there.

Tour of Red Spring (30 minutes)
The purpose of this activity is to use **observation** techniques and questioning strategies to have them find how water flows and percolate through rock and soils. In the Red Spring Area the different types of vegetation are good clues to the amounts of water in the area. Trees need greater amounts of water than desert shrubs, for example. They will also see an active spring.

Review water cycle and deposition.
Point out the Red Springs thrust fault.
Have the students look at the vegetation around the entrance into Red Spring Picnic Area.
Is it desert vegetation? How do these plants get their water? Identify several plants such as cactus, salt bush, and Indian Rice Grass (NV State Grass).

Walk along the trail that parallels Entrance Station Road looking for signs of water and wildlife.
At several points along trail have them look at trees and large shrubs visible. How much water do these plants need and where does it come from?

As they climb the hill to the east of the meadow ridge have them touch the ground to feel the wetness/coolness from the water seeping underground. Where does this water come from?

At the crest of the meadow ridge, have them observe the difference in plants you see looking east toward Calico Basin and into the Red Spring area. Does this (the meadow area) look like your school playground? Why is it grassy? How does this grass get its water?

Lets find evidence and source of water?

Walk to cultural site (petroglyphs). How was water important for the first settlers and Native Indians.
Why were people using this site? (water, planting crops) reiterate protecting nonrenewable rock art sites.

Using their senses of sight, smell, and hearing have them predict where the water is coming from. Take the group to the spring head “cave”. How did this water get here? Where is it going?

Walk to lower picnic area pointing out the moist soils and different vegetation in the meadow area.

Exploring Percolation

What do you notice about the amount of vegetation around the spring? More or less?
Why is this?

What happens to the water after it leaves the spring? **Evaporation**? **Percolation**? Absorption into plants?

Transpiration?

Have samples of limestone and sandstone with magnifying glasses for each student (or pair)
Have students observe the texture of each and predict which will absorb water more quickly. Using pippet drop water on each sample of Ranger's to see which absorbs water faster/slower. Using clear containers of sandstone rock = sandstone and gray play sand = limestone, pour water into each to demonstrate how quickly water percolate through each.

Have students predict what happens when Limestone is on top of sandstone and visa-versa .

The water cycle live activity! (15 minutes)

The purpose of this activity is to present a live representation of the water cycle and show the energy requirements necessary for the cycle to function. Areas of emphasis are evaporation, condensation, precipitation, and accumulation.

Students are divided into groups so there are no more than 30 students in any one group.

Materials needed:
2 large buckets
8 cups for each child (who is a "Cloud")
40 plastic spoons for every other kid in groups
2 "SUN" hats

This activity is best done on a fairly steep slope, incline, or set of stairs.

A bucket filled with sand at the base of the hill represents the Ocean or any large body of water. An empty bucket at the top of the hill represents a tiñaja or area of accumulation. All students except five, form a line from the bottom of the hill towards the top. Each student in this line represents the energy to move water through the cycle. The "Sun" student nearest the bottom bucket dips a spoon in the "water" and passes sand up the hill. "Clouds" are spaced along the line to represent the Coastal Range, the Sierra's, and the Spring Mountain Range. The clouds can move to the "**tiñaja**" to deposit water. Student teams are competing to see how much water they can accumulate. Inevitably water will be lost (precipitation). Water could be substituted especially in hotter weather.

After 10 minutes have groups get together to discuss what they have learned. What happens to water once it accumulates at the top? Where does it go? What would happen if people changed their oil here or other "pollutants."

Conclusion: (5 Minutes)

Discuss "Why is it important to have places like Red Rock Canyon?"
What happens if water cannot percolate through the soil or rocks?
What happens when the water percolates through pollutants?

Post -site activity: Make a poster or brochure to convince people how to keep Red Rock water clean. Please send us your best examples to display!