



Description: Students roleplay water molecules going through a water cycle.

Objective: Students will understand that:

- water cycles through the Earth and the atmosphere;
- the processes involved in the water cycle include: precipitation, evaporation, runoff, transpiration (transpire), respiration (respire), and condensation;
- in the semi-arid climate of New Mexico, low precipitation amounts limit the quantity of water available for plant, animal, and human use; and
- human users of limited water resources must consider all water users.

- Materials:**
1. two large buckets, one labeled “Ocean” and the other labeled “Aquifer.” Mark a fill line about 1” below the top of the aquifer bucket
 2. six bowls with different labels—one each for “River,” “Plants and Animals,” “Lake,” “Agriculture,” “Industry,” and “Residents”
 3. seven paper cups (eight to 12 ounces) to take water from aquifer for agriculture, industry, and residents
 4. 18 plastic spoons

29. Rio Grande Bosque Water Cycle



Grades: 3–8

Time: Material preparation: 20 minutes

Class activity: 20-30 minutes

Subjects: science, social studies

Terms: *precipitation, evaporation, runoff, transpiration, respiration, condensation, aquifer, reservoir, ground water*



5. four small (four ounces) paper cups labeled “Clouds”
6. water
7. cards, copied and cut out (from following pages). Laminate them, if possible, since they will be around water.

Feel free to use cups, spoons, etc., that can be reused. Try not to create lots of trash.

Procedure:

Preparation:

1. Label all buckets and bowls.

Note: On small cups (Clouds) mark a fill line at two-thirds of the cup capacity.

2. Copy and cut out game cards on the following pages.
3. Fill Ocean, Aquifer, Plants and Animals, River and Lake containers with water. Spread the containers around the room.
4. Place the Clouds (empty) together in another spot in room. Clouds should be as far as possible from the Ocean container because water moving from the ocean to form clouds in New Mexico must travel a long distance.
5. For Round 2, fill Agriculture, Industry and Residents bowls. During Round 2 these containers will also be placed around the room.

Doing the Activity: *Round 1—Rio Bravo*

1. Pass out game cards and appropriate equipment (spoons or cups). Have each student stand at the first station marked on the card. For example, the student with the “Cloud to River” card stands at the cloud station.
2. Explain the basic procedure. Students will move the water in the containers according to the directions on their card. For example, “River to Lake” moves one spoon of water from the River to the Lake, and returns to the River to take another spoon of water to the Lake. Each student/station continues the activity as directed on their card, if possible, for the time-period of the activity (see 4. below).

3. Announce the following special considerations.

Clouds cannot dump the water as their card directs until their cups have been filled to the fill line.

Players taking water from the Aquifer and moving to Plants and Animals may not take water if the water in the Aquifer falls below the marked line.

The Ocean should never be empty.



If a container is empty, players must wait for water to be added by the appropriate process before they take water from the container.

4. Allow five minutes for students to do their assigned task. Switch cards and repeat the process for five more minutes so students may participate in another part of the cycle.
5. Use the following questions to lead a discussion of the process.

Why do the clouds wait so long to dump their water?

Air in New Mexico is very dry. Clouds must gather a lot of moisture before they are able to rain.

Why are the cloud stations so far from the ocean station?

New Mexico is a long way from the nearest ocean. Moisture must travel a long distance before it can rain on New Mexico.

Is there enough water available for the plants and animals? Why is the water below the fill line in the aquifer bucket unavailable to plants and animals?

This water is too deep to be reached by plants or animals.

Is there enough water available for the river?

In an undisturbed system, the plants and animals have adaptations for survival with the amount of water available.

Where is the most water available for use?

In the aquifer. The ocean certainly has a lot of water, but it is not available for use by freshwater plants or animals in New Mexico.

The ocean is so far away, and it is saline/salty.

Where is the least water available for use?

In the clouds.

Round 2—Rio Manso

6. Add Agriculture, Industry, and Residents containers to the set-up. Pass out cards and equipment for Round 2.
7. Repeat the exercise as in Steps 3 and 4.
8. Use the following questions to lead a discussion on the process.

How was this water cycle round different from Round 1?

Was there enough water available for plants and animals?

Why?

Was there water in the river? Why?

What do you use water for in and around your home?

What does agriculture need water for?



How would you make changes to insure that everyone, including residents, agriculture, industry, plants, and animals, has enough water?

Where would pollutants enter into this system and where would they go? What would be affected by pollutants?

To the teacher: This is not a black-and-white easy-to-answer issue. There are many pieces to the problem and very good reasons for what each party wants to do with water. We encourage a discussion about the need for agriculture, industry and communities to use water. Who is allowed to use how much water has been an issue since the first people arrived in this area, with many fights between differing parties. We want students to be able to make responsible decisions about water use in the Southwest.

Extensions: Have students determine their daily water use and suggest what impacts they have on the New Mexico water cycle/water budget. See Project Learning Tree, "Every Drop Counts," or Project WILD, "Water's Going On?!"

Do an "imaginary field trip" through the water cycle. See Project WILD, "Stormy Weather," for general idea.

Related

Activities: Project Learning Tree, "Water Wonders."

Assessment:

1. Have students draw a diagram or a picture of the water cycle, from memory.
2. Have students write a story about a water molecule that travels through the water cycle in New Mexico.

Water Cycle Cards

Part 1: Rio Bravo



1.

Cloud to River

small cup



2.

**Cloud to Plants
and Animals**

small cup



3.

Cloud to Aquifer

small cup



4.

Cloud to Lake

small cup



5.

River Evaporates to Cloud

plastic spoon



6.

**Plants and Animals
Transpire and Respire
to Cloud**

plastic spoon





7.
**Lake Evaporates
to Cloud**

plastic spoon

rio
bravo
10

8.
**Lake Evaporates
to Cloud**

plastic spoon

rio
bravo
10

9.
**Ocean Evaporates
to Cloud**

plastic spoon

rio
bravo
10

10.
**Ocean Evaporates
to Cloud**

plastic spoon

rio
bravo
10

11.
**Aquifer to
Plants and Animals**

plastic spoon

rio
bravo
10

12.
River to Aquifer

plastic spoon

rio
bravo
10



13.

Aquifer to River

plastic spoon



14.

**River to Plants
and Animals**

plastic spoon



15.

River to Lake

plastic spoon



16.

River to Ocean

plastic spoon






Water Cycle Cards

Part 2: Rio Manso


17.
Aquifer to Agriculture

large cup




18.
Aquifer to Agriculture

large cup




19.
Aquifer to Industry

large cup




20.
Aquifer to Industry

large cup




21.
Aquifer to Residents

large cup



22.
Aquifer to Residents

large cup





23.

Evaporation from Agriculture

large cup



24.

Evaporation from Industry to Clouds

large cup



25.

Evaporation from Residents to Clouds

plastic spoon



26.

Agriculture Runoff to River

plastic spoon



27.

Industry Runoff to River

plastic spoon



28.

Residents Return to River

plastic spoon

