

## WATER IS LIFE: Build Your Own Hueco Tanks

Grade 6th

### Vocabulary

biotic  
abiotic  
pluton  
ecosystem  
population  
hueco  
dormant  
organism  
community  
rotifer

### Activity Overview

In this activity, students will understand that abiotic factors such as water are necessary to create a living environment. Animals use a variety of strategies to deal with harsh environmental conditions, including cryptobiosis.

### TEKS Alignment

**6.12 E** The student is expected to describe biotic and abiotic parts of an ecosystem in which organisms interact.

**6.12 F** The student will diagram the levels of organization within an ecosystem including organism, population, community and ecosystem.

### Materials

#### Per Group:

- 3 Clear containers (can be plastic water bottles, glass jars or three shallow bowls.)
- Dry dirt from an area where water naturally pools after a rainstorm such as a dry arroyo bed or riverbed
- Water (dechlorinated) if you are using tap water, let it sit out for a day before using it.
- Magnifying glass
- Camera
- White paper
- Masking tape (used to label the jars by group)

#### Per Student:

- El Paso Water Chronicle: Issue 1
- Build Your Own Hueco Tanks Procedures and Student Works sheets

### THE SCIENCE BEHIND IT: Cryptobiosis

**6.12 E Abiotic and Biotic Factors within Ecosystems:** An ecosystem is only successful when the living things within the ecosystem have everything that they need to survive, which includes both living things (biotic) and nonliving things (abiotic) within the environment. In earlier grades these were described as “basic needs”. Water is a key abiotic factor with all living things on Earth and in this particular unit, the animals and plant life have evolved adaptations to help them wait until this life saving factor is plentiful enough to flourish. In this activity



the smallest life (bacteria) feeds on the most basic abiotic factor (carbon).

**Cryptobiosis:** Survival in harsh environments is a never-ending battle for animals and plants that make their home in the Chihuahuan desert. One such adaptation is cryptobiosis. Cryptobiosis is a dormant state that some microscopic animals such as tardigrades, brine, fairy and tadpole shrimp and rotifers go into when it encounters an unfavorable environmental condition such as drought. During cryptobiosis the animal dehydrates itself to protect itself from the harsh conditions and will revive itself when exposed to water. This state can occur either during their egg stage or sometimes during their adult life, but always with the possibility that they will be revived with the coming of a desert rain. Cryptobiosis doesn't just happen with microscopic animals, the majority of plant seeds also are in a form of cryptobiosis and the desert plant named the "Resurrection Plant" can also dehydrate itself and bring itself back to life during harsh arid conditions.

Collecting the soil for this investigation should be done at the base of arroyos, dried riverbeds and other areas where ponding occurs. You will almost certainly collect specimens of microbial cryptobiosis in these areas. The animals that spring to life after a desert rain become food for the tadpoles of desert amphibians such as desert toads and tiger salamanders.

**6.12 F Levels of Organization:** Vocabulary such as organism (a single living thing), population (multiple living things of the same species) and community (living things within the ecosystem that interact together to survive) should be used throughout the lesson to ensure that at risk and second language learners are aware of the academic vocabulary.

**ENGAGE: El Paso Water Chronicles Issue 1:  
East El Paso Hueco Tanks State Park**

Students will read the El Paso Water Chronicle and discuss life in the huecos at the Hueco Tanks State Park.

**Answers to the Life in Huecos Wordsearch:**

**Across**

- 3. biotic
- 7. ecosystem
- 8. population

**Down**

- 1. rotifer
- 2. dormant
- 4. pluton
- 5. community
- 6. hueco
- 9. organism
- 10. abiotic

**EXPLORE: Build Your Own Hueco Tanks**

Students will need the “Build Your Own Hueco Tanks” Procedure Sheet.

**Whole class:** Students will read and discuss of the procedure that describes the setting for huecos to come to life after a desert rainstorm. Then proceed to follow the steps to build their own hueco models:

**Purpose:**

Understand that water is required to create a living environment. Models can be used to simulate natural environments. Animals use a variety of strategies to deal with harsh environmental conditions, including Cryptobiosis.

**Materials:**

- **Three clear containers** that can hold water and dirt. Any size will work. Just make sure that the sides are smooth. (If you are using glasses from your home, make sure you have your parent’s permission!)
- **Dry dirt from an area where water naturally pools after a rainstorm such as a dry arroyo bed or riverbed.** You can use the same type of dirt for all three containers, or you can try a different type of dirt in each one. You don’t need a lot, just enough to cover the bottom of your container with about 5-10 cm of the collected dirt. Not everyone can get dirt from an arroyo, so use whatever dirt you can find, such as dirt from a garden. (Try to remove any large objects such as pebbles or sticks that might be in the dirt.) If you cannot get to dirt from an outside source, students could even try dirt from a garden. (Note: Do not use dirt that is just on the surface. Dig down a little bit, maybe 20-30 cm below the surface. Organisms that are in a suspended state must burrow down a bit.
- **Water:** Rainwater is best for this experiment, but in El Paso we don’t get a lot of it. You can use tap water, but you should let the water sit uncovered for a day or more before using it. Tap water is treated with a variety of gases to keep it safe for human consumption, including chlorine. These gases that are quite harmless to us would probably kill any micro-organisms that they come in contact with. Letting the water sit allows the chlorine to evaporate. You will need enough water to cover the dirt to a depth of about 5cm. You can also treat tap water with a de-chlorinator.

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- Magnifying glass
  - Camera if you have one (Smartphone cameras are fine for this!)
  - White paper

#### **Procedure:**

1. Remove the top of the plastic bottle.
2. In each container place 5-10cm of dirt. If you are using the bowls, place enough to cover the bottom of each bowl.
3. Pour the water over the dirt until it covers the dirt at least 2cm deep from the surface.
4. Let the mixture settle.
5. Put aside out of direct sunlight, but in a warm environment.
6. If too much evaporation occurs before the animals have a chance to hatch, add more dechlorinated water to the model.

#### **Observations:**

Students will use the “Record Your Observations Worksheet” and “Investigation Questions”

1. After a day, use your magnifying glass to see if you can spot any signs of life. (You may wish to place the white paper behind the clear bottle if using a bottle or jar container so that you can better see the contents)
2. Observe your artificial “hueco” for a week or until the water evaporates. Is there change over time? Signs of life might include:
  - bubbles arising from the dirt
  - movement in the dirt
  - movement across the top of the dirt or in the water
3. Check daily for a week to see what happens inside your micro-ecosystem.
  - What do you see?
  - Are there signs of life? What are they?
  - Can you see living organisms in the water?
  - How are they swimming? In straight lines? Zig-zag motion?

### EXPLAIN: Researching Life in the Hueco

Students will research life forms that are found within the Hueco using the “Researching Life in the Hueco” worksheet. In this worksheet students will research the basic needs of the life in the Hueco. With this information they will be able to create a food web.

Possible answers to this worksheet include:

Animal Description (sketch)	Biotic Factors	Abiotic Factors
<b>Bacteria</b> 	<ul style="list-style-type: none"> <li>• Detritus: (decomposed animal and plant life)</li> </ul>	<ul style="list-style-type: none"> <li>• Oxygen</li> <li>• Nutrients such as: carbon, nitrogen, phosphorus or sulfur</li> <li>• Water</li> <li>• Temperature</li> </ul>
<b>Algae</b>	Carbon dioxide released from animals within the environment Nitrogen released from decomposers	Water Sunlight Carbon dioxide Nitrogen
<b>Rotifer</b>	Rotifers are omnivorous and eat anything that fits in their mouth: algae, detritus protozoa, bacteria	Water Oxygen
<b>Protozoa</b>	Protozoa eat bacteria and detritus	Water Oxygen (sometimes soil)
<b>Fairy Shrimp</b>	Fairy Shrimp eat protozoa, rotifers, algae, bacteria and detritus	Water Oxygen



**ELABORATE: Design a Hueco Food Web**

Using the “Researching Life in the Hueco” data, students will create a Hueco Food Web. Possible Food Web Answer:

**Design a Hueco Food Web**

Lizards and birds will feast on tadpole and fairy shrimp in huecos. Using your hueco environment research, design a food web that includes the community of the environment. Include the sketches that you made into the food web design.

