



Build your own Hueco Tanks Model

Think about how fast the hueco environment cycle has to happen in the desert:

- A passing rainstorm leaves some water in a small hueco.
- Bacteria and other microscopic organisms have to come out of their dormant state. This state is known to biologists as “Cryptobiosis” when an organism can go into a state of suspended animation when it encounters an unfavorable environmental condition, like drought.
- The dormant fairy and tadpole shrimp have to come out of their dormant state and start their life cycle, which includes looking for food and to reproduce. They eat the bacteria and algae that are also growing.
- The shrimp grow large enough to be seen by passing animals looking for lunch such as birds and lizards.
- If they can survive not being eaten, they reproduce and when the hueco dries up, the offspring go into their own state of cryptobiosis until the next rainstorm.

Park rangers and scientists strongly discourage anyone from touching inside these little depressions during dry times (or anytime for that matter), for fear of disturbing the dormant eggs laying inside. But you can make your own “Hueco Tanks” at home using some simple materials that you probably have around the house, and a few things that you gather from outside.

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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:

- 3 clear containers (can be plastic water bottles, glass jars, or three shallow bowls). 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 a depth of 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**
Rain water is the best for the 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. Water is treated with chlorine so it is safe for human consumption but may kill microorganisms, letting the water sit allows the chlorine to evaporate. You can also treat tap water with a de-chlorinator.
- **Magnifying glass**
- **Camera if you have one (Smartphone cameras are fine for this!)**
- **White paper**

Procedure:

1. Remove the top of the wide brim clear container
2. In each container place 5-10 cm 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 2 cm 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:

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 container if using a bottle or jar container so that you can better see the contents).*
2. Observe your artificial "Hueco Tanks Model" 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 Hueco Tanks Model
Record your observations:
 - 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

Results:

- Can you see different types of organisms? Describe them.
- Do you see shrimp, or do you see some other kind of organism?

Extensions:

There are many variables that can be manipulated in this experiment.

- What happens when you change the type of dirt, the amount of water, or the color of the container? Will it make a difference in your results?
- Does the depth from where the dirt was removed make a difference?
- Assuming that the water does not evaporate, how long will your ecosystem stay alive?

Record your observations

Use the data table below to record your observations.

Day	Observation: Appearance of water	Appearance of static factors within the environment	Abiotic factors within the environment	Inferences you can make about biotic and abiotic factors
1	Water is cloudy and is still settling	No living organisms evident	Water, dirt	Eggs may not have hatched yet
2				
3				
4				
5				
6				
7				
8				

Investigation Questions

1. What organism appeared first? Why do you think that was the case?
2. How could you identify the organisms in your water? Ask yourself a series of questions that have yes or no answers to identify the organisms. For instance, you might ask if the organism:
 - Can be seen without a magnifying glass
 - Is it translucent or opaque
 - Does it swim in a straight line or in a zig-zag motion
 - Does it bury itself in the dirt or stay in the water at all times
3. What order did organisms appear in your "Hueco Tanks Model"? What appeared first?
4. What happened as the water began to evaporate?
5. What were some signs that there were living organisms in the "hueco"?
6. Draw the life cycle inside of a hueco at Hueco Tanks State Park based on what you have learned.