Water Conservation

Data Jam

DESCRIPTION

Students work together to solve and open a breakout box, which represents a water issue affecting a community. Students play the roles of various stakeholders with specific water needs and complete an activity to open a lock on the breakout box. The information learned by each stakeholder group is then reported to the whole class during a newscast-style session.

GRADE LEVEL
6-12

OBJECTIVES

Students will:

- Understand the importance of community collaboration in tackling water issues and implementing conservation strategies

TIME
30 MINUTES

MATERIALS

- Copies of Stakeholder Breakout Box handouts [1 set for every 6 students]
- Copies of H_2O News handout [1 per student]
- PowerPoint presentation
- Computer and projector for educator
- Stakeholder Scenario Pages, printed double sided, marked with invisible ink pen (as explained in Preparation section), laminated for durability if desired [1 class set]
- Set of Pecan Farmer Scenario Cards, printed double sided (long-edge left), cut on lines, marked with invisible ink pen (as explained in Preparation section), laminated for durability if desired [1 class set]
- Set of Reporter handouts, cut in half, laminated if possible [if laminated: 1 set to reuse with every class; if not laminated: 1 set for each class]
  - If Reporter handouts are laminated, one set of 7 thin wet-erase markers are also needed
- News Anchor handout, copied double sided, laminated if possible [if laminated: 1 to reuse with every class; if not laminated: 1 for each class]
- 12" toolbox with top tray (Figure 1), such as the one found at this link
- Lock-out hasp (Figure 2), such as the one found at this link
- Black 4-digit, set-your-own combination lock (Figure 2), such as the one found at this link
- Blue 4-digit, set-your-own combination lock (Figure 2), such as the one found at this link
- Pink 4-digit, set-your-own combination lock (Figure 2), such as the one found at this link
- 3-digit, set-your-own combination lock (Figure 2), such as the one found at this link
- 4-letter word, set-your-own combination lock (Figure 2), such as the one found at this link
- Directional set-your-own combination lock (Figure 2), such as the one found at this link
- Two black lights (Figure 3), such as the one found at this link
- Invisible ink, black-light pen (Figure 3), such as the one found at this link
- Prizes for entire class [1 set per class]
  - These can include stickers for water bottles (Figure 4), collapsible water bottles, water bottle holders, wrapped snacks, or any other small prize.



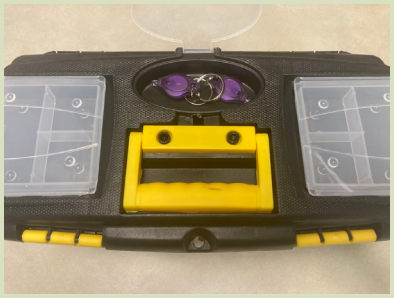

Figure 1. 12" toolbox with top tray to be used as the breakout box

Figure 2. Lock hasp and locks

Figure 3. Invisible ink pen and lights

Figure 4. Example breakout box prizes

PREPARATION

1. Set up a computer and projector and display the PowerPoint presentation.
2. Use the instructions included with the locks to set them up with the following combinations.
   - o Black 4-digit combination lock: 2 6 4 2
   - o Blue 4-digit combination lock: 3 0 2 2
   - o Pink 4-digit combination lock: 2 5 9 1
   - o 3-digit combination lock: 2 2 4
   - o Word lock: B E E S
   - o Directional lock: ⇦ ⇦ ⇧ ⇧
3. Cut the Pecan Farmer Scenario Cards on the lines. Draw the arrows indicated below on the back of each of the listed cards with the invisible ink, black-light pen, and then laminate for durability if desired.
   - o Growers should know the soil type = ⇦
   - o The first watering of the year is very important = ⇦
   - o The age of the pecan tree affects its water needs = ⇧
   - o High summer temperatures equal a high water demand for pecans = ⇧
4. On side two of the Landscape Designer Stakeholder Scenario Page (Figure 5), use the invisible ink, black-light pen to write the following letters in invisible ink in the Water Use column of the Tree and Shrub Guide table for the indicated species. See the answer key for clarification if needed.
   a. *Prosopis velutina*, velvet mesquite, in the Water Use column, below the word "low," write "E" (which is the student's answer for #2).

TREE AND SHRUB GUIDE

SCIENTIFIC NAME	COMMON NAME	COLOR	PLANT TYPE	WATER REQUIREMENTS	VISITED BY OR HOSTS POLLINATORS
Rosa ausmus	*rose bush*	purple, red, white, yellow, or pink flowers	shrub	high K	butterflies
Populus deltoides	*eastern cottonwood*	green leaves	tree	high E	bees and flies
Prosopis velutina	*velvet mesquite*	greenish-yellow leaves	tree	low E	bees, flies, and butterflies
Salix babylonica	*weeping willow*	leaves are green and whitish on underside	tree	high Y	bees and butterflies
Buddleja buddleja	*butterfly bush*	green, purple, white, orange, or pink flowers	shrub	medium T	bees, hummingbirds, and flies
Chilopsis linearis	*desert willow*	whitish tinged with purple flowers	tree	low B	bees, butterflies, and hummingbirds
Leucophyllum frutescens	*Texas barometer bush*	purple flowers	shrub	low E	bees and hummingbirds
Yucca torreyi	*Torrey's yucca*	white to cream flowers	yucca	low R	yucca moths
Cylindropuntia imbricata	*tree cholla*	magenta flowers	cactus	low A	cactus bees
Purshia mexicana	*Mexican cliffrose*	yellowish-white flowers	shrub	low S	bees and flies

Figure 5. Back side of Landscape Designer Stakeholder Scenario Page - all letters should be in INVISIBLE INK

   b. *Chilopsis linearis*, desert willow, in the Water Use column, below the word "low," write "B" (which is the student's answer for #1).
   c. *Leucophyllum frutescens*, Texas barometer bush, in the Water Use column, below the word "low," write "E" (which is the student's answer for #3).
   d. *Purshia mexicana*, Mexican cliffrose, in the Water Use column, below the word "low," write "S" (which is the student's answer for #4).
   e. For all of the other species, write the letters T, R, and A in the Water Use column, below the word "low" and "medium". Then write the letters K, E, and Y in the Water Use column, below the word "high."
5. Laminate the Stakeholder Scenario Pages for durability if desired.
6. Cut the Reporter handouts in half. Laminate for reuse if possible.
7. Assemble the breakout box.
   a. The locking loop on the toolbox may need to be expanded to fit the hasp. This can be done with a 5/16-inch drill bit.
   b. Place the prizes inside the breakout box.
   c. Hook the hasp through both parts of the locking loop on the front of the toolbox.
   d. Add the locks to the lockout hasp (Figure 6). The locks can be placed on the hasp in any order.

Figure 6. Locks on the hasp

8. Place the breakout box in a visible location to generate student interest.
   a. Make sure the breakout box is easily accessible because one student from each group will be attempting to open one of the locks.
   b. During the activity, plan to station an instructor near the breakout box to assist with the locks.
9. Plan to assign students to one of the following stakeholder groups. It is best if there are at least two people in each of the six stakeholder groups. Consider the difficulty level listed below when assigning students to groups.
   a. Landscape Designer – easy
   b. Pecan Farmer – easy
   c. Wildlife Biologist – medium
   d. Community Member – medium
   e. NM Environment Department – difficult
   f. Homeowner - difficult
   g. News Reporter, one student per stakeholder group – easy
      i. Each stakeholder group will need one student to act as the news reporter for their group. The news reporter must be capable of working with their stakeholder group and also completing the corresponding reporter handout simultaneously. Each reporter will deliver the information collected on the reporter handout during the H_2O News newscast session of the class period.
   h. News Anchor, one student per class – easy
      i. The news anchor (one student per class) will also be part of one of the stakeholder groups. The news anchor must visit each of the other stakeholder groups and record the name of the student acting as reporter in each of the groups. The news anchor will coordinate and lead the delivery of the information collected on the Reporter handouts during the H_2O News newscast session the end of the class period. The stakeholder group that has the news anchor will have two students participating in the newscast: the news anchor and a reporter.
10. Organize the Stakeholder Breakout Box handouts and Stakeholder Scenario Pages.
    a. Sort the Stakeholder Breakout Box handouts by stakeholder group and be prepared to pass them out to each of the six groups during class. The number of copies needed per group will vary, depending on how many students will be assigned to each of the six stakeholder groups.
    b. Place the corresponding Stakeholder Scenario Page with each of the stacks of Stakeholder Breakout Box handouts.
11. Plan to pass out a H_2O News handout to each student just before the H_2O News newscast session near the end of class.

PROCEDURES

Breakout Box Introduction

1. Play the slideshow in PowerPoint, and select "use timings" in the slideshow settings.
2. **Slide 1**: we will be unlocking a breakout box with prizes for everyone inside. This breakout box requires that you work together and think critically to solve water conservation issues. Your success with opening the box will depend a great deal on collaboration, critical thinking, and communication. Similarly, your success with the Water Conservation Data Jam project is dependent on collaboration, creativity, critical thinking, and communication.
3. **Slide 2**: everyone in your stakeholder group will work together to solve your assigned tasks. You can divide the work, work together, or volunteer for different tasks. Work quickly and

be aware of time because time is limited.

4. **Slide 3**: there are six stakeholder groups, one for each lock on the breakout box.
5. Divide students into six stakeholder groups. Pass out the sorted Stakeholder Breakout Box handouts and Stakeholder Scenario Pages to the corresponding groups.
6. **Slide 4**: one member of each group will also be a reporter who will collect the information from her/his stakeholder group and report it during the Daily H_2O News newscast at the end of class. Additionally, there will be one news anchor to coordinate and lead the delivery of the information collected during the H_2O News newscast. Reporters and the news anchor should be prepared for public speaking and must be able complete their group work in addition to an extra, simple handout.
7. Assign or ask for volunteers to play the role of six reporters and one news anchor.
   a. One reporter is needed from each stakeholder group.
   b. All news reporters and the anchor will work with a stakeholder group to collect the information on their handout to report on the news.
   c. Plan to also appoint one student as news anchor within one of the stakeholder groups. This stakeholder group will have two students take part in the newscast session at the end.
8. Pass out the Reporter handouts to the reporters in each group, being sure to give them the handout that corresponds to their stakeholder group, and pass out the News Anchor handout to the news anchor.
9. **Slide 5**: each group has a different Stakeholder Breakout Box handout. Everyone in your group, including the reporter and anchor, if applicable, should have the same handout. Your group also has one Stakeholder Scenario Page. It contains all of the clues you will need to solve the questions on your Stakeholder Breakout Box handout and figure out the combination for your team's lock. The reporter in your group will use the Reporter handout to record the information needed for delivering their report during the newscast session at the end of the class.
10. **Slide 6**: make sure to work together to answer the questions on your handouts so you can open your lock for the breakout box. You will determine the combination for your team's lock by answering the questions. Have your answer checked before attempting to open the lock for your team. Ask for help if you need it.

Solving the Breakout Box

1. ***Slide 7***: you have will 20 minutes to complete the breakout box challenge and open the box. Once you believe that you are ready to try to open your lock, try it on the lock. If it does not work, check your worksheet and try again. Ask for help if you need it.
   a. Your 20 minutes will begin when the raindrops appear. [Click to make raindrops appear on the screen.] Each raindrop will disappear after four minutes. When all of the raindrops disappear, time will be up.
2. While students are completing their Stakeholder Breakout Box handouts:
   a. Visit all groups regularly to check for understanding and clarify instructions as needed.
   b. Ensure that the reporter in each group is completing the Reporter handout.
   c. Ensure that the news anchor is visiting the other groups to record the names of each of the reporters on the News Anchor handout.
3. Check each stakeholder group's answers using the Stakeholder Breakout Box handouts answer key if student groups are unable to open their lock on a second attempt.
4. Allow one student from each group to attempt to open their lock.
5. End the activity after 20 minutes.
6. Once the last lock is off, do not allow the students to open the breakout box. Leave the hasp attached to the box.

H_2O News

1. Once the locks are off, the news anchor and news reporters will present their reports.
2. Pass out the H_2O News handout to each student.
3. Direct the news anchor and reporters to come to the front of the classroom to conduct the newscast session. The news anchor will lead the session from their handout.
4. **Slides 8-14**: the news anchor and reporter from each group will now come up to the front of the class. Bring your News Anchor and Reporter handouts. As they deliver the newscast, everyone in class will fill out the H_2O News handout with the information from the reports. The news anchor will now begin.
   a. **Slide 9**: after the anchor delivers the introduction, the reporter from the New Mexico Environment Department will present their report. [For Slides 9-14, click to make the answers appear one at a time as the reporter reveals them.]
   b. **Slide 10**: the reporter from the pecan farmer group will present their report.
   c. **Slide 11**: the reporter from the homeowner group will present their report.
   d. **Slide 12**: the reporter from the landscape designer group will present their report.
   e. **Slide 13**: the reporter from the community member group will present their report.
   f. **Slide 14**: the reporter from the wildlife biologist group will present their report.
5. **Slide 15**: now that we have heard the news report, the news anchor

will open the breakout box to reveal and pass out the prizes inside the box.

a. This collaboration was a type of cooperative learning.
b. This activity illustrated that as your groups worked together to learn or solve a problem, the whole class worked toward a bigger solution.
c. The small groups were essential to this process because they showed us how smaller groups are necessary to solve the bigger issue of water conservation.