THE UNIVERSITY OF ARIZONA
COLLEGE OF SOCIAL & BEHAVIORAL SCIENCES
Center for Middle Eastern Studies

Fulbright-Hays
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Water Resource Management

Unit Overview	
Grade/Subject	Grades 3-5, Language Arts
Introduction	
For students in water rich environments water insecurity and scarcity can be difficult to comprehend. This set of lessons is aimed at helping students understand these concepts by connecting to their prior knowledge of their environment. Students will also engage in a mathematical task to grapple with personal water consumption. Finally, students will think about the implications of their own actions on water resource management.	
Possible Mentor Texts	
Lindstrom, Carole. (2020). *We are water protectors*. Roaring Brook Press. Minoglio, Andrea. (2021). *Our world out of balance*. Blue Dot Kid Press.	
Pacing	
Timing	Lesson Title
15-30 minute class session	See, Think, Wonder: Wetlands
One 30-45 minute class session at the beginning, One 30-45 minute class session at the end *one week for data collection*	3-Act Math: Water Consumption
30-45 minute class session	Water Resource Management

Lesson One: **See, Think, Wonder: Wetlands**

Standard(s):
CCSS.ELA-LITERACY.RL.3.7 Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story (e.g., create mood, emphasize aspects of a character or setting)
CCSS.ELA-LITERACY.SL.3-5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grades 3-5 topics and texts*, building on others' ideas and expressing their own clearly.
CCSS.ELA-LITERACY.RL.5.7 Analyze how visual and multimedia elements contribute to the meaning, tone, or beauty of a text (e.g., graphic novel, multimedia presentation of fiction, folktale, myth, poem).
CCSS.ELA-LITERACY.SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
CCSS.ELA-LITERACY.SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
CCSS.ELA-LITERACY.SL.4.1.D Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
CCSS.ELA-LITERACY.SL.5.1.D Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

Materials:
See, Think, Wonder Graphic Organizer (Lingít Version, Arabic Version)

Vocabulary:
wetland
reserve

Set-up/Prep:
Copy See, Think, Wonder Graphic Organizers for each student

Essential Question:
What are wetlands? Why are they important?

Lesson Plan:

1. Gather students in a circle around chart paper
2. Students will use what they know about wetlands to understand water scarcity and the importance of conservation efforts. Begin this lesson by brainstorming what students know about wetlands. Guide students to think about field trips or family visits to the wetlands. Chart their responses.
3. Show the video clip of the Azraq wetlands (LINK).
    - First viewing: students just watch and observe.
    - Second viewing: guide students in closely looking at the video, and have them complete the first section of the See, Think, Wonder Graphic Organizer.

      Potential script:
      Although the first column says 'see,' use all of your senses to help you describe what you notice. Where are your eyes drawn? What sounds do you hear? Are there colors, textures, or objects that catch your eye? Be specific. Note how many and what kind of each object you see. We will be watching this clip again, so really take this opportunity to observe and closely look.

    - Third+ viewing: show students the video again as needed to complete their thinking routine. In these viewings, students focus on what they think and wonder. Remind

students to root everything they think or wonder in observation.

If students have not noticed, point out at the end of the video the water seems to be coming from one source, a water pipe. Draw students' attention to this water source.

4. Use the Think-Pair-Share protocol for students to partner and share their thinking
5. Explain that the video we watched was from the Azraq Wetland Reserve in the country of Jordan. Jordan is a country in the Middle East that has very few water resources. In the middle of the northern desert there is a wetlands reserve. Use this video to learn a bit about the Azraq Wildlife Reserve (LINK).
6. Again have students Think-Pair-Share to discuss what they heard in the video clip, particularly anything that surprises them.
7. As an exit ticket, have students respond to the following journal prompt.

   Often judgments are made at first glance. What was the first impression you had about this video clip? How did your judgment change after multiple viewings, and watching the video about the Azraq Wetlands Reserve?

Extension Opportunities:

- Field trip to the wetlands
- Connect to science research project about wetlands around the globe
- Provide for students to

Additional Resources:

- Azarq Wetlands
- World wetlands

Lesson Two:
3-Act Math: Water Consumption

Standard(s):
CCSS.ELA-LITERACY.SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
CCSS.ELA-LITERACY.SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
CCSS.ELA-LITERACY.SL.4.1.D Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
CCSS.MATH.CONTENT.3.MD.A.2
Measure and estimate liquid volumes and masses of objects using standard units. Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.
CCSS.MATH.CONTENT.4.MD.A.2
Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

Materials:	**Vocabulary:**

3-Act Math Sheet (Lingít Version, Arabic Version) Water Usage Evidence OPTIONAL: Large bucket or small swimming pool	scarcity consumption

Set-up/Prep:
Copies of 3-Act Math Sheet for each student

Prepare materials for students to collect their data (may vary depending on what they ask for)

Essential Question:
How much water do I use everyday?

Lesson Plan:
This lesson is based on a 3-Act Math model. In Act 1, students will be introduced to an engaging real world problem aimed at inspiring students' curiosity about water scarcity in Jordan. Students will also be asked an open-ended math question based on the video. In Act 2, students will think about what information and tools they need to answer the math question posed in Act 1. After planning and asking for what they need, students complete the mathematical task. In Act 3, students receive the "real-world" answer, and compare their result. Finally, they reflect on their thinking.

SESSION 1

ACT 1

1. Show *Is Jordan running out of water?* (LINK). As students watch the clip have them jot their thinking on the mini-See, Think, Wonder organizer in Part 1 of the handout. Students will only watch the clip once, so encourage them to fill-in all three sections as they view the recording.
2. Facilitate a short discussion about what students observed and thought about the video. Ask them to reflect on the math they saw in the video. Have each student think of a math question inspired by the video and write it down on the Math Question box. Quickly have students share their math question with a shoulder partner.
3. Share the following math question with students:
   How much water do I use each day?
4. Ask students to make an estimate for their water consumption in gallons. Guide their thinking by asking them to first make an estimate that they know is too high, one that is too low, and then a "just right" estimate.
5. Use Think-Pair-Share protocol for students to partner and share thinking behind their estimates.

ACT 2

6. Give students their challenge.

   In Southeast Alaska water is everywhere. Life in a rainforest makes water scarcity in other parts of the world seem very far away. However, even in a place with an abundance of water

it is our responsibility to maintain balance, wooch yáx, by caring for our resources and not taking more than we need. This week, we will determine how much water, on average, we consume each day.

In act 2 of our math challenge, what information do you need to figure out how much water you use in a day? What tools do you need to get this information?

7. Allow students to work in partners or small groups to discuss what information they need to solve this problem, and record their thinking in the first box. Even though students are working in a group, each student should record their own response. These conversations encourage students to think about ALL the many ways we use water, doing dishes, laundry, flushing toilets, in addition to drinking water. If students are struggling, brainstorm ways we use water as a large group.
8. After they know what information they need, have students move to the second box to record the tools and strategies they will employ to get the information and solve their challenge.

   Throughout act 2 use questioning to guide and support students without providing them a clear path forward.
   - *What are you thinking so far?*
   - *What do you need to know?*
   - *What makes you say that?*
   - *Have you thought about____?*
   - *Talk to me through your reasoning.*
   - *Tell me more about _____.*

   Students will need a way of determining and tracking how much water they use each day. They will have many ideas for doing this. Encourage students to be as creative as possible, and provide the tools they need within reason. If students are proposing things that are outside of the scope of our project, guide them to solutions that are feasible. If they have not already, ask students how they will organize their data as they collect it over the week.
9. Check-in with each group to hear their plan for figuring out their water consumption.

There will be a few days of data collection in between sessions

<u>SESSION 2</u>

10. Once students have their data, they are ready to complete their mathematical task. Every student will have different data, but they can work in groups to determine their daily water consumption, and take an average for the week.
11. Gather the class and have students share their findings. Consider graphing or visually representing this data in some way for students to see how water consumption varies from person to person.
12. Have students reflect on how close their personal water consumption estimates compare to how much they use in real life. Allow students some time to reflect with each other.

ACT 3

13. Share with students that the average American uses 82 gallons of water each day according to the EPA, while the average Jordanian uses about 40 gallons of water each day.
14. In their groups, students discuss their consumption in comparison to the average American and Jordanian.

    Potential questions:
    Does that number surprise you? Why?
    How does this number compare to your initial estimate?
    What do you notice about the average water usage by country?

15. After their discussion, students should complete Part 3 of their organizer, and post a reflection on a shared padlet.

Extension Opportunities:
- Field trip to the hydroelectric dam that provides Juneau with water, or a similar facility
- Physically collect water throughout the day in a bucket of pool to visually demonstrate water usage
- Look at water usage by individuals in countries around the world

Additional Resources:
SFUSD 3-Act Math Resource
Dan Meyer's TED Talk
EPA Water Statistics
Water Resources Website
EPA WaterSense

Lesson Three:
Water Resource Management

Standard(s):
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Materials:	**Vocabulary:**
Water delivery images	scarcity

Poster paper Markers	water resource management

Set-up/Prep:
None

Essential Question:
What can you do about water scarcity?

Lesson Plan:

1. View the Umm Jimal water system video
2. Explain that the process of planning, developing, distributing, and managing the use of water resources is called Water Resource Management. One example of water resource management in Juneau is the series of dams we use to generate our electricity. If water resources are mismanaged it can cause water to run out leaving people without access to clean drinking water.
3. Review what students learned over the last week about water scarcity. Highlight the impact on the Azraq wetlands of water mismanagement, and the amount of water the average American consumes in comparison to the average Jordanian.
4. Explain to students that Jordan is one of the most water insecure countries in the world. Unlike Juneau, much of its water comes from nonrenewable sources or sources that are not replenishing at the same rate water is being used, meaning eventually all of the water will be used up.
5. Project the images of water trucks and tanks. Currently most Jordanians receive their water by delivery each week. The trucks pump water into large tanks. If the water in the tank runs out before the next delivery families either go without or must get water from a private company which can be 5 times as much as the public water company.
6. Make groups of 3-4 students. Have students use the *What? So What? Now What?* protocol to discuss what they have learned about water scarcity and water resource management around the world.

   What? Describe what water scarcity and water resource management are.
   So What? Explain why water scarcity and water resource management are important.
   Now What? Identify actions and create a plan to address issues of water scarcity and water resource mismanagement.

7. Have groups create a visual that captures that makes their thinking visible.
8. Groups will present their thinking to the class.

Extension Opportunities:

- Ask an expert to come in a discuss water resource management
- Research local water resources and how they are used

Additional Resources:
Water Resource Management Website
PBS Water Resources