



Post-festival Lesson 6.1 Water Web Lesson Plan

Investigative Question:

- How do I use water both directly and indirectly?
- What are the water sources and who are the water users in my community?

Summary: Students define direct and indirect water use and explore how they use water in their daily lives. Students explore local industries in Arizona to see how they use water. Then students model a “water web” to illustrate their dependence on water and the interdependence among water users, producers and people in the community.

Reference: adapted from “Arizona Water Web” Part 1, *Arizona Conserve Water Educator’s Guide*, 2007, pg. 190-206 and “Virtual Water”, Project WET Curriculum and Activity Guide 2.0, 2011, pg. 289-296.

Time Frame: 50 minutes

Cross Cutting Concepts Demonstrated:

- cause and effect
- systems and system models
- stability and change
- scale, proportion, and quantity

Science and Engineering Practices Integrated:

- develop and use models
- construct explanations and design solutions

Materials Needed:

- [Direct and Indirect Water Use worksheet](#)
- [Arizona Water Resources and Users](#)
- Copy of [Water Users Cards](#) (enough for each group)
- 2 – one-gallon empty milk jugs filled with water – label one “groundwater” and one “surface water” tied together with yarn.
- 1 ball of yarn
- Enough Dixie cups for one per student

PowerPoint Slides: [AWF Unit Slides Lesson 6](#)

Warm Up:

Use the slides above to introduce this lesson. Discuss with students: **Direct and indirect water usage, what do you use water for?** Have students quickly brainstorm a list of how they use water at home. Explain that these are direct uses of water. Then ask: **What do you think is meant by the phrase: indirect use of water?**



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If students do not know, ask them if they think water is used to make the food they eat or tools they use. Explain that producing things requires a lot of water. Water is used when manufacturing products and growing things (two examples of indirect water). For instance, a 2 oz. serving of pasta takes 36 gallons of water to produce the ingredients and make the pasta. Have students name other indirect water uses or users they can think of.

Lesson Sequence:



Investigation:

Give each student a copy of the [Direct and Indirect Water Use Worksheet](#). Using the information they discussed in the warmup, have **students fill out Tables 1 and 2**. (If students are not able to use the form, they can write answers in their notebooks.) Then students will **read about some industries in Arizona** and how they use water directly and indirectly. After, students should **fill out Table 3 using that information**. Have students discuss as a class what they learned about indirect water use in Arizona and how communities might reduce their water usage overall.



Activity – full-body simulation:

In **table groups**, students will look at what happens when everyone in the community shares a common water source and think about ways water usage can be reduced to meet the water supply.

- 1) Summarize what students know so far about indirect water users in Arizona. **Who are the indirect water users in Arizona that they have learned about in this lesson so far? Divide Students into 8 groups and each group will get one of the [water user cards](#).**
- 2) **What are our water sources in Arizona?** Each group of students should **identify their local water sources** and discuss where their user might be in the state (multiple places possibly). They can use the [AZ Water Sources](#) by Festival document if they don't know.
 - a) While students discuss in their groups, you should clear an area in the middle of the room and place the two milk jugs on a desk or chair. Make sure they are labeled ground water and surface water and draw a line of where the water level is currently on each, so it is visible to all students. Also pass out one dixie cup to each student.
- 3) Have a **volunteer from one of the groups read the description of the water user** they represent. Also have students explain if as that user they most likely use surface water or groundwater, or both. Then **connect the ball of yarn from that group of students and loop it through one of the handles on the jug and then back to their group**. The yarn indicates that this water user consumed water.
 - a) After the student is done reading the card, also **have each student in that group come up and fill their Dixie cup with water from one of the jugs**.



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- 4) **Ask students in other groups to raise their hand if they use the goods or services offered by that group** (this can be repeated after each time a new group reads a card so students can see all the connections). Have students consider how they depend on products and services supplied by others. Example a car manufacturer is dependent on the power plant, the steel plant and the water used to create it.
- 5) Tell the students with the yarn to **pass the ball to a student in a different group and have them read the description of the water user they represent**. Have them explain if as that user they most likely use surface water or groundwater, or both. Then **connect the ball of yarn from that group** of students to the jugs again and each student in this group **now also fills up their Pixie cup**.
- 6) Repeat the process for all water user groups **until each group is connected to a jug and each student has a Dixie cup full of water**.
- 7) Look at the **level of the water now in the jugs...** has it gone down? Why? Have the students gently pull on their yarn. Students should feel these tugs and see that the water supply becomes unstable. **What do these tugs represent in the real world?** The water use of one water user affects all the other water users.
- 8) Discuss: **What would happen to the water in the jugs if each student had had two dixie cups to fill instead of one?** The level of water in both jugs would be lower or might run out. **What would happen if some water users had more dixie cups than other users? Do all users use the same amount of water?** When others use more, then there is less for others.
- 9) **What will need to happen to make the water level go up again?** More water will need to come into the water supply. **Ask students, what is another way we can keep the water supply up?** We can each use less water.

Wrap-Up:

Discuss as a class:

- 1) Have each group of students think of **one way they can reduce their water usage in their production process or service**. Then as that group shares their water reduction strategy, each student in the group should **pour half the water back from their Dixie cup into their water supply**. Repeat this until each group gets to go again.
- 2) **What does reducing the amount of water they use do for the amount of water available?** It increased the available water. **What does this mean for the availability of water for the whole community?** There is more for everyone.
- 3) **If there are water shortages, what are some solutions for coping with the problem without causing hardships for a community or water users?** Students should think of other ways their community can decrease water usage and save water.