Water Conservation, 6th Grade
"WATER CONSERVATION AND YOU"
10 Lesson Plans

Synopsis:

In this unit, students first identify the problems associated with societies and their environments in relationship to our limited water supply. They learn that as water resources become smaller per capita, that there are effects to themselves and to the natural world. Then, students learn about the different ways in which plants and some animals conserve water and realize that doing so is a necessity of all living things. Once students see this, they look back at their own habits and identify and analyze the ways in which households are wasting or conserving water and how they can be more efficient. Finally, students learn about how the distribution of water becomes more and more based on priorities of what is needed in a community. In so doing, students then conclude and summarize about the ways in which water conservation is important in their lives, in their community and for the natural world.

Structure:

Lessons are designed to be implemented in ten, 60 minute lessons. Each lesson, unless noted in the lesson plan, is 10-15 minutes in which the teacher "launches" a set of background knowledge, teaches into the experiment and asks the children a key question to drive inquiry. Students then work for roughly 40 minutes to "explore" that key question by doing, noting/recording and discussing their findings in order to interpret a larger discovery each day. When the explore period concludes, students are given roughly a 10 minute "summary" period. This is facilitated by the teacher, using ELL strategies in order to help the students tie back to a larger concept and summarize the key findings.

Unit Objectives:

Core Ideas

Students will learn that humans have significantly altered the environment and that the amount of available clean fresh water is one very important part of that.

Students will learn that as the availability of fresh water decreases per capita, that many negative effects occur for people and living things.

Students will learn how water can be moved, change forms, reduced.

Students will learn that water conservation is possible and in many instances required in modern society in order to ensure healthy quantities for both people and the natural world.

Science and Engineering Practices

Students will analyze and interpret data.

Student will use graphs, charts and images.

Students will apply scientific principles to designing a method or model.

Crosscutting Concepts

Students will learn about causal relationships and correlational relationships in data and phenomena during study and experimentation.

Students will learn about natural phenomenon that helps living things conserve water.

Students will see the causes and effects locally and regionally when water is not conserved including the economic benefit to conserving water.

DAY BY DAY LESSON PLANS

Lesson 1	***Essential Question: How does the amount of available water impact our environments?*** **Materials and Set Up:** Pictures of Animals using water (see Handouts Folder) Book "From Brooke to Ocean" Chart paper Note paper **Launch:** Book "From Brooke to Ocean" **Explore**: Watershed Organism Activity, Gallery Walk Students note what animals are using water for. **Summary:** Map of Chollas Creek What can I predict about what the lack of water does to living organisms in Chollas Creek and San Diego Waterways? Chart responses **Discovery and extension:** A lack of water hurts many different living things in our waterways. What does it mean to conserve water? What are some thoughts on how you can help?
Lesson 2	***Essential Question: How do humans conserve or waste water in our daily lives?*** **Materials and Set Up**: Grape juice concentrate 1 gal. of Water per team Pitchers Cups Dish Soap. **Launch:** Now that we know that a lack of water harms our natural environment, how do you feel about the ways humans use their water? Are we being efficient with it? Why or Why not? Show 1 gallon of water. Did you know a five minute shower uses 100 gallons of water? **Explore**: Grape Juice Activity, Students use one gallon of water to do a variety of tasks. A competition amongst groups tries to encourage them to conserve as much water as possible.

	Summary: Chart the strategies we used to save water. What did we do to conserve water? How did we do it? Use student names for agency. What is the implication for me as a scientist for the conservation of water in my community? With a little bit of effort, people can conserve a lot of water! **FORMATIVE Write, Modeled** How can conserving water help the plants and animals that depend on it in San Diego waterways? C+E+R
Lesson 3	***Essential Question: Now that we know a lot about a plant's leaves, what characteristics would help a plant survive better in an area with less water?*** **Materials and Set Up**: Leaves from Different native trees See attached video links in lesson 3 Handouts Page Video: "Cactus Flesh Cleans up Toxic Water" Video: "Desert Adaptations" **Launch:** Now that we know that many plants in San Diego are living with less water, do you think some plants do better than others without as much water? What are the characteristics of a plant that helps it survive in an area with less water? Picture of a cactus and a fruit tree. Today we are going to be looking at the leaves of some mystery plants and you are going to sort them into groups that would survive with more water, or less water. I do an HGO (a scientific illustration with the class) where we describe leaf characteristics such as texture, color, vein structure, shape of "blade", leaf edges or "margins". **Explore:** Leaves Activity, In teams of 4, each person chooses a leaf and describe the characteristics of it. Then, students discuss which leaves have similar characteristics and why they think those characteristics might be the same? **Summary:** Teacher shows several leaves from activity and asks class to collectively explain which of their plants most likely would survive a time with little water?
Lesson 4	***Essential Question: What are other ways that plants have adapted to conserve water besides their leaves?***

	Materials and Set Up: Sponges Toothpicks Wax Paper Cups Water Handout: Cacti/Nopales Experiment **Launch:** Yesterday we learned that a plant's leaves can help us predict how well it will survive with less water. But why? Teach with a chart to explain how one characteristic from each category helps a drought tolerant plant. We are going to conduct an experiment with a plant that doesn't have leaves. Show our old friend's picture, the cactus! How does a cactus conserve or save water? We all know it does, but how? **Explore:** Cactus Experiment Control: sponge with 100mL of water in a tray Cactus Sponge: sponge with 100mL of water and a waxy coating and spikes. **Summary:** What was your prediction about the amount of water that would be left in both experiments? How do your results compare? What does this tell us about how a cactus' characteristics help it to survive in an environment with limited water? Teacher charts responses etc.
Lesson 5	***Essential Question: What characteristics then, does a plant need to survive in an area of limited water?*** **Materials and Set Up:** Drawing paper Prepared Chart Coloring instruments Post-it notes **Launch:** As we can see from all of our experimenting, plants have some incredible ways to help them survive in an area with limited water. For example, teacher shows chart (prepared) of discoveries based so far about leaves, skins, and other. **Explore:** Design a plant that can live in an area of limited water, by choosing and selecting traits that help it to do that. Students make a scientific illustration and

	label with traits and why they chose them. Students go on a gallery walk and investigate the other students' plants. Students then select the trait they think helps that plant the most and why. **Summary/Formative Writing (Shared Activity)** How do you know your plant can survive in a drought like environment with limited water? Give evidence and explain with reasoning. Teacher provides scaffolds but this is not a modeled write.
Lesson 6	***Essential Question: What are some ways we saw people conserving water? What does that mean for us?*** **Materials and Set Up:** Soil Succulent cuttings Gravel Wire Plastic tubs/containers 3 different pictures of Vertical Gardens Handout: Vertical Gardens See attached video links in lesson 6 Handouts Page Video: "7 Principles of Xeriscape Gardening" Video: "What is Xeriscape Gardening?" Video: "Xeriscape is not a Garden, it's a System" **Launch:** We've seen how plants can conserve water, but what about us? Take a look at these gardens in the video. Play Video Partner talk about what things were done in the video to conserve water. Teacher demonstrates how to create a hanging garden. **Explore:** Hanging Garden Activity. Students prepare a hanging garden with succulent cuttings. Early finishers can make a scientific illustration of their garden and explain how it helps save water based on their observation of watering it. **Summary:** Show illustrations of three hanging gardens. With your partners, explain a benefit of each system and how it saves water. Students share.
Lesson 7	***Essential Question: How much water am I actually using? How much is wasted and what can I change?*** **Materials and Set Up:** Handout: "Pre/Post Self Assessment of Water Conservation"

	Handout: "How Much Water Do You Use?" Handout: "Promise to Save Water", calculator (if applicable) **Launch:** *Essential Question: How much water am I actually using? How much is wasted and what can I change?* Students complete pre-assessment. Discuss with class in a share out. Which areas do we think are using a lot of water? Are there any areas of our water usage that are more important than others? **Explore:** Self Analysis of Water Students in groups complete and discuss the Handout, "How Much Water Do You Use?" Students calculate their total water usage. Students then receive Handout, "Promise to Save Water". Discuss ways that they themselves might improve their water efficiency. How many ways can you improve your water usage, think about how smart you were with the grape juice activity? **Summary:** In which ways can I better conserve water? FORMATIVE C+E+R While students are writing, teacher charts different strategies students have said to improve their water usage.
Lesson 8	***Essential Question: What can I learn about how water is distributed in San Diego?*** **Materials and Set Up:** Graph "Typical Single Family Home Water Use" Graph "Percentage of Total Water Use by Category" Handout: "Water Director Information for Lesson" Handout: "Water Authority Plan". **Launch:** Teacher displays Graph "Typical Single Family Home Water Use". Yesterday we learned that we can improve our water conservation in many areas. How do you compare to the typical family? Teacher explains through an HGO that there is a limited amount of water available to San Diego and that it is distributed or shared by many different people and organizations. Teacher draws this on chart paper and explains. Use the categories listed on Handout "Water Director Information for Lesson". **Explore:**

	Water Director Activity Students form teams for a hypothetical city. They then use the instructions on Handout "Water Director Information for Lesson" to decide on which organization gets water, and who gets what amount. Note: The activity is meant to frustrate them and force a conversation because there is not enough water for them all to have what they need. Students complete Handout "Water Director Activity Plan" and total all usage to only 100 gallons. **Summary:** Today's lesson is about how all of us in San Diego use water, not just one person. Teacher charts which decisions were hardest in why, and prompts a discussion. If time permits, teacher shows graph "Percentage of Total Water Use by Category". What does this graph tell us about the importance of knowing where our water is being distributed?
Lesson 9	***Essential Question: What happens to our region when water is not as plentiful as it once was?*** **Materials and Set Up:** Handout "Drought!" Handout "Water Director Activity Plan" **Launch**: Yesterday, we saw how difficult water decisions are in San Diego. Today though, we will experience a drought. **Explore:** Drought! Students do the same activity as day 8, with reduced water supply. **Summary:** Again, teacher charts difficult decisions (add to yesterday's chart) Why was today's decision making so much harder? Teacher explains (maybe by simply writing it on board) that in 1990 the San Diego region had nearly 3 times as much water to distribute as it does now. What does that tell you about decision making now for water in San Diego? How can we help? What are the trends we can expect? What happens if we don't start conserving water and making smart decisions about water conservation?

Lesson 10	**Essential Question: What can I do to teach others about conserving water?** **Gallery Walk** **Materials:** Display Charts in various areas of the classroom A/t each chart, place the Key Question for that particular lesson in big readable print. Students, we are going to take a walk along the learnings and discoveries we have made so far. Each team of four will start at a different station . Students are given a small period of time to walk the various charts created in this learning period of water quality and water conservation. They may add notes etc. Discuss. They should discuss the key question at each station. What is your answer now? When all rotations are done, have a whole class discussion. What have we learned through this incredible process? I hope you are all ready to show what you have learned, because we need you! **SUMMATIVE Writing and Assessment** Students write a summative authentic piece using and incorporating a variety of evidence, data, and experiences to support their view. *The mayor has called because she needs help in spreading the word about water conservation in our community. Write a speech as a citizen to give in which you:* *a)state the problems with limited water supply* *b) describe what you learned about how many plants and animals can conserve water* *c) how humans can save water themselves* *d) what things you have learned about the distribution of water in our neighborhoods.*