Teacher's Guide for The Oregon Story: Water

Introduction

Water is a limited resource. There is a limited amount of water on the planet and an even smaller supply of freshwater that continually cycles through the atmosphere and back to earth. Today's water is yesterday's water and will be tomorrow's water. We could be using the same water the ancient Egyptians used. As the world's population increases and more water is used for industry, agriculture, and personal uses, greater demands are made on this limited water supply.

During the rainy months of winter, it might be difficult to convince someone in the Willamette Valley that Oregon might face water shortages in the next decade. In truth, the state of Oregon receives about as much rain on average as the state of Texas! The news over the last few summers has been that water is over-allocated in many regions in Oregon. Deciding whether water should be used for irrigation, for recreation, or for fish is a hot debate with no easy answers. It is critical for students to understand the issues involved in water rights debates, as they will most likely be part of the solution.

Many issues involving water are irrevocably linked: where does the water come from, who is using it upstream, who has the right to use it, what are the most important uses for it? To help students better understand some of the main issues in water rights disputes, the topic has been divided into three lessons. The first lesson explores the importance of water and how it is used. The second helps students better understand water flow, where it comes from, and where it goes. The third lesson focuses on water as a limited resource on which many parties rely. There is a considerable amount of overlap between the three subjects – the parties involved in the water rights disputes discussed in Lesson 3 utilize water in ways described in Lesson 1. The units have been divided into these particular categories and put in this specific order to take students through a natural progression of understanding – from personal applications, through an understanding of the water cycle and how water flow affects use, to the current applications in the state of Oregon.

Each lesson goes through a process of examining current conditions, investigating a specific question, and sharing results with the community. Activities focus on local water issues to help students understand first on a small scale, and then on a larger, more abstract scale. The activities in each lesson are meant to work as a complete investigation cycle. They can be used individually but are most effective when used together.

Note to Teachers: *Portions of these lesson plans refer to clips from the Oregon Story: Water video. For information on purchasing a copy of the video, call* ***503-293-1982*** *or* ***888-293-1982*** *(outside Portland).*

Lesson 1: The Value of Something So Simple

Grade Level: 6-12

Background Information:
Water is an invaluable resource for all life on the planet. In some places, it is so scarce that access to water has become a highly political issue. Even in places where water seems abundant, increased demands on limited water supplies have made people question water rights and usage. As we go through our daily routines, how much do we pay attention to our water use?

We use water for everything – we drink it, we bathe in it, we wash our cars and dishes with it, we use it for recreation. This unit is designed to help students look more closely at everyday water uses and examine personal and community water usage.

Content Standards:
This lesson addresses the following standards from the Science and Social Science portions of the Oregon Standards produced by the Oregon Department of Education.

Science
- Collecting and Presenting Data – Conduct procedures to collect, organize, and display scientific data.
- Analyzing and Interpreting Results – Analyze scientific information to develop and present conclusions.

Social Science
- Economics – Understand that resources are limited.
- Social Science Analysis – Design and implement strategies to analyze issues, explain perspectives, and resolve issues using social science.

Extension Web Sites from PBS:

- **Bill Moyers Reports – Earth on Edge- Ecosystems**
  http://www.pbs.org/earthonedge/ecosystems/value.html
- **Cadillac Desert: More Facts About Water**
  http://www.pbs.org/kteh/cadillacdesert/water2.html
- **PBS TeacherSource - In Your Town - Iowa PTV Explore More**
  http://www3.iptv.org/exploremore/water/
- **Wild Wings Heading South: Wetlands**
  http://www.pbs.org/audubon/wildwings/wetlands.html
- **NOVA: Leasing the Rain**
  http://www.pbs.org/now/science/water2.html

Activity 1 – How is Water Used?

Time Allotted: 45 minutes

Materials:
OPB video: The Oregon Story: Water
Butcher paper and markers

Objectives:
- Students will discuss who uses and needs water.
- Students will examine personal uses of resources.
- Students will learn about historical uses of water in Oregon.

Teaching Instructions:
- Ask students to make a list of the different ways they use water. Make sure they include every-day uses like brushing their teeth and have them create a different column for occasional uses like skiing, boating, etc. Have students guess how often they use water during the day.
- Brainstorm with the class to create a list of water uses. Record the information on the board.

Watch the First Video Clip
Start at beginning: sound of running water, "I've been taught, since I was a child…"
End: approx. 3:33 "Without irrigation, none of this would be as productive as it is."

Discussion Questions Based on the Video Clip:
- Why can't we be without water?
- What uses of water did you see?
- Were there any uses that surprised you?

Watch the Second Video Clip
As the students watch the next video clip, ask them to think about whether all water uses are equally important.
Start: approx 19:30 "In time, though, the waters of the Kalamath Basin, like waters elsewhere, became over-allocated…"
End: approx 23:15 "If we can get into it, we can enjoy it."

Discussion Questions Based on the Video Clip:
- Have students discuss with a partner or small group the difference between want and need. Where does recreation fit in the picture – in Oregon it affects the local economy – does that make it a "need"?
- Discuss as a whole group: When there is a water shortage, where should the water be allocated first? Why?
- As a class, decide how important is water – is it only important for personal use, for agricultural use? Should everyone be allowed use for everything? Have students return to their lists and mark which uses are needs and which are extras.

Activity 2 – Water Use Investigation

Time Allotted:
Two 45 minutes periods

Materials:
Use the following websites to help you prepare for this lesson:

- **Purdue University Water usage – per capita water consumption pie graph**
  http://pasture.ecn.purdue.edu/AGEN521/epadir/grndwtr/water_usage.html If you click the water-saving link you get liters per minute of toilets (various kinds), washers, showers, faucets.
  Note: If you go to the Purdue University homepage and type in "water usage" there are many sites that may be of interest, including information on groundwater contamination, surface water, water quality, and resources.
- **Rice University's Water Use Analysis Chart**
  http://www.rice.edu/armadillo/Projects/Ecodillo/Wildlife/water.html
  click on Home Water Use Analysis Chart

Water use tables (from Rice and Purdue University websites)
School Water Use Observation Sheets (attached)
Butcher paper and markers (or dry erase board or overhead)

Objectives:

- Students will discuss and list water use in their school.
- Students will investigate school water use.
- Students will compile information and create a water use report.

Teaching Instructions:

- Discuss with the students water use in their homes: How much water do they use (if they have done activity 1 they can refer to their notes)?
- Have students use the water usage chart from the Rice University web page to determine how many gallons of water they use in one day (limit this to home use only).
- How many people are in each family? Have students imagine the number of gallons of water they use at home during the day and have them multiply that by the number of people in their family. Discuss the answers.
- Have students imagine the amount of water used in their school each day. Each student should write down an estimate of the amount of water the school uses each day. Explain to students that their class is going to do a 10-15 minute sample observation of water use in the school.
- Brainstorm with the students the places water could be used in the school (examples: science lab, cafeteria, sprinkler systems, bathrooms, gym). Divide the class into teams and each team will be responsible for observing the water use in the area discussed for 10-15 minutes. Discuss expected behavior while students are conducting observations and hand out the Observation Sheet. Have students be prepared to interview appropriate staff about unique uses as well (examples: Do the custodians mop the floors at night? How much water is used to wash the trays in the cafeteria?). Also have students look for examples of water conservation or excessive use.
- When students return to class, have them discuss what they observed and how much water was used in the designated amount of time. As a class, create a list of the total amount of water used around the school in a 15-minute period. Have the students multiply that amount to represent the total amount of water used per day at the school. Add the amounts of water used in the "unique situations" described above. How did the results compare with the students' estimates?
- Have students create a water usage report for the school. The report should include: how is water used in your school, what areas of the school use the most water, how the students conducted their survey.

Activity 3 – Creating a Conservation Plan

Time Allotted:
45 minutes

Materials:
OPB Video: Oregon Story: Water
Rice University Water Usage Survey (from Activity 2)
Butcher paper
Access to the internet or library (this depends on the depth of the project)

Objectives:
- Students will learn about water conservation methods.
- Students will discuss school use of water.
- Students will create a water conservation plan for the school.

Teaching Instructions:

Watch the Third Video Clip
As the students watch the next video clip, ask them to think about whether all water uses are equally important.
Start: approx 53:30 "I think it should be required of any Oregonian to know where their water comes from."
End: approx 56:12 "In some cases it could be not there pretty quick."

- Ask students: Does conservation in personal use make a difference, or is it such a minute amount of the water used that it doesn't matter?
- Discuss water conservation methods used in your town during dry months: Are people encouraged to refrain from washing their cars? Do people have to limit water use on lawns? Are there any conservation requirements in the wetter months?
- Have students examine the "Conservative use" portion of the Rice University Water Usage Survey. Do any of the students use any of these conservation methods at home?
- Discuss how much water your school uses (or is used in a home) based on the investigation in Activity 2. Does this seem an appropriate use of water? Does your school use any conservation methods? Ask students if they noticed any areas in the school where there was an excessive use of water.
- Have students brainstorm any methods of conservation that might reduce excessive use of water at your school. Students may need to research appropriate conservation methods at this point.
- Have small groups make some kind of product to share their suggestions about water conservation with your school (examples: a letter of recommendation to the janitors about putting bottles in the tanks of the toilets, posters reminding students to turn off the water instead of leaving it running).

Assessment:
Design rubrics with students for the water usage report in Activity 2 and for the products in Activity 3.

Lesson 2 – How Does Your Water Flow: Where Does Water Come From and Where Does It Go?

Grade Level: 6-12

Background Information:

" I think it should be required of any Oregonian to know where their water comes from." – Rick Bastasch, author of "Waters of Oregon"

When discussing water flow, the inclination is to consider rivers. But rivers are only one piece of a much larger picture. Water comes to earth in multiple forms; it can run along the surface or be absorbed, some of it is stored underground, some evaporates before it even reaches a stream. Understanding where water comes from requires information not only on the watersheds but also on the impact humans have on the water cycle. Practically from the moment water hits the ground, it is diverted, trapped, dammed, or otherwise manipulated by humans for consumption.

Content Standards:

This lesson addresses the following standards from the Science and Social Science portions of the Oregon Standards produced by the Oregon Department of Education.

Science

- Earth and Space Science – Understand changes occurring within the lithosphere, hydrosphere, and atmosphere of the earth.

Social Science

- Geography – Understand and use geographical skills and concepts to interpret contemporary and historical issues.
- Social Science Analysis – Design and implement strategies to analyze issues, explain perspectives, and resolve issues using social science.

Related Information on the Oregon Story: Water Website

- **Feature: A Model River**
  http://www.opb.org/programs/oregonstory/water/model_river/index.html
- **Cool Water**
  http://www.opb.org/programs/oregonstory/water/resources/page_2.html

Exension Web Sites from PBS

- **Online NewsHour: Low Water- June 5, 2000**
  http://www.pbs.org/newshour/bb/environment/jan-june00/drought_6-5.html
- **Online NewsHour: Drought in the Northeast -- April 23, 2002**
  http://www.pbs.org/newshour/bb/weather/jan-june02/drought_4-23.html
- **Yellowstone: America's Sacred Wilderness**
  http://www.pbs.org/edens/yellowstone/teach1.html
- **Journey to Planet Earth**
  http://www.pbs.org/journeytoplanetearth/education/riversofdestiny.html
- **Water Rich Water Poor**
  http://www.wpt.org/waterrich-waterpoor/

Activity 1 – Water Cycle – The Big Picture

Time Allotted: 45 minutes

Materials:
Use the following websites to help you prepare for this unit.
- USGS Water Science For Schools
  http://ga.water.usgs.gov/edu/followdrip.html
  Follow a drip through the water cycle

Butcher paper and markers
Blank sheets of paper for pre-assessment
Oregon Story Video: Water

Objectives:
- Students will learn about the water cycle and water flow.
- Students will examine where people get water.
- Students will discuss how water flow affects usage.

Teaching Instructions:
- Preassessment: Have students draw the water cycle. Ask them to include the ways water flows along/through the earth and any human impediments/interventions with the water cycle. Have students get into groups and discuss their findings.
- As a class, discuss the drawings. You may need to explain the following:
  1. How the water cycle works (the USGS website listed in Materials is a useful refresher)
  2. Vocabulary – (information can be found in the glossary on this website)
     - Aquifer
     - Groundwater/ surface water
     - Water table
     - Watershed
     - Evaporation/Condensation
- Start a class diagram of the water cycle – leave room for information on human intervention (drawings of dams, irrigation, etc.)
- As students watch the next video clip, ask them to think about ways humans control water flow.

Watch First Video Clip
Start: approx. 17:38 "Even disasters like Tumalo Reservoir could not undermine the quest to water Oregon's arid lands."
End: approx. 19:00 "We can do all of this and we have the water."

Discussion Questions:
- How do humans influence where water flows?
- What kind of impact does that have on the system?
- Should humans tamper with natural water flow for agricultural or other purposes?

Watch Second Video Clip:
Start: approx. 23:15 "The Klamath and Willamette River Basins have been highly modified to serve people's needs."
End: approx. 33:00 "Just like many other towns that were never blessed with a resource like this."

Discussion Questions:

- What is the toll of human impact on a river?
- Was the ground water contamination- just a by-product of necessary human intervention?
- Is chlorinated water such a bad thing?
- Have you ever had an experience when your tap water was undrinkable/ unusable? What was the cause?
- Did this second video clip change your mind about whether it was ok for humans to interfere with water flow?

For the last few minutes of class, have students write about where they think their water comes from – both for home and for school.

Activity 2 – Local Water Flow

Time Allotted:
1 hour

Materials:
Map of the school – photocopied for student use
Water Flow Checklist (attached)
Butcher paper and markers
Access to the internet, a telephone, or the library

Objectives:

- Students will investigate where their school's water comes from.
- Students will examine water flow on school grounds.
- Students will learn where their water goes

Teaching Instructions:

- If students have done Activity 1, have them share where they think the water for their house and school comes from.
- Discuss how far water flows from its source (a river, basin, etc.) before it is used – does it travel feet, miles, hundreds of miles, thousands? If your school is near a stream or river, ask if the school's water comes from that stream or river (it most likely does not!).
- Explain about water reservoirs and how water for consumption needs to be protected or treated.
- Explain to students that they will investigate where the school's water comes from and where it goes.
- Make a list with the class of the information needed to understand your school's water flow. Some suggestions:
    1. What reservoir/well does our water come from?
    2. Does it go through any treatment stations?
    3. Where are the taps/ outlets in the school?
    4. Where are the drains in the school?
    5. Where are the gutters?
    6. Are there any other ways rainwater is diverted or used? (An example would be examining impervious surfaces like parking lots or playgrounds and their drainage)
    7. Once water has been used, where does it go? Does it all go to the same place?
    8. What kind of treatment needs to be done to it to have it go back into the water cycle?
- Divide the class into groups to investigate the questions. Those students investigating local reservoirs and sewage treatment plants should be sent to research on the internet or via telephone, and all others should take a designated area of the school and map the water flow. Have students use the checklist below and a map of the school to help them remember and record all of the components.

- Use this information for Activity 3.

Extensions:
- Have someone from a water treatment plant visit your class and discuss how water must be treated to return it to a stream.
- Visit your local reservoir if possible.

Activity 3 – Mapping the Flow

Time Allotted:
45 minutes

Materials:
A large map of the school (for students to record their information)

Objectives:
- Students will create a map that shows a comprehensive understanding of school water flow.
- Students will discuss the environmental impact of school water use.
- Students will develop recommendations to help balance water use with ecological processes.

Teaching Instructions:
- Ask one student from each group to record their water flow information on the big map (see materials) while the following conversation occurs:
- Ask students to share how many taps and drains they found, where the water flowed, and anything else unusual in their area.
- As the students were conducting their research, did they notice anything that seemed out of place, either because it was an over-use of water or because water flow was impacted in some way? (some examples: sprinklers going in the rain, clogged gutters, only one output for water from a parking lot, severe erosion in a specific area, places where puddles gathered).
- Make a list of unusual water flow in or around your school. Discuss why these examples are considered "unusual" – what should be happening in those areas? (Consider natural water flow, local ecology, etc.)
- Have groups choose one example each and brainstorm possible changes that could be made. Remind students to consider practicality and ecological impact – does the change improve the condition of the water flow?
- Have each student compose a 1-3 paragraph statement about their example that includes a description of the problem, possible causes, and suggestions for improvement.
- Groups should then compile their information and writings to create one statement for the group.
- Discuss with the class who should be given this information: the principal, the maintenance staff, the school board, a local parent group.

Extensions:
- Have some students compile all of the paragraphs into a complete document.
- Have someone write a description of the lesson to frame the document.
- Students can prepare a presentation -- to give the principal and other staff, the school board, or a parent group -- that shares the information compiled from this investigation and analysis.

Assessment:
Have each student draw a diagram of the water cycle and include water flow and human intervention. Ask them to write about where their water comes from and where it goes. Compare this information to the pre-assessment in Activity 1.

Lesson 3 – How is Water Divided? Who wants and needs it?

Grade Level: 6-12

Background Information:
Disputes over water rights are not new. As people settled Oregon, access to water was critical for survival and people fought fiercely for it. People needed water for personal use, for agriculture, for cattle. An Oregon Water Code established in 1909 designated that water belonged to the public but that rights to water use were assigned by the state on a first come - first serve basis. Rights to water use are often attached to property, making certain properties in an area considerably more valuable than others. Today many organizations, agencies, and groups have competing demands for water. Farmers need irrigation water for agriculture; ranchers need irrigation water to grow grass for livestock; cities need water for personal consumption; hydroelectric dams need water to produce electricity; water is a critical part of many Native American Tribes' cultures; fish need water to spawn; the list is practically endless. Sometimes water rights have been over-allocated so that in dry years, not everyone can have the water that they need. There have been many disputes over water rights and usage; this is not an easy discussion because competing parties do have reasonable and important needs for water.

Content Standards:
This lesson addresses the following standards from the Social Science portion of the Oregon Standards produced by the Oregon Department of Education.

Social Science
Economics
- Understand that resources are limited
- Understand economic trade-offs and how choices result in both costs and benefits to individuals and society.

Social Science Analysis – Design and implement strategies to analyze issues, explain perspectives, and resolve issues using the social sciences.

Related Information on the Oregon Story: Water Website
- **Oregon's Water – Trapped by Law**
  http://www.opb.org/programs/oregonstory/water/or_water/page_2.html
- **Oregon's Water – Tapping In**
  http://www.opb.org/programs/oregonstory/water/or_water/page_3.html
- **Conflicts & Crisis**
  http://www.opb.org/programs/oregonstory/water/conflicts/index.html
- **Finding Solutions**
  http://www.opb.org/programs/oregonstory/water/solutions/index.html

Extension Web Sites from PBS
- **NOW: Science & Health - Stripping the West | PBS**
  http://www.pbs.org/now/science/methane.html
- **Leasing the Rain: Who's Who**
  http://www.pbs.org/now/science/who3.html
- **Idaho, A Portrait, The Snake River**
  http://www.pbs.org/idahoportrait/tour/snaketour.html
- **Cadillac Desert**
  http://www.pbs.org/kteh/cadillacdesert/episode2b.html

Activity 1 – Who Has the Right to Water

Time Allotted:
45 minutes

Materials:
A textbook series –) any series, but there should not be enough for each member of the class.
Small pieces of paper with the numbers 1 or 2 written on them, enough for the class. The ratio of 1:2 does not really matter.
OPB Video – The Oregon Story: Water

Objectives:
- Students will discuss pros and cons of various water uses in the state of Oregon.
- Students will learn about historic and current water rights debates.
- Students will examine water as a limited resource.

Teaching Instructions:
- Explain to the class that you will be starting a new unit and you will be using a new textbook. Have students pass the textbook out – there should not be enough for everyone in the class.
- When students discover that there are not enough textbooks, explain that sometimes there are not enough to go around and that those students will have to deal with not having a textbook.
- Hand out pieces of paper with 1 and 2 written on them.
- Explain that you have determined a more fair way to divvy up the books. Each person who has a 1 on his or her paper gets a book. Each person with a 2 gets a book after all of the people with 1's have books. The last few students will have to convince you that they need a textbook more than their fellow students, and you will make some rearrangements. Have students give 1s their books, have 2s distribute the rest of the books and give them a couple of minutes to debate who deserves the books.
- Ask the students which method of distribution was more fair – randomly handing some out or randomly assigning people and then making them debate. Is it fair to use textbooks when there are not enough to go around? Isn't it better for some students to have textbooks than none? What about when you have no other options? What if the commodity is not a textbook but something necessary to life, and there is a limited amount? How do you decide who gets it and who doesn't?
- Suggest to students that Oregon's current water situation is very similar to the scenario they just experienced.

Watch First Video Clip
Start: approx. 4:00 "Oregonians began to hear a new term – water had been 'over-allocated.'"
End: approx. 6:45 "In my opinion, the next great battle we will have is about water."

Discussion Questions Based on the Video Clip:
- Where does water in Oregon come from?
- What parties do you see competing for water use?

Watch Second Video Clip
Start: approx. 7:00 "All in all, the west is a dry place…"
End: approx 15:00 "No one would allow state timber to be cut without accountability or payment."

Discussion Questions Based on the Video Clip:
- Why would water be such an issue to a homesteader?

- Was the reward of free water a reasonable one (did the government have the right to give water rights away forever)? Is prior appropriation/ first come, first serve fair?
- Should water rights be permanent? Why or why not?

Watch Third Video Clip
Start: approx. 51:45 – "All of our water jumps out of the ground right here."
End: approx. 53:32 – "That's our directive from the council."

Discussion Questions Based on the Video Clip:
- Discuss as a class the pros and cons of different groups using water – do they all need to use them? What about recreational water use some towns depend on tourist money, and if a reservoir is drained or a stream is low, it might affect the local economy. What determines need? Who needs water?
- Ask students to write an answer to the following questions: What parties are involved in water rights debates in Oregon? How should water be allocated – should it be on a "need" basis; should everyone compromise?

Activity 2 – Understanding the Major Players

Time Allotted:
45 minutes or longer depending on the depth of the investigation.

Materials:
Copies of the Klamath Basin Conflict article (attached)
Copies of the Klamath Basin Conflict Instruction Sheet (attached) – 1 per student
Access to the internet and the library

Objectives:
- Students will learn about the major players in water rights issues in Oregon.
- Students will research specific organizations or perspectives relating to water use.
- Students will weigh the benefits and detriments of their chosen organization.
- Students will prepare for a water rights debate (Activity 3). (If you choose not to have students conduct a debate, they can prepare to present the information to fellow students – this would add an extra 30-45 minutes to this activity).

Teaching Instructions:
- Share the illustration of management relationships from Conflicts and Crisis – The Natural Flow on this website with students as an example of how many organizations can be involved in water flow. If water supply is low – who should receive less water?
- Explain to students that they will each choose a perspective to research as preparation for a debate on a specific scenario.

Watch First Video Clip
Start: approx. 43:00 "The Applegate Valley in Southern Oregon's Jackson County is named for the Applegate River."
End: approx. 51:40 – "I think I'm going to enjoy it."

- Things to consider – What do we want to accomplish? How are we going to accomplish it? Who's going to get what out of it? Who is going to put what into it?
- Give students a copy of the Klamath Basin Conflict article and a copy of the instruction sheet. Have students choose one of the following perspectives to research:

1. Bureau of Reclamation
2. Lower Klamath Lake Water Refuge/ local refuges
3. Klamath Tribes
4. National Marine Fisheries Service
5. Local Farmers
6. American Land Conservancy
7. Environmentalists
8. Solutions (these students should examine solutions that work around the state of Oregon and elsewhere and see if any of them are applicable to this situation – a good place to start would be the "Solutions" section of this website)

- Students should read "Tapping In" and "The Natural Flow" sections of this website for a better understanding of the entire argument. Students should research newspaper articles about the debate and research their specific perspective.

Activity 3 – The Water Debate

Time Allotted:
45 minutes

Materials:
Butcher paper and markers

Objectives:
- Students will develop criteria for conflict resolution.
- Students will debate a current water rights issue using research they have conducted in Lesson 2.
- Students will examine various perspectives of an issue.
- Students will create an action plan for the issue based on the debate.

Teaching Instructions:
- Create with students the criteria for a debate. Discuss the following things:
  1. Student conduct during the debate
  2. Format for arguments
  3. What makes an appropriate argument
  4. Who will moderate or facilitate the arguments
  5. How the outcome will be decided (examples: a single judge, a class vote, a panel of judges, etc.)?
- Start the debate with a recap of the situation. Conduct the debate
- Once the debate is finished and the outcome has been decided, discuss the debate and decision as a class. If everyone voted, what influenced their decisions? Was the outcome fair?
- Based on the outcome of the debate, have each student write an action plan for the Klamath River Basin.
- Discuss the action plans as a class.

Extensions:
- Have students create a board game based on water flow and the conflicts between the parties involved in water rights.
- Have students examine the dam situation/conflict on the Columbia River.

Use With: Lesson 1 / Activity 2 – Water Use Investigation

Student Handout

School Water Use Observation Sheet

Name:

Date:

Site:

Type of Outlet (sink, toilet, water cooler, etc.)	Times used in designated time period	Total amount of water used (Use your Water Usage Table to help you)
1.		
2.		
3.		
4.		

Unique one-time water uses:

Remember to observe for water conservation or excessive water use!
Notes:

Use With Lesson 2 / Activity 2 – Local Water Flow

Student Handout
Water Flow Checklist

Name:

Date:

What area are you researching?

To gain a complete picture of water flow in our school, we must consider tap water, rainwater, and surface water. For your area, did you:

- ❑ Draw the location of any taps on your map
- ❑ Draw the location of any drains
- ❑ Draw the direction of the water flow (if you are dealing with an outside surface- remember to consider height!)
- ❑ Mark impervious surfaces and outlets
- ❑ Mark gutters
- ❑ Mark areas where rainwater soaks into the ground

Remember, you may find taps and drains outside as well.

Other information you will need to collect:

It is important this information accurately the first time. Remember the old adage "Measure twice, cut once." Make sure you double check your area and complete your checklist before you return to class.

Use With Lesson 3 / Activity 2 – Understanding the Major Players

Student Handout

The Klamath Basin Conflict

Excerpted from the Oregon Story: Water website
http://www.opb.org/programs/oregonstory/water/conflicts/page_2.html

The roots of this conflict date back to the early years of statehood. In 1864, the Klamath, Modoc and Yahooskin Tribes signed a treaty with the federal government guaranteeing perpetual hunting and fishing rights along Upper Klamath Lake.

At the dawn of the 20th century, Congress authorized construction of the Klamath Project, one of the Reclamation Bureau's first irrigation projects in the West. The project was designed to store and channel spring runoff in order to stimulate regional farming.

A year after the Klamath Project headgates opened, President Theodore Roosevelt created the nation's first waterfowl refuge on Lower Klamath Lake.

And finally, in the 1930s and 1940s, the federal government gave Klamath Basin land to homesteaders and war veterans with the promise that there would be plenty of irrigation water.

In less than 80 years, the federal government had made water promises to four different groups, and all had a reasonable claim to the water. That's when the first troubles began...

In 1954 Congress terminated federal recognition of the Klamath Tribes and converted the reservation land into a national forest. The landscape was partly farmland, and partly refuge and forest. Three years later, the Klamath Project was completed, including hundreds of miles of irrigation canals and ditches. In that same year, Oregon, California and Congress ratified the Klamath River Basin Compact to settle water disputes. That compact gave top priority to irrigation.

From 1957 to 1973, the disputes seemed resolved. Then Congress passed the Endangered Species Act (ESA). In 1986, 13 years after the ESA passed, the Klamath Tribes regained sovereign status and federal recognition. The Tribes quickly began urging greater protection of Upper Klamath Lake resources, two species of suckerfish and downstream Coho salmon. The fish were clearly in trouble, and in 1988 both the Lost River sucker and short-nosed sucker were listed as endangered species.

Still, water conflicts remained fairly low-key until 1992, when the U.S. Fish and Wildlife Service set a minimum water level in Upper Klamath Lake to maintain water quality for the suckers. Unfortunately, Upper Klamath Lake is also the area's primary irrigation reservoir. More droughts followed in 1994, 2000, 2001 and 2002.

A flashpoint came in 2001 when the Bureau of Reclamation (BOR) shut off Klamath Project irrigation water to 1,400 farms, encompassing 90 percent of the Basin's farmland. Water was also cut off to the Basin's national wildlife refuges, a key migratory stopover for bald eagles.

A federal court denied a request to restore irrigation, saying the need to protect imperiled fish outweighed the economic needs of farmers. The federal government then offered farmers low-interest loans and other emergency aid. Many farmers sold their lands to the American Land Conservancy, which planned to restore farmlands to marshland status.

The most recent twist in this tale occurred in early 2002, when the BOR released a draft biological assessment that would return irrigation water to farmers. Environmental groups quickly criticized the assessment, charging that the study was based on flawed science.

Outlook: The Klamath Basin conflict still has not been resolved. None of the aggrieved parties — Tribes, farmers, fish, environmentalists, wildlife and government agencies — is winning in this battle. A series of court cases have determined that (for the present) Klamath Basin water will be allocated as follows: first to meet the needs of endangered species, second for Native American tribes and the wildlife they depend on, third for farmers in the Klamath Project and fourth for wildlife refuges that depend on farm runoff for much of their water.

Use With Lesson 3 / Activity 2 – Understanding the Major Players

Student Handout

The Klamath Basin Conflict
Instruction Sheet

To be prepared for a debate you must do the following:

- Understand the legal issues – who holds the water rights? What is the argument? Why is this such a heated debate?
- Make a chart listing the pros and cons of your group receiving priority for water use – how will you benefit – how might someone else suffer if you have first shot at water?
- What are the major compelling arguments your side uses?
- Be familiar with your opponents' arguments.
- How much water do you need (find data)?
- Who would you be willing to work with to compromise?
- Be prepared to suggest some solutions.
- Write a summary of your perspective to be read as an introduction to the debate.

Make sure that you:

- Site your references so that if someone questions your information, you can find your source.
- View reliable sources for facts.
- Prepare various arguments for your group to have first priority water access.
- Consider rebuttals for your opponents' arguments.