Watersheds
Grades 3-6

Activity 1: Your Watershed video
Activity 2: Build Your Own Watershed
Activity 3: What Do Watersheds Matter?

Language Arts Skills

- Read an expository text
- Identify the structures of a text: compare/contrast, cause and effect, sequential order, proposition and support
- Practice reading comprehension and test taking skills

Science Skills

- Communicating
- Simulating
- Analyzing information

Objectives

Students will:

- demonstrate an understanding of the watershed concept through reading an article and answering questions.
- understand how humans affect the clarity of Lake Tahoe.
- read and follow directions to build a watershed model.
- identify the pollutants that cause loss of clarity.

Materials

Activity 1

Your Watershed (Lake Tahoe Report segment 2) on videotape or DVD

Activity 2

1. White 8 _ by 11 paper
2. Student instruction worksheet
3. Blue and black water soluble markers
4. Large piece of thin plastic
5. Cocoa powder
6. Red and Green food coloring

Activity 3

"Why Do Watersheds Matter" article and "Why Do Watersheds Matter" worksheet, one for each student.

4. Overhead transparency of article and "From Watersheds to Water Clarity" worksheet and Secchi Disk Graph (optional).
5. Overhead projector
6.Colored pencils

Lesson One: WATERSHEDS

Background

A watershed is an area of land where all the water flows to one point – a stream, river, lake or ocean. Our entire continent is made up of watersheds. Watersheds often have smaller watersheds inside them, and these smaller watersheds are called sub-watersheds.

The Lake Tahoe Basin is our watershed, including the lake itself, and the surrounding land which sheds water into the lake from rain and snow melt. The mountain peaks and ridges surrounding the lake separate the Lake Tahoe Basin from other watersheds. Within the watershed there are a number of creeks that flow into the lake from smaller watersheds, and the basin is itself part of a larger watershed, the Truckee River.

Lake Tahoe is known worldwide for its clarity, meaning how far down into the water you can see. With the reflection of the sky, it makes the lake an incredibly beautiful deep blue. Tahoe is also unusual because the lake takes up such a large part of the watershed. The lake is naturally clear because the creeks that flow in bring some large particles of sediment that settle out quickly, and the healthy soils of the watershed filter water runoff before it reaches the lake.

However, human development of the basin has brought fine sediment that settles out slowly, sediment from soil erosion, nutrients that feeds the algae that grows along the shore and in the lake, and pollutants such as car oil. Parking lots and buildings have covered large areas of soil, so water runs off quickly and picks up pollutants rather than being filtered. What Tahoe does not have is factories or wastewater plants that pollute lakes in other places. Instead, the pollutants that enter the lake come from many small disturbances to the watershed. We call these small disturbances – a little soil erosion here, a little spilled fertilizer there – non-point source pollution.

As a result of these human actions, the clarity of Lake Tahoe has decreased from 105 feet (? meters) in 1968 to about 70 feet (? meters) today. If we do not control non-point pollution, the clarity of the lake will continue to get worse. But if people understand watersheds and how they function naturally, particularly the way healthy soils filter water, and then work to reduce runoff and pollution, then the lake can become clearer again.

Duration
Activity 1: 10 minutes
Activity 2 - 45 minutes
Activity 3 - 45 minutes
Lesson may be divided into 2 language arts lessons.

Vocabulary
basin
watershed
sub watershed
ridges
pollution

Standards
California Language Arts Content Standards -Grades 3, 4, and 5
Reading
1.1 Know and use complex word families when reading (e.g. -ight) to decode unfamiliar words.
1.2 Use word orgins to determine the meaning of unknown words.
1.3 Use knowledge of root words to determine the meaning of unknown words within a passage.
1.6 Use sentence and word context to find the meaning of unfamiliar words.
Reading Comprehension
2.1 Identify structural patterns found in informational text (e.g. compare and contrast, cause and effect, sequence in chronological order, proposition and support) to strengthen comprehension.
2.2 Use appropriate strategies when reading for different purposes (e.g. full comprehension, location of information and personal enjoyment).
2.3 Demonstrate comprehension by identifying answers in the text.
2.3 Discern main ideas and concepts presented in texts, identifying and assessing evidence that supports the conclusions.
Listening and Speaking
1.10 Compare ideas and points of view expressed in broadcast and print media.
1.10 Evaluate the role of the media in focusing attention on events and in forming opinions on issues.
1.7 Identify, analyze and critique persuasive techniques (e.g. promises, dares, flattery, glittering generalities, logical fallacies) used in oral presentations and media messages.

Activity 1: Your Watershed Video

Activity 2: Build Your Own Watershed

Part One: Student Teams Build Watersheds

1. Teacher models by crumpling a piece of paper and unfolding it to demonstrate how students will create a **watershed**. Point out ridges, mountains, streams and valleys. Explain that they will be making their own watersheds and students will work in pairs to read and interpret the directions. Ask students if there are any questions.

2. Assign partners, or student's pair up, then pass out Instruction Worksheet and have students begin working.

Part Two: Teacher Led Demonstration and Discussion
1. Place all student sub-watershed models in a circle on large piece of plastic. Have students gather around the watershed model. Use the model and the activity in part one to define and discuss vocabulary words. You may want to add water cycle vocabulary terms or extend it to discussion about point source and non-point source pollution.

2. Introduce **pollutants** and add drops of food colors and cocoa to student watershed model. You could include the story about Harriet and Howard and their dog Pooper or make up your own story as you move around the model to add pollutants to each team's part of the watershed. (Opportunity for interactive writing as students generate their own story about pollution and where it comes from)
Story will also be an appendix for other uses ie. Writing activity

Harriet and Howard Human

Harriet and Howard live in the Lake Tahoe watershed. They left their house early one Saturday morning to go mountain biking along a mountain ridge with their dog Pooper. Before they left Harriet reminded Howard to fertilize their lawn so that the grass would grow. (Drop green food coloring on the model and explain that fertilizer is carried by water to the lake and causes pollution). They did not realize it, but as they drove, their car was leaking a little motor oil onto the street. (Drop red food coloring in a line around part of the model.) Their exhaust pipe was releasing very tiny pollutants, from the gas being used to drive the car. (More red food coloring to represent gas pollution.) Harriet and Howard had a great time mountain biking, they love to go really fast around the corners, down the hill and skid out right before they get to the stream. Unfortunately, when they do this, lots of dirt is eroded from the mountain and ends up in the stream. The dirt that ends up in the stream is called sediment. (Sprinkle cocoa powder on the mountain and near the creek, marked blue, to represent the dirt that is displaced when humans mountain bike or snow ski.) After mountain biking, they took their dog Pooper to the dog beach for a swim. After cooling off in the water, Pooper had to do just what his name suggests. Harriet and Howard had forgotten their pooper-scooper and did not have plastic bag to put the poop in. (Sprinkle more cocoa powder near the lake to represent this.) As Harriet,

California Science Content Standards - Grade 3
1.f Students know evaporation and melting are changes that occur when objects are heated.
3.c Students know living things cause changes in the environment in which they live: some changes are detrimental to the organism or other organisms, and others are beneficial.

California Science Content Standards - Grade 4
3.a Students know ecosystems can be characterized by their living and nonliving components.
5.a Students know some changes in the earth are due to slow processes, such as erosion, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.
5.c Students know moving water erodes landforms, reshaping the land by taking it away from some places and depositing it as pebbles, sand, silt, and mud in other places (weathering, transport, and deposition).

California Science Content Standards - Grade 5
3.e Students know the origin of the water used by their local communities.
4.c Students know the causes and effects of different types of severe weather.

Howard and Pooper drove passed the golf coarse, a little more motor oil leaked onto the street and pollutants continued to come out of the car's exaust pipe. (Add more green food coloring for golf coarse and red food coloring for car pollutants).

3. Ask students what they think will happen when it rains. Use water spray bottles to simulate rain falling on the watershed while students observe. Allow discussion. Reiterate vocabulary words and write main ideas on the board during the discussion. Demonstrate how **sediment** (cocoa powder) can be moved by water and wind. **Erosion** is the movement of sediment caused by wind and water. Have students share their observations orally as you write on the board.

Part Three: Results and Reflection
Allow time for students to write their observations independently in his/her journal. Main ideas will be written on board for students to use during the discussion in Part Two.

Option: Use prompts and allow students to use ideas generated on board to reflect on what they learned. Potential questions for discussion or prompts for independent writing activity:

Does erosion happen naturally? (Yes, wind and water…)
How might human activities speed up erosion? (Disturbed soils, impervious surfaces speed up run-off)
Why might erosion be a problem? (Water can carry sediment and pollutants to the lake, which is causing it to loss its clarity)
How can people slow down erosion? (Use Best Management Practices BMP's to slow down erosion and get water to run into the soil and not run off…)
What is causing Lake Tahoe to loss its clarity? (Sediment and water carry nutrients that feed the algae in the lake and cause it to loss clarity)
What can people do to keep Tahoe clean and beautiful?

Activity Three: Why do Watersheds Matter? Article

1. Pass out *Why Do Watersheds Matter?* newspaper article. Explain that the students will use the article to answer multiple choice questions. Instructor reads aloud, or students be called on to read sentences aloud, unfamiliar words can be discussed as they appear. Pass out accompanying multiple choice worksheet. Instructor may choose to remind students that they will not be graded on how many questions they answered correctly. Rather, students will be graded on how well they were able to find the correct answer in the article.

2. Demonstrate the process using an overhead copy of the article and questions. Find the correct answer to question 1 in the article, underline it, and write #1 next to the sentence. Then circle the correct answer on the multiple-choice worksheet.

3. Students locate the correct answer in the article, underline it and write the corresponding question number next to that sentence. Students may work individually or in small groups.

4. Ask the students why the instructor had them do this exercise. Explain that

	to underline the correct answers in the reading passage is a good test taking strategy. Discuss additional test taking strategies that may be exemplified by this lesson. Page 5 will be the Harriet and Howard Human Story printable Page 6 will be the instructional worksheet for building model Page 7 will be What Do Watersheds Matter article Page 8 will be What Do Watersheds Matter worksheet Page 9 will be the Secchi Chart