

Texas and Its Watersheds



Grades: 4-8, Environmental Systems,
Aquatic Science

TEKS:

4: 1B, 2A, 3C, 7B, 7C

5: 1B, 2B, 3C, 7B, 9C

6: 1B, 2A, 3D

7: 1B, 2A, 3D, 8B, 8C

8: 1B, 2A, 3D

ES: 1B, 2E, 5B, 9A

AS: 1B, 2E, 7B, 7C, 12A

Topics:

Human Activity/Environmental Impacts

Landforms

Scientists/Naturalists

Water Quality

Water Sources/Use

Weathering/Erosion/Deposition

Wildlife

Methodologies:

Critical Thinking

Models

Poster/Visual Aid

Setting: Classroom

Activity Time: 45-60 minutes

Objective:

Students will create a model of a watershed to understand the impact of slow changes to Earth's surface through the processes of weathering, erosion, and deposition, and discover the impact of pollutants as they travel throughout.

Materials:

Provided

PowerPoint

Not Provided

Per Group

One cafeteria tray

One bowl of Skittles

One bowl of small pebbles

One spray bottle with water

Paper towels as needed

Per student

Pencil

Paper or journal

Washable blue marker

Piece of heavyweight,
white copy paper

Vocabulary:

canyon, deposition, ecosystem, erosion, non-point source (NPS), point source pollution, runoff, valley, watershed, weathering

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Background:

A watershed is the land area from which water drains into other bodies of water. All Texans and Texas wildlife live in a watershed and both must have water to live. When it rains, the water falls on streets, lawns, and buildings. Water that is not absorbed into the ground becomes runoff and may cause erosion, which shapes the land throughout Texas. Rock is broken apart and carried away by fast-moving water and deposited in new locations. Eventually, the water will flow into other bodies of water.

As runoff water drains into the nearest creek, lake, or river, it picks up everything in its way, including pollutants like motor oil, grass clippings, animal waste, and perhaps litter that someone carelessly left on the side of a road. Pollutants can also be harmful to groundwater, which is a major source of drinking water. Because we all live on the land, it is important that we protect the condition of our watershed.

Watershed Websites:

Watersheds, <http://www.epa.gov/hwp>

Texas Watershed Viewer, <http://tpwd.texas.gov/education/water-education/Watershed%20Viewer>

Watershed Puzzle, <https://www.gbra.org/presentations/watershedpuzzle/index.html>

Activity Preparation:

- Please note that slides 1-16 provide background information and are intended to serve as a review. Students will have a better understanding of this lesson if they have already been introduced to the processes of weathering, erosion, and deposition as related to watersheds and landforms.
- Review slides 17-22 of the PowerPoint prior to starting the lesson to see the set-up procedure.

Procedure:

Discussion

1. To provide background information, use the provided PowerPoint.
 - Tell students they will be creating a model of a watershed. Before beginning, provide background information that will help them understand the models they are going to create.
2. Slides 1-8 provide background information on the processes of weathering, erosion, and deposition, which in this lesson, are caused by water. When you reach slide 5, ask the students to stand and use their hands to practice the processes of weathering, erosion, and deposition. The instructions are on the slide and also below.

Weathering breaks it, breaks it, breaks it!

Instruct students to pound one fist on top of the other.

Erosion takes it, takes it, takes it!

Instruct students to start with both hands together as if they are praying.

Separate hands and move them away from one another, keeping them flat and parallel to the ground to simulate movement.

Deposition lays them down, lays them down!

Gently lower your hands down, all the way to the sides of the body.

3. Slide 7 provides an example to which students can relate their own experiences with water.
4. Slides 9-13 provide a review of a watershed, along with information on locating their watershed addresses. Non-point source pollution is introduced.
5. Slides 14-16 are for use later in the lesson. Slide 14 addresses watershed management and stewardship. Slides 15 and 16 provide an oral review of the lesson, with extension questions.

Activity

1. Arrange students in groups of 4-6 and provide each group with the materials listed above.
2. Instruct students in each group to use a piece of heavyweight white copy paper to create the model. Students should gently crumple each piece of paper. *Slides 17-22 of the PowerPoint are example pictures of the model and are for the teacher or student use, as needed. The picture on slide 22 is what the model might look like after students identify their watershed.*
3. Instruct students to use the blue washable markers and trace all creases on the crumpled paper. The blue ink represents water.
4. Next, instruct students to arrange the crumpled paper on the cafeteria tray in a fashion that resembles hills, ridges, or mountains. Explain that this model represents a canyon watershed, which is a land area from which surface water from rain or runoff drains into another body of water. Canyons are formed from slow changes to the Earth's surface through many, or sometimes millions, of years of water erosion.
5. Each student should then choose five Skittles from the bowl and place them at various locations, including in between ridges, in valleys, or on top of hills or mountains.
6. Instruct each group to place several pebbles onto the model. The pebbles represent rock and sediment.
7. Use slide 9 to review the meaning of a watershed and introduce non-point source pollution. Explain to students that the Skittles represent pollutants that have become a part of runoff waters. Introduce or review the term "runoff" as water that does not become absorbed by the earth and flows across the surface of the land into a stream or lake.

Allow students to share known pollutants such as nutrients from fertilizer, pesticides, bacteria, sediments, animal waste, and oil. Pollutants released from a location that is unknown are non-point source pollutants, as you cannot "point" to the source. Point source pollution is the opposite; these pollutants came from a specific location, such as a tunnel, sewer, or pipe. This slide also explains the purpose of storm drains as a way to connect urban areas to the watershed. The slide discusses how pollutants wash into urban waterways.

8. Ask students to record in their journals their predictions of what will happen to the rainwater, the pebbles, and the Skittles, when it begins to rain.

9. Instruct each group to use the spray bottle of water and heavily mist the entire model. Students will observe the blue water (blue ink) flowing downhill, as well as the pollutants (dissolving Skittles) contaminating the color of the water. Allow them to use as much water as desired in the bottle. The more water sprayed, the better the results. As students are observing the runoff that occurs, this is a good opportunity to make sure they understand its meaning.
10. View the YouTube video referenced on slide 11, which further explains the meaning of a watershed and humanity's impact on the water within a watershed. [What's Your Watershed Address?](#), TPWD videos (2:00)

This will also give the models time to settle and for the colors to mix. Slides 12 and 13 contain links to websites that locate and provide the names of the watersheds across the state.

11. Return to the models and ask students if their predictions of what would happen to their models were correct. Brainstorm ways to promote stewardship by preventing non-point source pollution from entering their own watersheds. Slide 14 addresses this as watershed management practices.

Wrap-up

1. Slides 15 and 16 contain questions to facilitate an oral review and will be helpful for younger students.
2. Project the following questions on a screen. Instruct student groups to answer any four of the following questions. Students should base their answers on the background information given and the models they created. They may record answers on paper or in journals. Allow time for groups to share responses with the class. If a question goes unanswered, initiate a class discussion.
 - How did this model replicate weathering, erosion, and deposition? *Water broke up the sediment and washed it away, then deposited it in a new place. Pollutants contaminated the water.*
 - Of the processes of weathering, erosion, and deposition, which happens first? *Weathering happens first. All erosion begins with weathering.*
 - Did the contaminated or polluted water end up near the source of pollution or did it runoff to other areas? Most of it ended up in other areas as it was carried away. *The water was contaminated with pollutants because it was no longer blue. The dye from the Skittles (pollutants) mixed with the blue and contaminated it, representing non-point source pollution.*
 - How can the processes of weathering, erosion, and deposition have an effect on ecosystems and wildlife? *If enough destruction occurs from the processes, ecosystems can be damaged forcing wildlife to move to other locations, to adapt, or to perish. Wildlife habitats can also be destroyed.*
 - When pollution occurs in the city or in the country, how does it affect private land and its wildlife? *It can contaminate water miles away from its original source due to runoff and even seep into the groundwater. The pollutants can be harmful to wildlife as it may contaminate their drinking water.*
 - What are the advantages of creating a model like this? *It is a way to learn about weathering, erosion, and deposition, and the way runoff water and a river can create a canyon. It is also a way to learn about pollutant transfer from one place to another through non-point source pollution.*
 - What are the limitations or disadvantages of creating a model like this? *The model is not real and the rainfall is not real. The size is not anywhere near the same. The materials used to create the model were not real.*

- Why would a scientist want to visit and study watersheds in Texas? *Scientists study the Earth to look for clues to the past and to predict the future. They also can test water for certain contaminants.*

Extension

Instruct students to pretend they are a wild animal that lives in a Texas watershed. Ask them to write a letter explaining how pollutants are harmful and how to prevent pollution.

Students may wish to play the following game to discover interesting information about watersheds along the Guadalupe River Basin.

Watershed Puzzle, <https://www.gbra.org/education/elementary-classroom-materials/>

For younger children, the following extension activity demonstrates the need for all citizens to be good stewards by being mindful of not polluting.

- Increase the scale of the activity to a piece of butcher paper. Use a 10-15 foot piece of butcher paper, fold it in half, and draw a river in the middle.
- Students can use washable markers to draw privately owned and public land on either side of the river. Privately owned land may consist of houses, factories, farms, and ranches. Public lands may include streets, schools, and parks.
- “Rain” on the watershed using a spray bottle. Lift the paper at one end allowing the water to create runoff and cause “pollution” from both private and public land.