

Watershed Detectives: The Fish Kill Mystery

LESSON 1 Watershed Analysis

Overview

Students determine watershed pollution sources by identifying locations on the land that drain to a pond where a fish kill occurred. They will investigate a watershed model and interpret watershed maps to define the topography and drainage in the watershed surrounding the fish kill in Country Club Creek. The land uses are determined and pollution sources are identified.

TEKS (7th grade Science)

7.1, 7.2, 7.3 B-C, 7.4 A, 7.8A, C

Time

One class period

Purpose

The students will:

1. Define watershed;
2. Interpret topography of the watershed surrounding the site of the fish kill;
3. Identify flow paths in the Country Club watershed that drain to the site of the fish kill;
4. Identify possible pollution sites based on drainage patterns that could have caused the fish kill.

Materials

For each student:

- Student Sheet **1.2**-Map of Country Club Creek Fish Kill
- Student Sheet **1.3**-Watershed Analysis Lab
- Blue and red map pencils or markers

Lab materials for each group of 4-5 students:

- Student Sheet **1.4**-Map of Country Club Creek Watershed
- Student Sheet **1.5**-Austin's Watersheds
- Model of Country Club Creek Fish Kill
- Spray bottle or watering can
- Food coloring
- Bucket or pan to catch runoff

For the teacher:

- "The Mystery of the Dead Fish in Country Club Creek" story
- Student Sheet **1.2**-Map of Country Club Creek Fish Kill

- Student Sheet **1.4**-Map of Country Club Creek Watershed
- Student Sheet **1.5**-Austin's Watersheds
- Poster, "Do You Know Your Watershed?"
- Topographic Map Examples
- Water-Erase Vis-A-Vis

Getting ready

1. If you do not have a document camera, make a transparency of "The Mystery of the Dead Fish in Country Club Creek" story, student sheet **1.2, 1.4, and 1.5** and topographic map examples and set up the overhead projector.
2. Duplicate Student Sheet **1.2** and **1.3** for each student.
3. Divide the class into lab groups of 4-6 students (maximum of 5-6 groups). It is suggested that the groups formed for this activity work together for the remainder of the module.
4. Make a copy of Student Sheet **1.4** and **1.5** for each lab group.
5. Set up lab materials for each group (watershed model, watering can, food coloring, pan and map pencils).
6. Write vocabulary terms on the board.
 - **Watershed**- the area of land that drains to a creek, lake, or aquifer.
 - **Ichthyicide**- a fish kill.
 - **Groundwater**- water within the earth that supplies wells and springs.
 - **Tributary**- a smaller stream that flows into a bigger stream.
 - **Main stem**- the largest creek in the watershed that receives water from the smaller tributaries.
 - **Headwaters**- the beginning point of a creek, stream, or river.
 - **Flow path**- the path runoff water takes over the land as it flows downhill to a lake, creek or river.
 - **Water Treatment Plant**- a facility where fresh water is filtered and cleaned for drinking.

THE ACTIVITY

1. Introduction

☛ Tell students Austin is a place of incredible beauty, due largely to the clean water found in the abundant creeks, springs, and water in the Colorado River. However, like any urban area, Austin's water resources are threatened by pollution. Pollution from past and current events are often reported by citizens and investigated by City employees. In this module, you will investigate a fish kill in a tributary to Country Club Creek that was first reported on May 3, 1979. You will follow the scientific process used by environmental investigators to determine the source of pollution that caused the fish kill in Country Club Creek.

2. Identify the Problem

- ☛ Display "The Mystery of the Dead Fish in Country Club Creek" story on the overhead. Ask for volunteers to read a paragraph out loud to the class. Explain to the class that for the next few days they will be investigating this fish kill which actually occurred in Austin in 1979. In each lesson they will acquire more background information to help them discover the source of the fish kill.
- ☛ Display Student Sheet 1.2-Map of Country Club Creek Fish Kill on the overhead and point out the "X" on the map where the fish kill in Country Club Creek occurred.

3. Define Watershed

- ☛ Refer to the "Do You Know Your Watershed" poster.

Tell students when investigating a pollution spill, we can limit the investigation by targeting the watershed in which the pollution event occurred.

- Define Watershed: the area of land that drains to a creek, river, or lake. Water also flows through the ground in a watershed and emerges as springs. The extent of the land that drains to the creek is limited to the land between the high points or hilltops surrounding the creek and the low point where the creek is formed. The quality of that land (how it is used, the chemicals that are present on the land, etc.) determines the quality of the water in the creek. If a specific site on a creek is polluted, the watershed that drains to that site will be investigated.

- ☛ Display transparency of Student Sheet 1.5-Austin's Watersheds.
 - Locate Country Club Creek Watershed. Mabel Davis Pond is located in Country Club Creek Watershed.
 - Locate your school's watershed.

☛ In Austin, most of our creeks and their watersheds are part of the larger Colorado River Watershed. The Colorado River is Austin's main drinking water source. Point out the water treatment facilities. Explain that water downstream of these facilities is not part of Austin's drinking water.

- ☛ Display transparency of Student Sheet 1.4-Map of Country Club Creek Watershed. Locate Mabel Davis Pond on the map. Explain to the students that the pond flows into a tributary of Country Club creek. A tributary is a smaller stream that flows into a larger stream. You can determine the number of tributaries to Country Club Creek by counting the number of points where a creek flows into Country Club Creek. You will investigate the watershed of the pond tributary.

4. Interpret Topography of a Watershed

- ☛ Display topographic map examples and give each student a printed copy of Student Sheet 1.2-Map of Country Club Creek Fish Kill. Explain the rules of contour maps using the transparency of Topographic Examples. Apply the rules to interpret the topography of Student Sheet 1.2.

1. **Contour lines** depict areas of equal elevation by number of feet above sea level.
 - Where is the highest point on Student Sheet **1.2**? (SW corner)
 - What is the height in feet above sea level in this area? (660)
2. **Contour intervals** are the consistent increase or decrease in feet above sea level represented by each contour line. The bold red lines represent 10 foot intervals. The light colored lines represent smaller contour intervals.
 - What is the smallest contour interval for this map? (2 feet).
3. **Steep or Gentle Slope:** Contour lines spaced close together show a steep slope, or steep hills and ridges. Conversely, areas having contour lines spaced widely apart display a gentle slope.
 - Does the area depicted on Student Sheet **1.2** consist mostly of steep or gentle slopes? (gentle)
4. **Hilltops:** Contour lines that form circles indicate a hilltop, or a place of higher elevation.
 - Locate the hilltops on Student Sheet **1.2**.
5. **Creek Crossings:** Contour lines bend upstream when crossing streams.
 - Locate the contour lines crossing the creek on Student Sheet **1.2**
 - Indicate the direction of water flow by drawing an arrow next to the stream. Make sure the arrow points downstream.
6. **Ridge Lines:** Contour lines bend downslope when crossing ridges.
 - Locate the ridge between the two tributaries to Country Club Creek on Student Sheet **1.2**.
 - Draw the ridge line. Tell students this would be the east watershed boundary for the Country Club Creek tributary we are investigating.

5. Watershed Lab

➤ Display Student Sheet **1.2**-Map of Country Club Creek Fish Kill. Tell students they will be testing a model of the topography of the watershed around the Country Club Creek fish kill to determine the area of land that flows to the contaminated site. Tell students that the pond in Mabel Davis Park where the fish kill occurred is fed by surface water runoff and a **groundwater spring**. Point out the landfill boundary on the map. Tell students that this area was a City operated landfill from 1944 to 1955 and became inactive in 1959. The park was constructed over the landfill area in 1978, so they might want to test sites over the landfill they think will drain to the pond.

Test specific land use sites, e.g. the gas station, farm, IRS etc. Use Student Sheet **1.2** to draw the **flow path** (the route the water flowed as it drained downhill) from each site you test to the pond.

➤ Have students complete Student Sheet **1.3**-Water Analysis Lab.

THE MYSTERY OF THE DEAD FISH IN COUNTRY CLUB CREEK

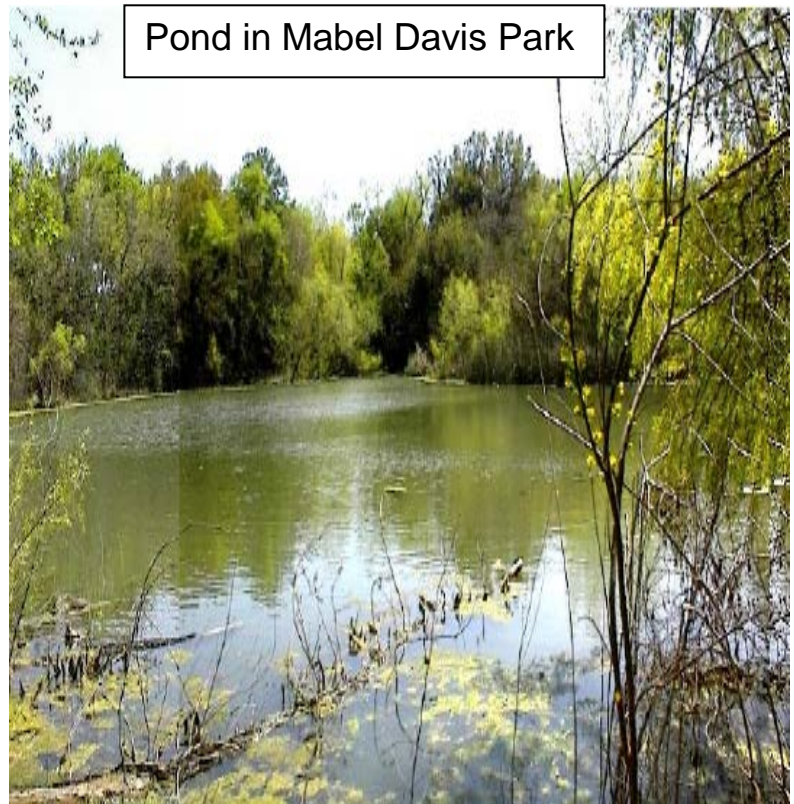
It is the summer of 1979 and you are staying with your grandmother who lives near Mabel Davis Park in southeast Austin. It has been raining all week and you are glad to finally get out to the park. Before you reach the park, you notice a dead fish in the creek that flows through the park. You decide to follow the creek to see if you find anything else unusual.

As you continue walking along the creek towards the park pond you see several more dead fish. Finally you reach the park pond and you are shocked to see about 200 fish floating belly up in the pond. You are not happy about this. You also notice a strong chemical odor. You've been studying water pollution at school and so you decide to investigate, but first you call the City Pollution Hotline to report what you found.

You begin by making a map to record what you observe. Much of the neighborhood has changed since you began staying with your grandma during the summer five years ago. There are many more houses and fewer farms. Linder Elementary and playing fields have replaced the old country school. The creek has been cleaned up since you and your friends used to make forts out of scraps of metal and wood you found there.

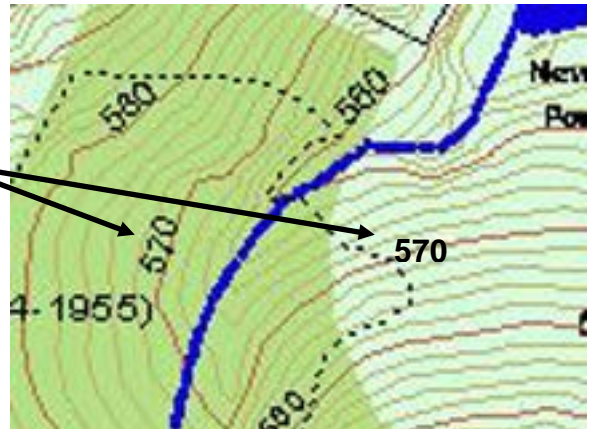
As you are finishing your map, one of your Grandma's neighbors, Mr. Newell, comes over to visit. He sees your map and tells you he has a pond downstream of the park. He has not seen any dead fish in his pond, but is concerned about the survival of the fish and about the possible harmful effects of eating the fish from his pond.

While you are talking with Mr. Newell, city environmental department workers drive into the park. You and Mr. Newell walk to the park with your map and tell them about your observations. Impressed with your careful investigations, they ask for your help to decide which sites to test to determine the source of the pollutant.



TOPOGRAPHIC MAP EXAMPLES

1. **Contour lines** depict areas of equal elevation by number of feet above sea level



2. Elevations on one side of a line are **higher or lower** than elevations on the opposing side

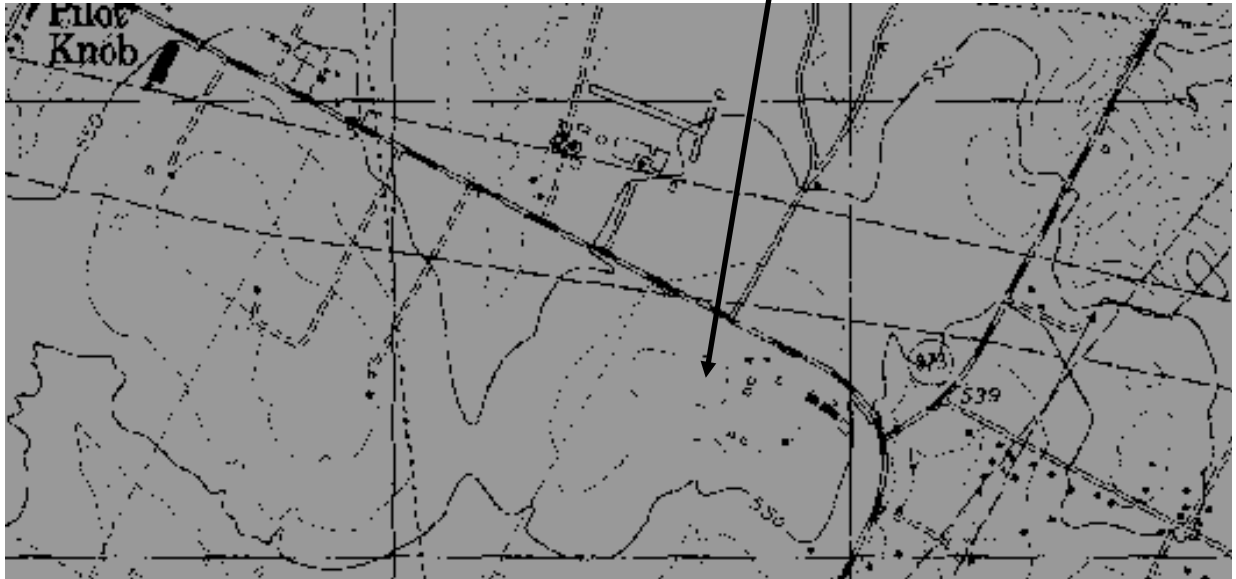


3. **Steep slope**

Gentle or flat slope



4. Circles indicate **hilltops** or a place of high elevation



5. Contour lines **bend upstream** when crossing creeks

6. Contour lines **bend downslope** when crossing ridges

