

Learning Activity 1

WHAT IS STORM WATER AND WHERE DOES IT GO?

INTRODUCTION:

Excess water from rainfall and outdoor watering, called **runoff**, needs a place to go where it won't interfere with the safety of residents or damage their property.

Public streets in urban areas drain runoff from our homes and businesses. Runoff flows along the gutters, into **storm drain inlets**, and through **pipelines** lying beneath the streets.

The storm drain system is operated by the Fresno Metropolitan Flood Control District. Many underground storm drain pipelines are large enough for a six foot tall person to stand erect inside. Even so, rainfall can be so intense that pipelines fill up and runoff backs up into the streets until it drains away.

Most storm water runoff generated in Fresno and Clovis flows directly to **ponding basins**. The water in these basins soaks, or "**percolates**," through the soil and replenishes the **groundwater aquifer** below. This aquifer - water stored in the spaces between sand, silt and clay particles deep beneath our feet - is the sole source of drinking water for Clovis and Fresno.

A small amount of our urban runoff flows directly to the **San Joaquin River, canals**, and **creeks**. Beneath these waterways, water percolates through the soil and replenishes the groundwater aquifer below.

Because runoff reaches groundwater, canals, creeks and the river - the water supplies that people and wildlife depend on - it's important to keep runoff clean.

Objectives - Students will be able to:

- ?? Define storm water and runoff.
- ?? Identify where storm water goes - specifically ponding basins, canals, creeks, the San Joaquin River and groundwater.
- ?? Identify groundwater as Fresno and Clovis' sole source of drinking water.
- ?? Explain the purpose of a storm drain.

KEYWORDS:

storm water	San Joaquin River
runoff	groundwater
gutter	aquifer
storm drain	percolate
ponding basin	inlet
canal	pipeline
creek	

MATERIALS:

Clipboards

Writing supplies

Clean Storm Water Poster

Overhead transparencies, including the school storm drain map (optional: include one of each handout).

Copies of student learning sheets 1-1 and 1-2 and "School Storm Drain Map"* (copied back-to-back)

*School storm drain maps for most of the local middle schools are included in Appendix A.

PART 1: GROUP DISCUSSION (Time: 10 minutes)

1. Display the side of the poster, "Storm water and where it goes."
2. Divide class into groups. Have each group select a leader. Pass out copies of the student learning sheet, "Storm Water and Where It Goes," the "School Storm Drain Map," and the "Storm Drain Survey" worksheet.
3. Use the poster, learning sheet, transparencies, and observations through the classroom window to introduce the following:

TRANSPARENCY 1-1

- ?? What is runoff?
- ?? When rain falls on a roof, where does it go?
- ?? When water from sprinklers flows off the lawn, where does it go?
- ?? Which outdoor surfaces will absorb, or soak up, water and which will not?

TRANSPARENCY 1-2

- ◆ Where does runoff in our community go?
- ◆ Where does the water in street gutters go?
- ◆ Why do we have storm drains?
- ◆ What is a ponding basin?
- ◆ What happens to the water at a ponding basin?
- ◆ Where else does storm water go?

TRANSPARENCY 1-3

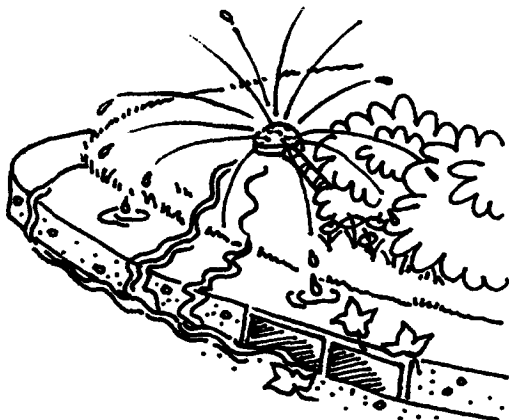
- ◆ What happens to the water that soaks deeply into the ground below ponding basins, canals, creeks, and the San Joaquin River?
- ◆ Where does our drinking water come from?

PART 2: STORM DRAIN SURVEY

(Time: 20 minutes)

The following activity may require permission slips to go off-site and extra adult supervisors.

1. Display the transparency of the "School Storm Drain Map" and help students roughly plot school buildings and parking lots onto their maps.
2. Make sure each group has clipboard, pencil, and copies of the "Storm Drain Survey" worksheet and "School Storm Drain Map."
3. Assign each group to a section of the map with at least one storm drain.
4. Review "Storm Drain Survey" worksheet instructions and your safety rules before leaving. Tell students not to stray into streets and what time to return to the classroom.



PART 3: FINDINGS/CONCLUSION

(Time-10 minutes)

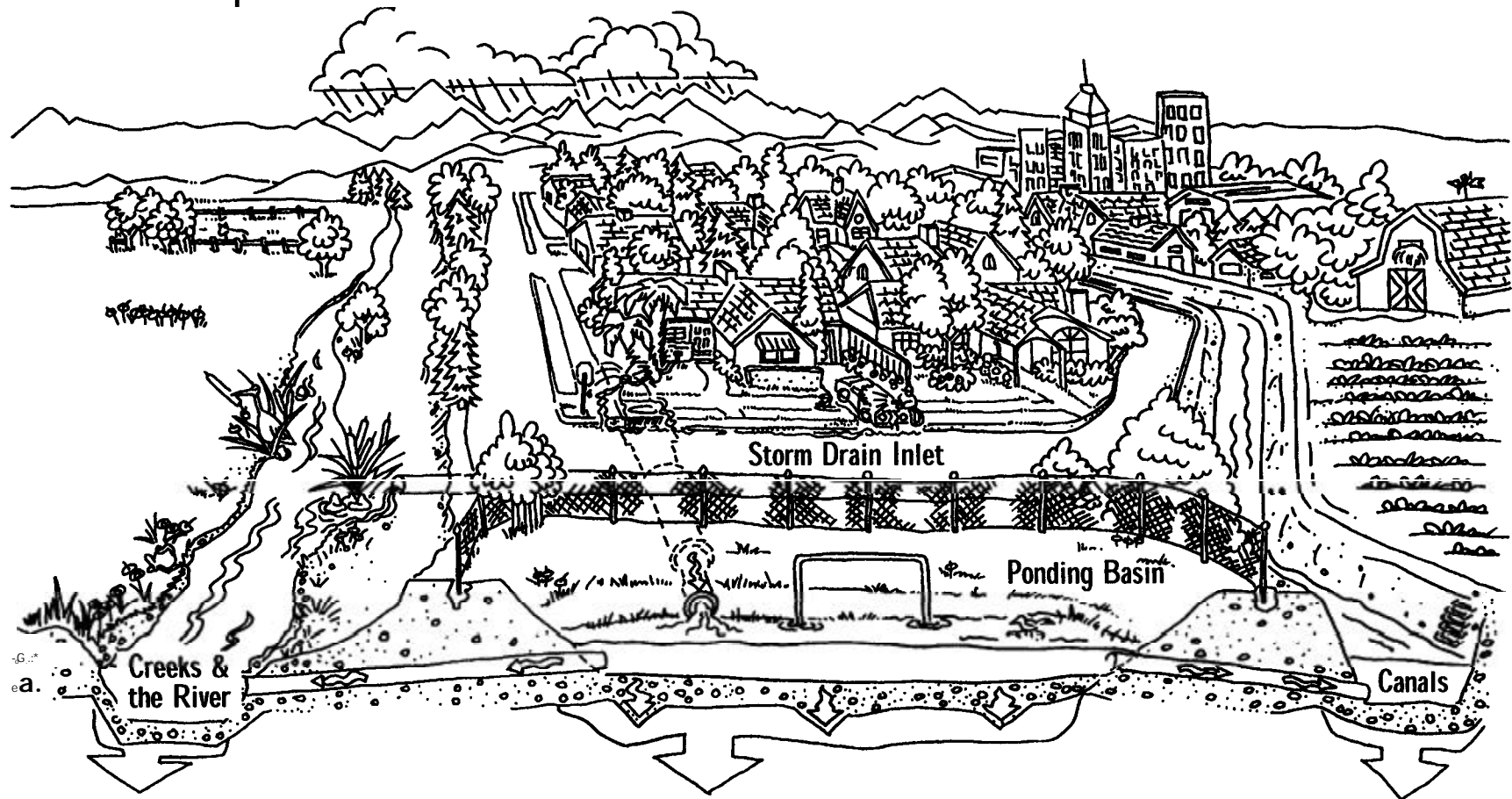
1. Each group should present their findings upon completion of their storm drain surveys. Presentations should focus on the following:
 - ◆ What did you see in the gutter or storm drain?
 - ◆ Where do these things go after they enter the storm drain?
 - ◆ Are there any items found that could pollute the environment? Why?
2. Conclusion: Review the definitions of storm water runoff, where storm water goes, that groundwater supplies our drinking water, and the purpose of storm drains. Ask students questions that help connect this lesson to their lives and values.
3. Optional Assessment: A student post-activity assessment and teacher's answer guide are provided in the last pages of this section.

SUPPLEMENTAL ACTIVITIES

- ✂✂ Have students take home the "Storm Drain Survey" to complete it for the streets where they live.
- ✂✂ Organize a field trip on foot or by bus to a District ponding basin.
- ✂✂ Borrow "Protect Your Water. . . It's Just Beneath Your Feet" (a 7-minute video about Clean Storm Water) or an interactive watershed model from the Fresno Metropolitan Flood Control District.
- ✂✂ Fresno Metropolitan Flood Control District staff can present supplemental materials or provide a tour of District facilities upon request.
- ✂✂ Conduct a water/soil percolation demonstration or investigation, such as the "Water Cycle Column" in Bottle Biology (Kendall/Hunt Publishing Co., 1993).

Student Learning Sheet 1-

1



Runoff soaks through the soil to groundwater

Excess water from rainfall and outdoor watering, called runoff, needs a place to go where it won't be a safety hazard or damage property. Streets drain storm water runoff from our homes and businesses, runoff flows along the gutters, into storm drain inlets and through pipelines lying beneath the streets. Most storm water runoff flows directly to ponding basins. A small amount of storm water runoff flows directly to canals, creeks, and the San Joaquin River.

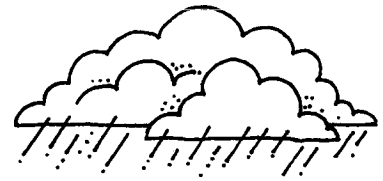
Beneath these waterbodies water soaks through the soil to the groundwater aquifer below. This aquifer - water stored in the spaces between sand, silt and clay particles deep beneath our feet - is the source of drinking water for Clovis and Fresno. Because runoff reaches groundwater, canals, creeks and the river - the water supplies that people and wildlife depend on - it's important to keep runoff clean.

Name: _____

Teacher: _____

Student Learning Sheet 1-2

STORM DRAIN SURVEY



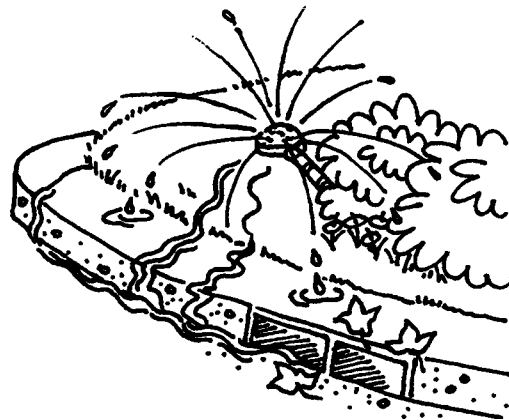
1. Look for rain gutters and downspouts on school buildings. Mark downspout locations with "X"s on the map. Estimate the direction water would flow from each downspout with an arrow on the map.
2. Water will flow from high areas to lower areas. Look for the higher end and lower end of parking lots and streets. Use arrows on your map to estimate the direction runoff would flow in your survey area.
3. Look for litter, dirt, oil, grass clippings, and other things on the ground that could be washed into storm drains. Describe at least 3 things you observed:

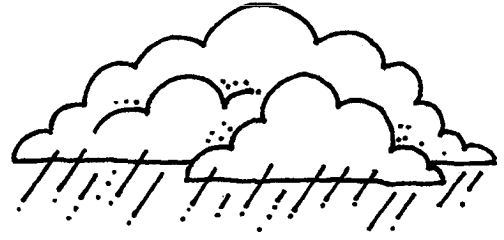
- a. _____
- b. _____
- c. _____

4. Look for a rainbow sheen on flowing water or puddles; this is oil pollution. Where did you observe this? _____
 Look for oil and grease stains from cars and trucks. Where did you observe this? _____

5. Observe the gutters and storm drain inlets in your assigned area. Show the drain inlets on your map.

6. Is there flowing or standing water? YES NO
 Is it from: Rain? Sprinklers/Hoses? Unknown? Other?, _____





- ? What is runoff?
- ? When rain falls on a roof, where does it go?
- ? When water from sprinklers flows off the lawn, where does it go?
- ? Which outdoor surfaces will absorb, or soak up, water and which will not?

- ? Where does runoff in our community go?
- ? Where does the water in street gutters go?
- ? Why do we have storm drains?
- ? What is a ponding basin?
- ? What happens to the water at a ponding basin?
- ? Where else does storm water go?

- ? What happens to the water that soaks deeply into the ground below ponding basins, canals, cheeks, and the San Joaquin River?
- ? Where does our drinking water come from?

Name: _____

Teacher: _____

Student Assessment for Activity 1

WHAT IS STORM WATER AND WHERE DOES IT GO?

DIRECTIONS: **Answer the following questions.**

1. What is runoff? _____

2. Name four places where storm water runoff goes:

- a. _____
- b. _____
- c. _____
- d. Runoff soaks through the soil to: _____

3. What is the source of drinking water for Fresno and Clovis? _____

4. What is the purpose of storm drains? _____

5. EXTRA CHALLENGE: Explain in your own words why storm water runoff is important: _____

LA 1-8

Teacher Resource for
Student Assessment for Activity 1
WHAT IS STORM WATER AND WHERE DOES IT

DIRECTIONS: Answer the following questions.

1. What is runoff?

Runoff is excess water from rainfall and outdoor watering that flows down the street and into storm drains.

2. Name four places where storm water runoff goes:

a., b., c. **ponding basins, canals, creeks, the San Joaquin River**

d. **groundwater**

3. What is the sole source of drinking water for Fresno and Clovis?

Groundwater; aquifer; water pumped from underground.

4. What is the purpose of a storm drain?

Storm drains protect people and property from flooding.

5. EXTRA CHALLENGE: Explain in your own words why storm water runoff is important:

Storm water runoff:

- **is a water resource and is part of the water cycle,**
- **reaches our underground drinking water supply,**
- **reaches ponding basins, canals, creeks, and the river - all of which support wildlife.**

