

Neighborhood Watershed Walk

An exploration of urban watersheds



Objectives:

Students will be able to:

- describe what happens to water when it hits the ground.
- identify how different kinds of urban infrastructure (both natural and built) impact the flow of water
- compare and contrast ways in which water flows through our urban environment by both natural and managed means.
- describe the importance of urban water management to provide reliable water supply and removal.

Author:

Ecology Explorers Education team

Time: 50-60 minutes

Grade Level: 4-8

Standards:

AZ Science Standards:

Inquiry Process, Personal and Social Perspectives, Life Sciences, Physical Science, Earth Science

NGSS-Core

ESS1.C Earth Materials and Systems

ESS2.C. The Roles of Water in Earth's Surface Processes

ESS3C: Human Impacts on Earth Systems

Specific standards listed on page 2.

Background:

Everyone lives in a watershed. The name of it might not be as familiar as the city or town, but a healthy watershed is vital to a healthy community. Urbanization impacts watersheds and affects how they function. This lesson identifies what a watershed is, the nested watersheds Phoenix Valley students live in, and how the built environment alters natural flows of water and materials through the watershed.

Vocabulary:

watershed - the region or area drained by a river, stream, etc.; drainage area

water cycle- the cycle of processes by which water circulates between the earth's oceans, atmosphere, and land, involving precipitation as rain and snow, drainage in streams and rivers, and return to the atmosphere by evaporation and transpiration. the movement of water around the earth.

urban - of, relating to, or designating a city or town

permeable/impermeable surfaces - the ability of water to pass through a surface, typically dependent on the porosity and connectivity of open space within the surface material

Advanced Preparation:

Observe schoolyard watershed to locate relevant features and possible hazards. Students should have some understanding of the water cycle

Materials:

- water
- cups
- slide presentation of natural and urban watersheds images (https://ecologyexplorers.asu.edu/docs/explorers/watersheds_slides.pdf)

video: <https://vimeo.com/96827422>

- student handouts

Recommended Procedure:

Engagement:

- 1) Discuss: You see and interact with water all the time, but may not think about it much. What things need water? Do you need water? How does water get to the things that need it?
- 2) Review the basics of the water cycle – condensation, precipitation, evaporation. What happens to liquid water when it is on the Earth? Where does it travel? How does it affect the living and nonliving parts of the Earth? (Slides 1-6)
- 3) Have students survey the surfaces around their school to consider where liquid water goes when it rains.
- 4) Use Worksheet 1 and have them predict both the general absorption rate (fast or

slow) and direction of and rate of flow across various surfaces.

- 5) Fill cups of water for them to take turns pouring on different surfaces. Were their predictions correct? Introduce the terms permeable/impermeable.
- 6) Survey the property to look for areas built to manage and direct the flow of water, such as drainage areas, evidence of storm water or sewage management, rain gutters fire hydrants, hose spigots, drinking fountains.

Exploration

- 7) Return to the classroom and project onto a white board or poster board a 'street view' map or photograph of the school that includes some of these built elements. Alternately, use the photo (slide 7) provided.
- 8) Invite students as small groups to come label each item in the photo that relates to water in some way.

Explanation

- 9) Have students complete worksheet 2 (slide 7), as one large or several smaller groups. Have students share their answers. (use slides 8 & 9 to reinforce urban infrastructure)

Elaboration

- 10) Since we live in a desert where does our water come from? (slide 10) Share the short movie of the human water cycle in Phoenix <https://vimeo.com/96827422>
- 11) Have the students evaluate the maps and answer the questions for Worksheet 3 (slides 11 & 12).

Evaluation:

- 12) Have students reflect about the importance of infrastructure for moving water around the city using Worksheet 4.

Extension:

- Evaporation rates may affect how much water moves into the wash. Ask how evaporation rates may be different throughout the seasons. Does water evaporate at different rates at different times of year? Discuss the evidence behind their answers. Based on the consensus, have students write a formal hypothesis and prediction. Can they design an investigation to test it?
- Perform a watershed assessment at home. Draw a picture or aerial map of the home site showing how water and pollutants flow.
- View short video on Tres Rios <https://sustainability.asu.edu/media/video/tres-rios/>

- Have students visit the National Geographic Water Footprint Calculator Link: <http://environment.national-geographic.com/environment/freshwater/change-the-course/water-footprint-calculator/> and complete the Water Footprint Calculator activity to the best of their ability.

Standards

Arizona Science Standards

S1C1-GR4-5-PO2
S1C2-GR4-8-PO1
S1C2-GR6-8-PO5
S1-C3-GR4-8-PO1
S1-C3-GR4-PO2
S3-C1-GR4-5-PO1
S3-C1-GR7-8-PO1
S3-C1-GR6-PO2
S3-C1-GR5-PO3
S4-C3-GR4-PO1
S4-C3-GR6-PO2
S5-C1-GR5-PO3
S5-C1-GR8-PO1
S6-C1-GR6-PO1-2, 4
S6-C2-GR4-PO3
S6-C2-GR6-PO1
S6-C3-GR4-PO1-2,4

AZ Social Studies

SS1-C1-GR4-PO1-2,5-7
SS1-C1-GR5-PO3-4
SS1-C1-GR6-8-PO3-5
SS1-C2-GR4-PO3
SS4-C5-GR6-4-PO1
SS4-C5-GR6-7-PO2-4
SS4-C5-GR8-PO1,4

NGSS- Core Ideas

ESS2A: Earth Materials and Systems
ESS2.C. The Roles of Water in Earth's Surface Processes
ESS3C: Human Impacts on Earth Systems

NGSS-Practices

Developing and Using Models
NGSS- Crosscutting Concepts
Cause & Effect
Systems and System Models
Stability and Change

Student Worksheet 1

Neighborhood Watershed Walk



1) Where does water go after it hits the roof of the school? Which way does it flow?

2) Where does water go after it hits the sidewalk?

Pour a cup of water on the sidewalk. Which way does it flow? Does it move fast or slow?

3) Where does water go after it hits the lawn ?

Pour a cup of water on the lawn. Which way does it flow? Does it move fast or slow?

4) Where does water go after it hits the parking lot?

Pour a cup of water on the parking lot. Which way does it flow? Does it move fast or slow?

5) Where does the water go after it hits dirt or sand?

Pour a cup of water on the dirt or sand. Which way does it flow? Does it move fast or slow?

6) Walk around the school? What else do you see that might be designed to move water? (hint: water might come from pipes as well as rain)

Student Worksheet 2

Neighborhood Watershed Walk



- 1) List at least two natural components that use water
- 2) How do the natural component obtain water?
- 3) How does water get to the fire hydrant?
- 4) How does water get to the house?
- 5) What feature do you see that would help water move out of this neighborhood after a heavy rainfall?
- 6) List at least two ways for water to leave the house
- 7) When it rains, how might water flow differently in the grassy versus the non-grassy yard?
- 8) Draw arrows showing the water cycle in this photo.

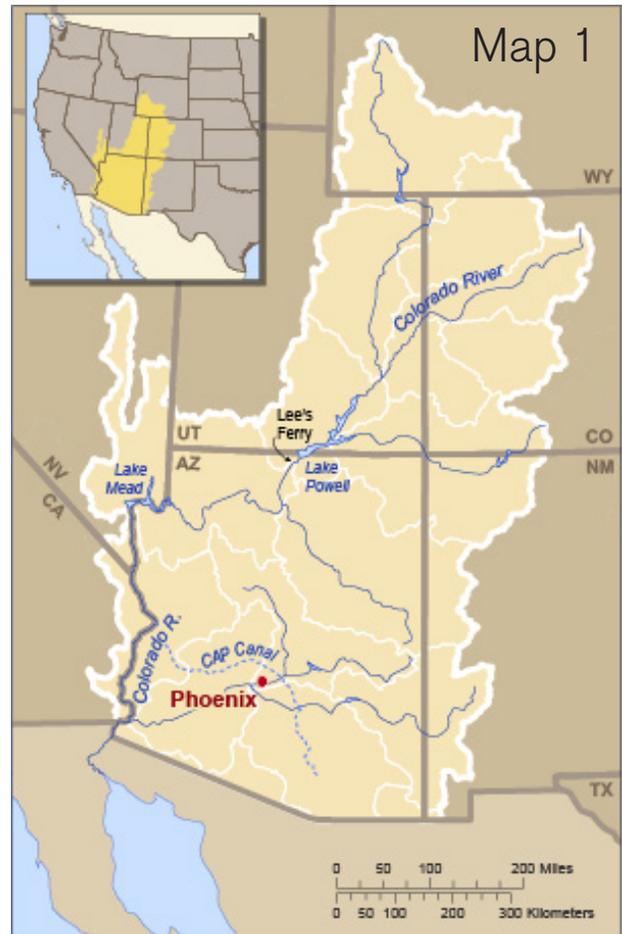
Student Worksheet 3

Neighborhood Watershed Walk



- 1) Locate Arizona on Map 1 and draw a red line around it.
- 2) Locate Phoenix on Map 1 and draw a green circle around it.
- 3) How many rivers contribute water to the Phoenix area?

- 4) Can you tell which direction the rivers flow? Draw some mountains where you think they are on the map.
- 5) Find the CAP canal and trace a blue line along it. What river supplies water to the CAP canal?
- 6) Compare Map 1, and Map 2, which shows a smaller area?
- 7) On Map 2, can you locate approximately where your city is?
- 8) Which rivers flow near your city (or Phoenix)
- 9) at what time of year do Arizona rivers contain the most water?

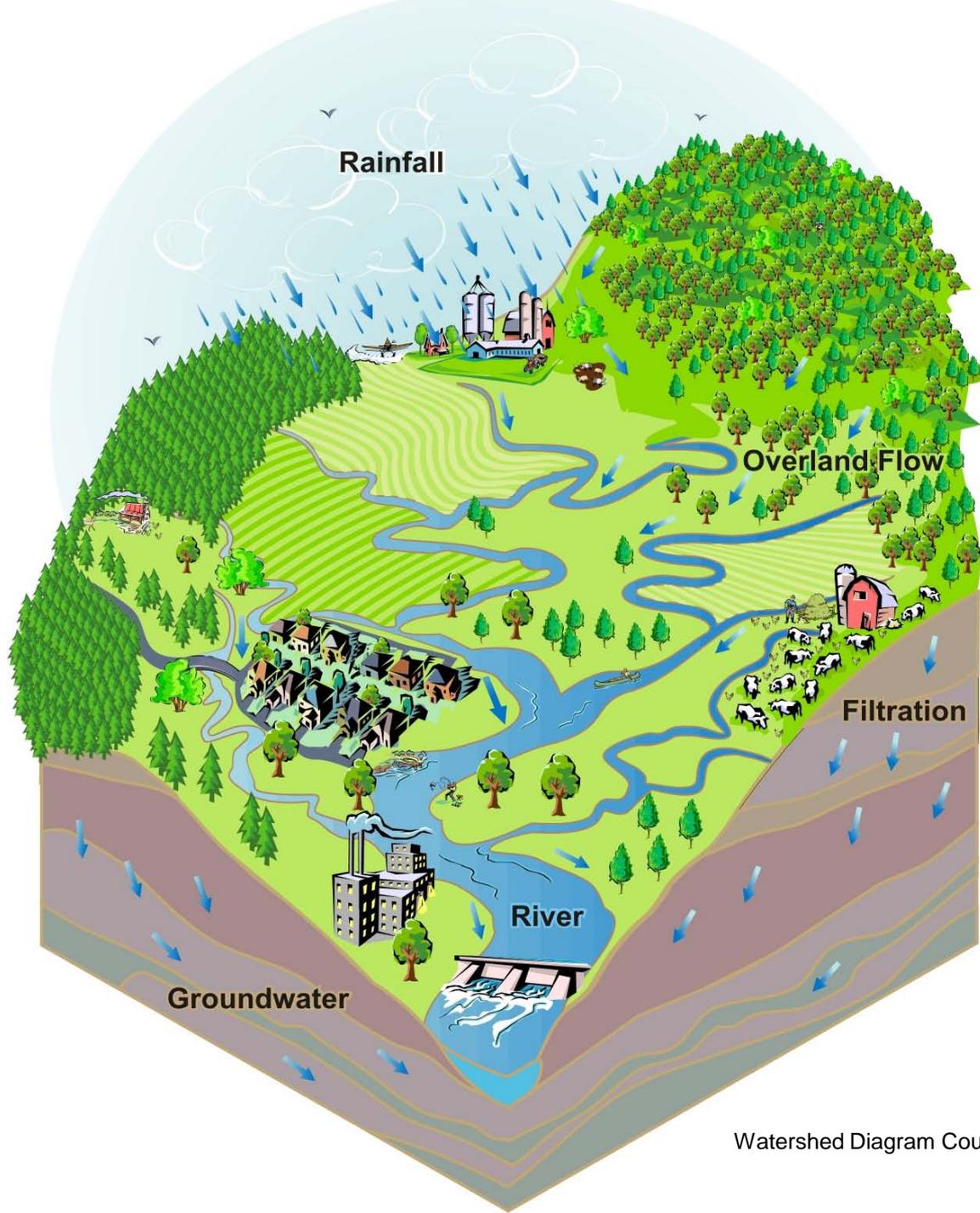


A Watershed



Where is water
found in
vapor form?
solid form?
liquid form?

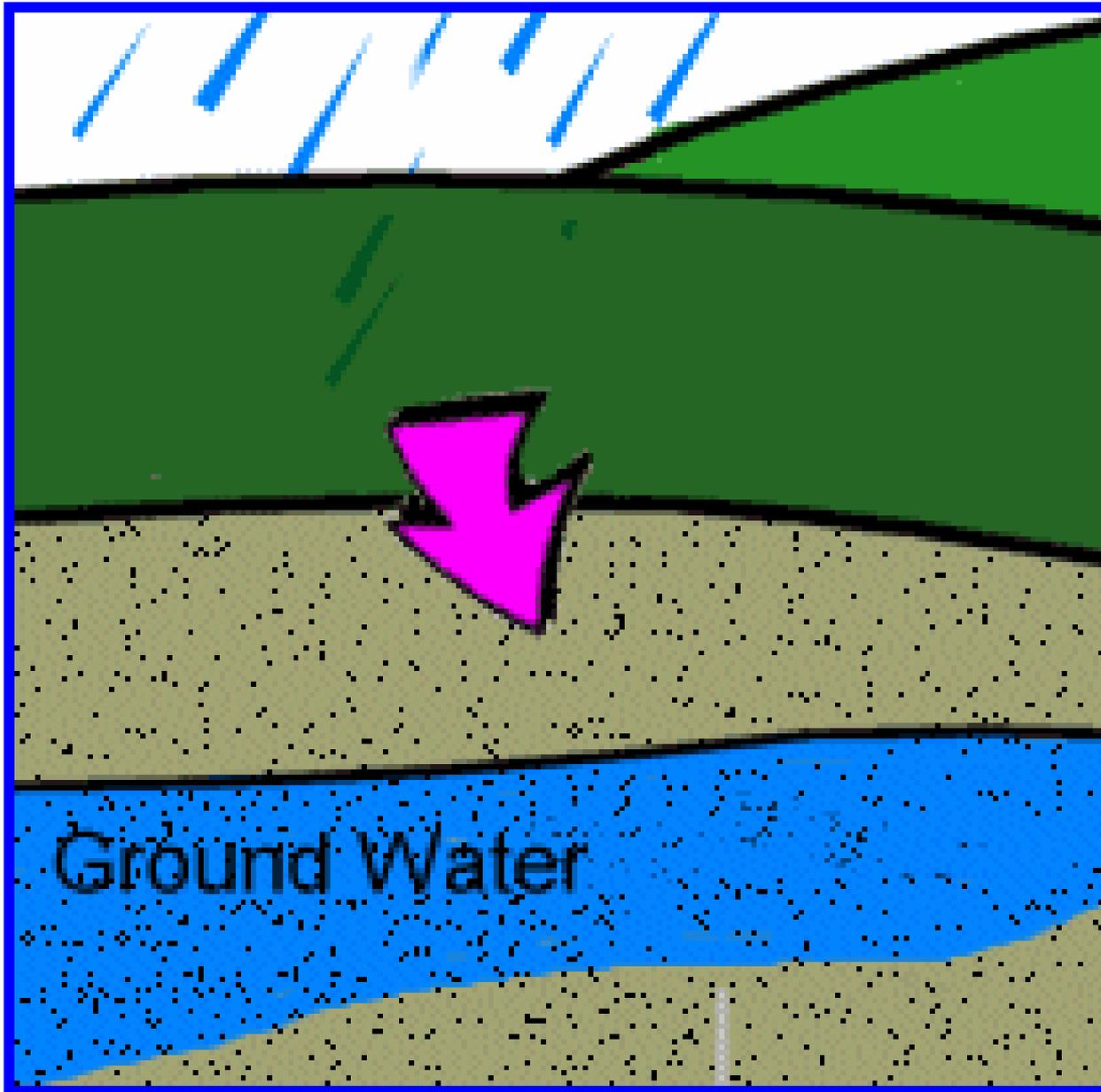
Describe the water
cycle in this
watershed to your
neighbor.



Water in a watershed flows from high to low



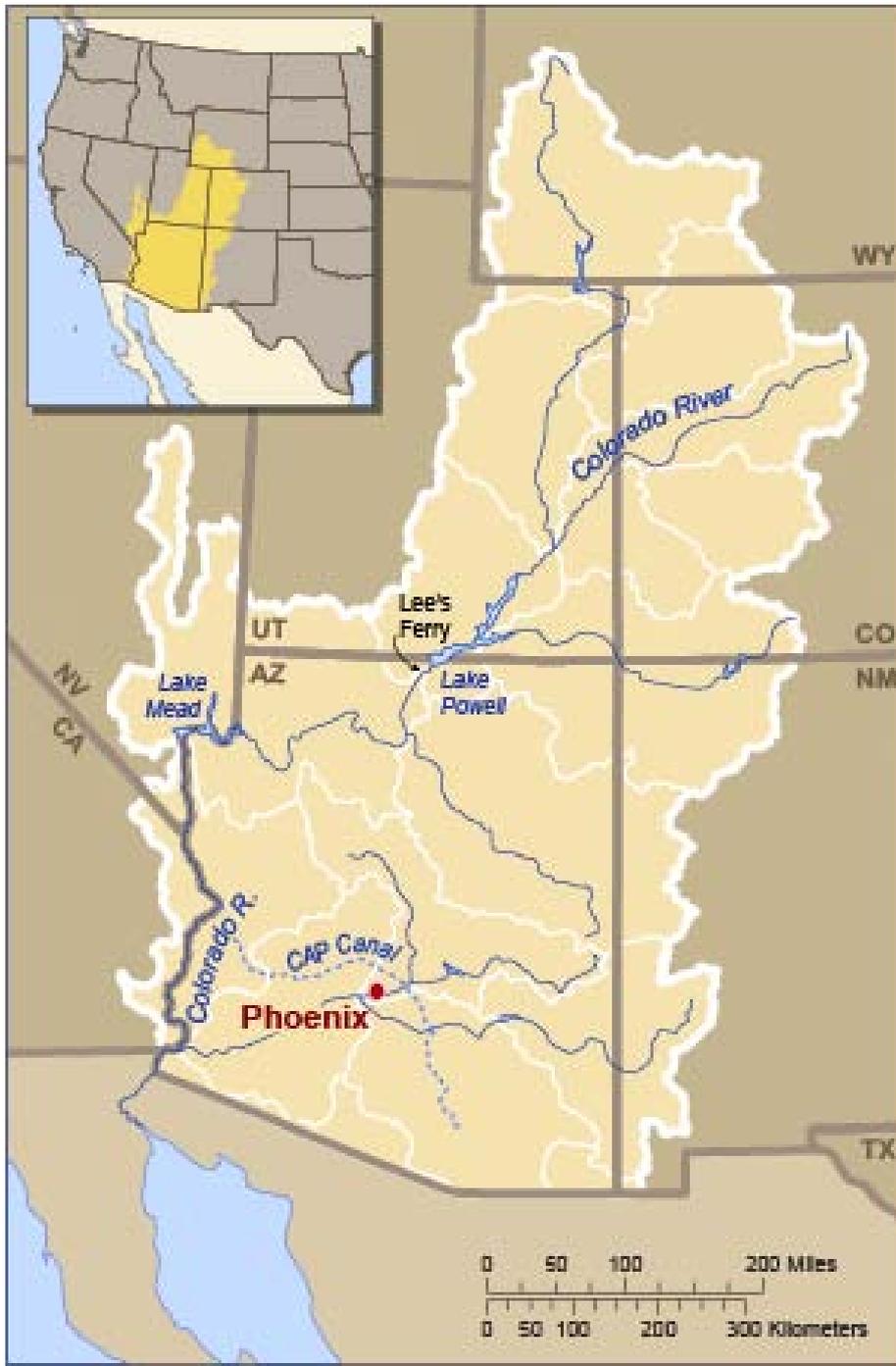
Water filters through different layers of soil.



The Earth
stores
water
underground
in aquifers.

Desert Watershed





Where are we on
the map?

Can you see the
rivers?

Can you tell
where the
mountains are?



What state is
this?
What rivers
are in our
watershed?

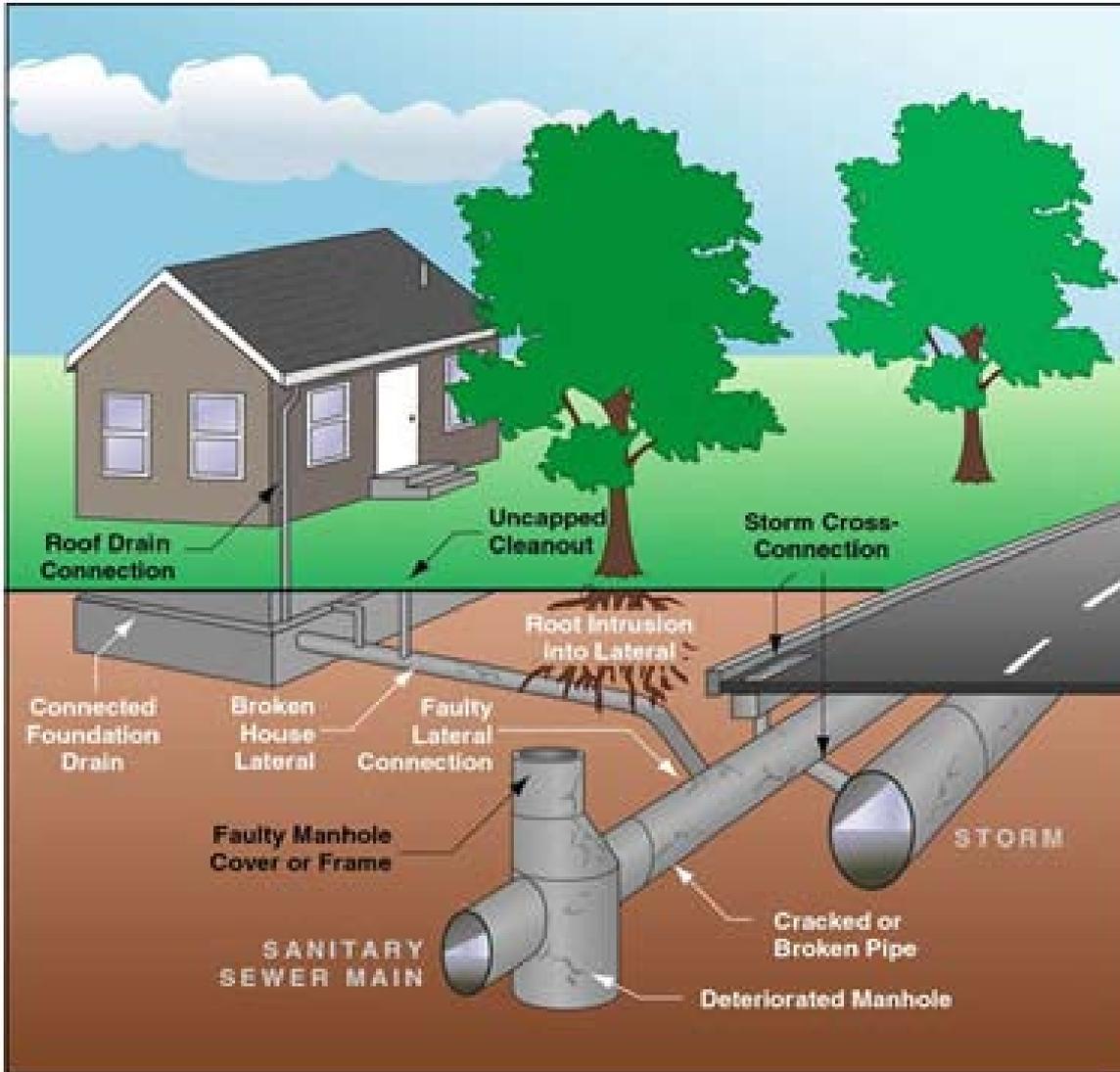
Urban Watershed





In urban areas,
pavement covers soil.

How does water get to
the soil?



What helps drain water in an urban area?

Key:

- ← Inflow Source
- ← Infiltration Source

<http://www.cityoflakeport.com/img/photos/i-and-i-lg.jpg>

How much does it rain in Phoenix?

