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# Rainwater Harvesting: Where does the Rainfall Go?



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# Objectives



- **Understand a watershed and how the water moves through it.**
- **Identify the major watershed that you reside in.**
- **Understand how activities in the watershed affect water quality in downstream water resources.**
- **Know the rationale and advantages behind harvesting rainwater.**

# Rainfall in your watershed



- What is a watershed?
  - An area of land that drains to a common point
- Quick facts
  - Texas has more than 191,000 miles of rivers
  - Texas has almost 2 million acres of lakes
  - 30-50% of total water is used for landscape irrigation
  - The state population will nearly double in the next 50 yrs



# Texas River Basins



## Texas Basins

### Basin Name

- Brazos
- Brazos-Colorado
- Canadian
- Colorado
- Colorado-Lavaca
- Cypress
- Guadalupe
- Lavaca
- Lavaca\_Guadalupe
- Neches
- Neches-Trinity
- Nueces
- Nueces-Rio Grande
- Red
- Rio Grande
- Sabine
- San Antonio
- San Antonio-Nueces
- San Jacinto
- San Jacinto-Brazos
- Sulphur
- Trinity
- Trinity-San Jacinto

# Rainfall in your watershed



- Infiltration vs. Permeability
  - Infiltration occurs when precipitation seeps into the soil
  - Permeability is the measure of how easily something flows through a substance

# Rainfall in your watershed



- Permeability is directly related to infiltration rate
- If the precipitation rate is greater than the infiltration rate runoff occurs

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# What is rainwater harvesting?



- **Rainwater harvesting** is the capture, diversion, and storage of rainwater for use in landscaping, rangeland, and other purposes.
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# Why harvest rainwater?



<b>Rainfall Depth (in.)</b>	<b>Volume per 100 ft<sup>2</sup> of catchment area</b>	<b>Volume per 100 ft<sup>2</sup> of catchment area (gal)</b>
0.5	4	31
1	8	62
1.5	13	94
2	17	125
2.5	21	156
3	25	187

# Why harvest rainwater?



- Rainwater harvesting
  - Saves money
  - Reduces demand on municipal water supply
  - Makes efficient use of a valuable resource
  - Reduces flooding and erosion
  - Reduce nutrient loading to surface waters
  - Protects water quality for downstream users



# Why harvest rainwater?



- Water quality in the watershed
  - Nutrients
  - Bacteria



# Texas River Basins



## Texas Basins

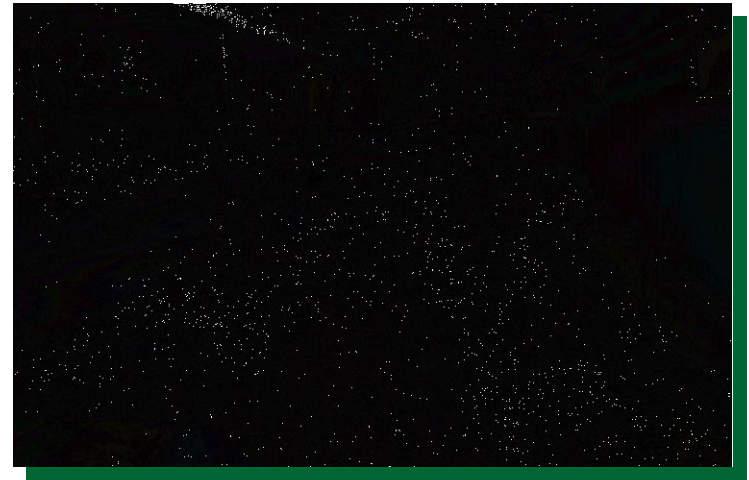
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# Where can rainwater harvesting be used?



- Rainwater harvesting can be used in large-scale landscapes.
  - Rangeland



- Rainwater harvesting can be used in small residential landscapes.

# How Rainwater Harvesting Works



- A rainwater harvesting system consists of
  - The supply – rainwater
  - The demand – plant/animal water needs
  - The collection system
- Simple and complex systems
  - Simple – distribute rainwater immediately
  - Complex – store some or all of rainwater for later use

# Supply: Rainfall



- Supply comes in the form of *runoff*, rainwater that flows off a surface.
  - If the surface is impermeable, runoff occurs immediately.
  - If the surface is permeable, runoff occurs when the surface is saturated.
  - If the rainfall rate is greater than the surface infiltration rate, runoff will occur.

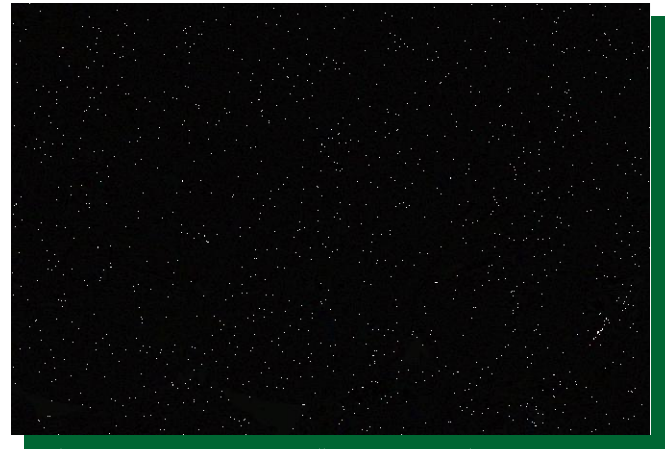


# Demand: Plant

## Water Requirements



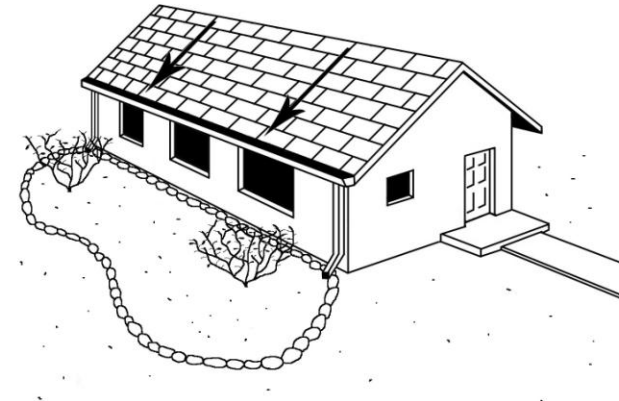
- The amount of water needed is determined by
  - Type of plants
  - Number of plants
  - Growth stage of plants
  - Size of plants
- Plants native to the region are the best choices because their water requirements are met by normal rainfall amounts.



# Simple Rainwater Harvesting Systems



- A simple water harvesting system consists of a catchment, a distribution system, and a landscape/rangeland holding area.
  - Catchment
    - Any area from which water can be collected (e.g. roofs, pavement, or soil surface)
    - Hard, smooth surfaces best
    - Amount of water collected depends on size, surface texture, slope, and rainfall received



# Simple Rainwater Harvesting Systems



- A simple water harvesting system consists of a catchment, a distribution system, and a landscape/rangeland holding area.
  - Distribution System
    - Channel water from catchments to holding area
    - Include gutters and downspouts, sloped sidewalks, hillsides, channels, ditches, and swales
    - Use gravity, gates, or a small pump to cause flow through the distribution system



# Complex Rainwater Harvesting Systems



- A complex rainwater harvesting system consists of catchments, a conveyance system, storage, and a distribution system.
  - Catchments
    - The “yield” that a catchment provides depends on its size and surface texture.
    - Surface textures include:
      - High yield – concrete, asphalt, and smooth roofing material
      - Medium yield – bare soil; compacted clay best
      - Low yield – areas with plants, such as grass or groundcover

# Complex Rainwater Harvesting Systems



- A complex rainwater harvesting system consists of catchments, a conveyance system, storage, and a distribution system.
  - Conveyance Systems
    - Direct water from catchments to storage containers
    - Roof conveyance systems use canals or gutters and downspouts to direct water into storage containers



# Complex Rainwater Harvesting Systems



- A complex rainwater harvesting system consists of catchments, a conveyance system, storage, and a distribution system.
  - Storage
    - Storage makes rainwater available when needed.

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# Web Sites



- [Rainwaterharvesting.tamu.edu](http://Rainwaterharvesting.tamu.edu)
  - [Texaswater.tamu.edu](http://Texaswater.tamu.edu)
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# Questions?

