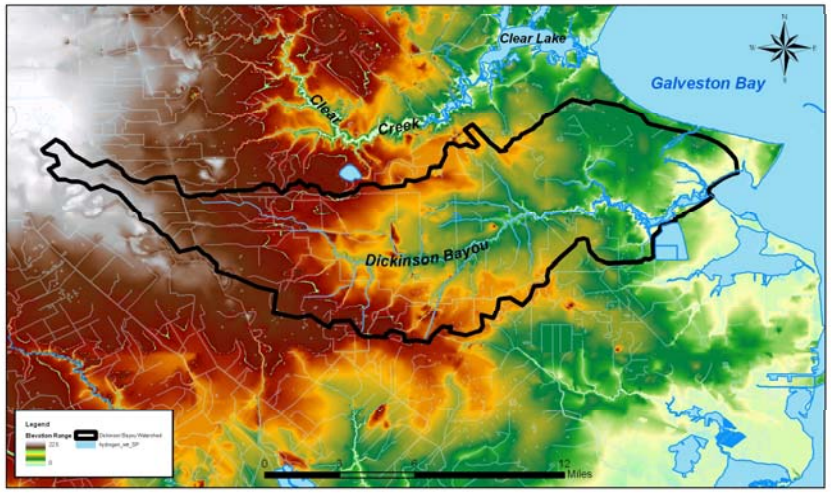
What is a Watershed?

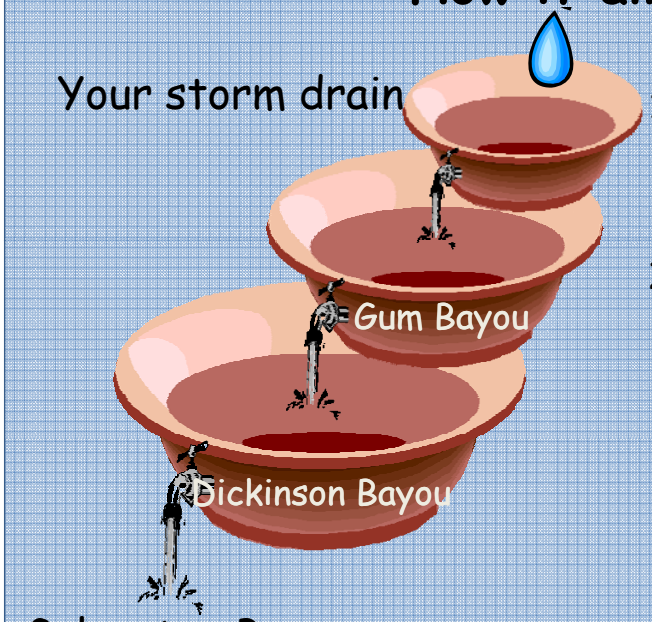


A watershed is an area of land where all the rain that falls drains into one water body such as Dickinson Bayou.

You live in a watershed!

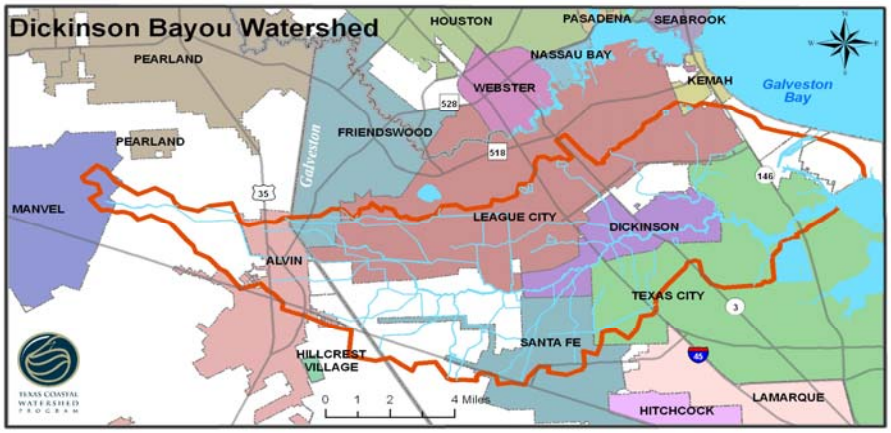
You can make a difference!

How it all works



1. Rain that falls on the street flows into a storm drain
2. Storm drains lead directly into a creek or small bayou
3. Small bayous flow into larger Bayous
4. Large bayous flow into Galveston Bay

Dickinson Bayou Watershed Partnership
&
Dickinson Bayou Watershed Protection Plan



The Watershed Partnership

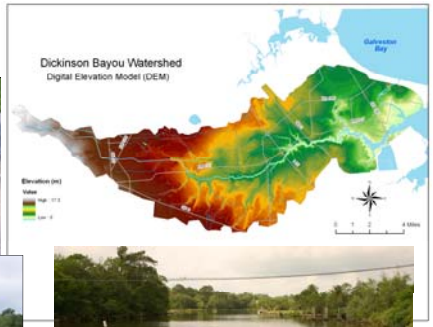
- Works together to implement the Watershed Protection Plan
- Incorporates ideas from many different groups
- Coordinates information and activities
- Involves **everyone**
- Works to make the Dickinson Bayou Watershed a better place to live, work and play

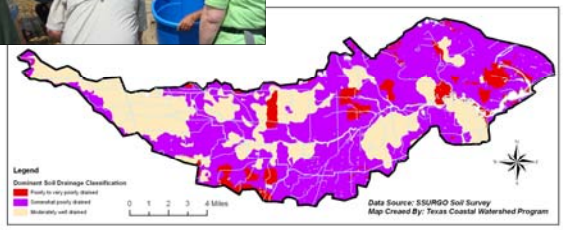
The Watershed Protection Plan

Identifies and tackles issues important to the public including:

- Protecting against flooding
- Preserving natural areas
- Providing recreational access
- Maintaining economic viability
- Addressing land use
- Improving water quality

Dickinson Bayou Watershed Needs You!
www.dickinsonbayou.org





AgriLIFE EXTENSION Texas A&M System

TEXAS NEMO

Dickinson Bayou WATERSHED PARTNERSHIP

Sea Grant Texas

TEXAS COASTAL WATERSHED PROGRAM

Dickinson Bayou Water Quality
Low Dissolved Oxygen

It is important to have oxygen in water for fish and other aquatic life to breath. With out oxygen these animals will suffocate and die.

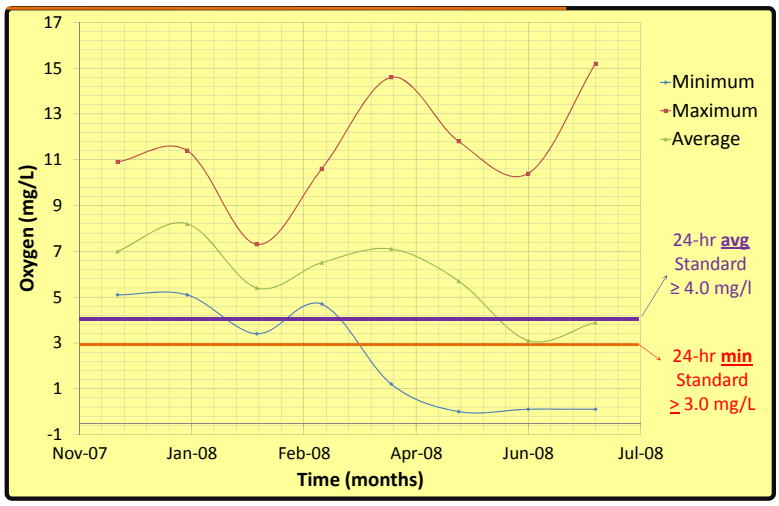
Dickinson Bayou currently has dangerously low levels of oxygen.

Water quality data have been collected at multiple stations on Dickinson Bayou since the early 1970's.

Dickinson Bayou is currently not meeting the TCEQ standard for Dissolved Oxygen Levels.

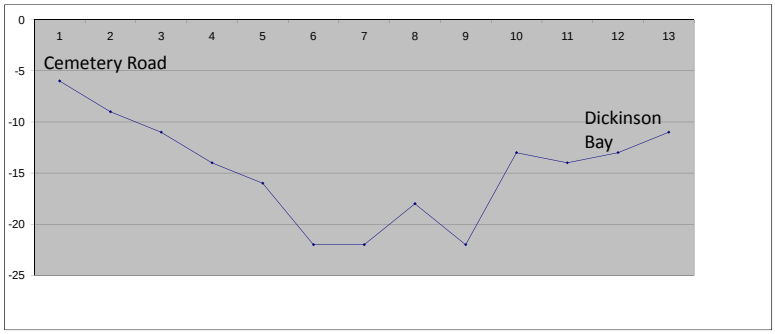
Probable Causes of Low Oxygen

- Excess **Nutrients** especially nitrogen (from fertilizer, waste water, etc.)
- Runoff from **failing septic** systems
- Leakage from **ageing sewage pipes**
- Excess **Organic** material



Data Source: TCEQ Continuous Water Quality Monitor at Hwy 3 and Dickinson Bayou (monitored by the Environmental Institute of Houston)

Water Depth along Dickinson Bayou



Deep water holes in the bayou make it hard for water to mix vertically in the stream

Less mixing = Less Oxygen

The Dickinson Bayou Watershed Needs You!

Here are some ways YOU can protect Dickinson Bayou:

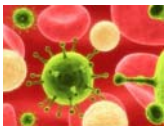
Keep grass clippings, leaf litter and other organic matter from washing into streams and bayous

Plant wetland vegetation in shallow areas of the bayou to help reduce nutrients and sediment s in the water

Plant a WaterSmart Landscape

AgriLIFE EXTENSION Texas A&M System · TEXAS NEMO · Dickinson Bayou Watershed Partnership · Sea Grant Texas · Texas Coastal Watershed Program

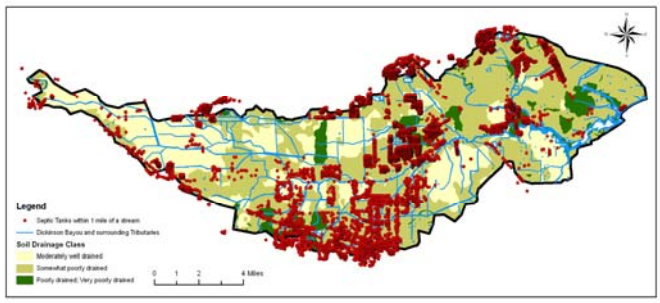
Dickinson Bayou Water Quality
Increased Bacteria Levels



Water quality data have been collected at multiple stations on Dickinson Bayou since the early 1970's.

Dickinson Bayou is currently not meeting the TCEQ standard for Bacteria Levels.

The majority of residential septic tanks in the watershed are in poorly drained soils, which increases the likelihood of contaminated runoff into nearby streams or ditches



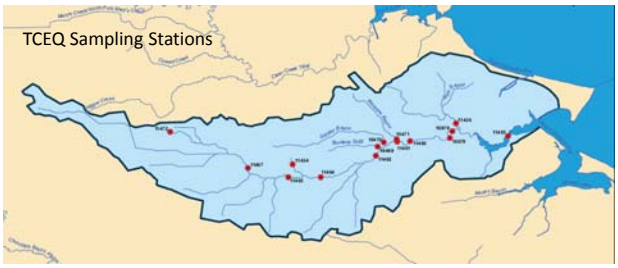
Problems contributing to increased bacteria levels in Dickinson Bayou

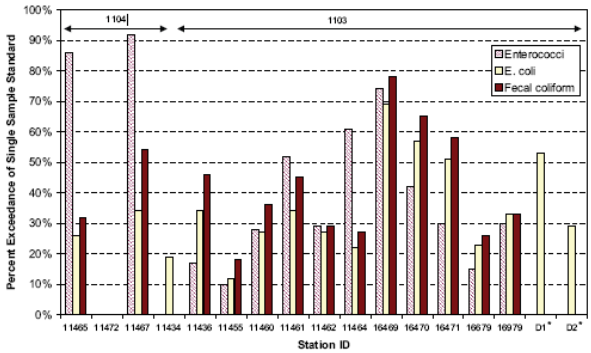
- **Poorly designed and maintained septic systems**
- **Increased urbanization**
- **Pet waste runoff**
- **Old and leaking sewer pipes**

Indicator Bacteria	Geometric Mean Concentration	Not to Exceed Concentration
Fecal Coliform (cfu/dL)	200	400
E. coli (MPN/dL)	126	394
Enterococci (MPN/dL)	35	89

cfu--colony forming unit, MPN -- most probable number

- **Studies are currently being conducted to better understand why bacteria levels are above the standard.**
- **These studies help us understand why the bayou is impaired and what changes we can make to help improve the quality of the water.**





Comparison of exceedances of the single sample standard for 3 bacteria indicators

Increased Bacteria Can Make Humans and Animals Sick

Failing septic systems and animal waste contribute to the overall bacteria levels in the bayou. When bacteria levels are high, contact recreation becomes risky due to increase risk of illness. Pets and fish can also be affected.

The Dickinson Bayou Watershed Needs You!

Here are some ways YOU can protect Dickinson Bayou:

Pick up dog poop and other pet waste so it does not enter our waterways

Keep livestock away from streams and bayous so untreated waste is not washed downstream

Properly maintain on-site septic systems

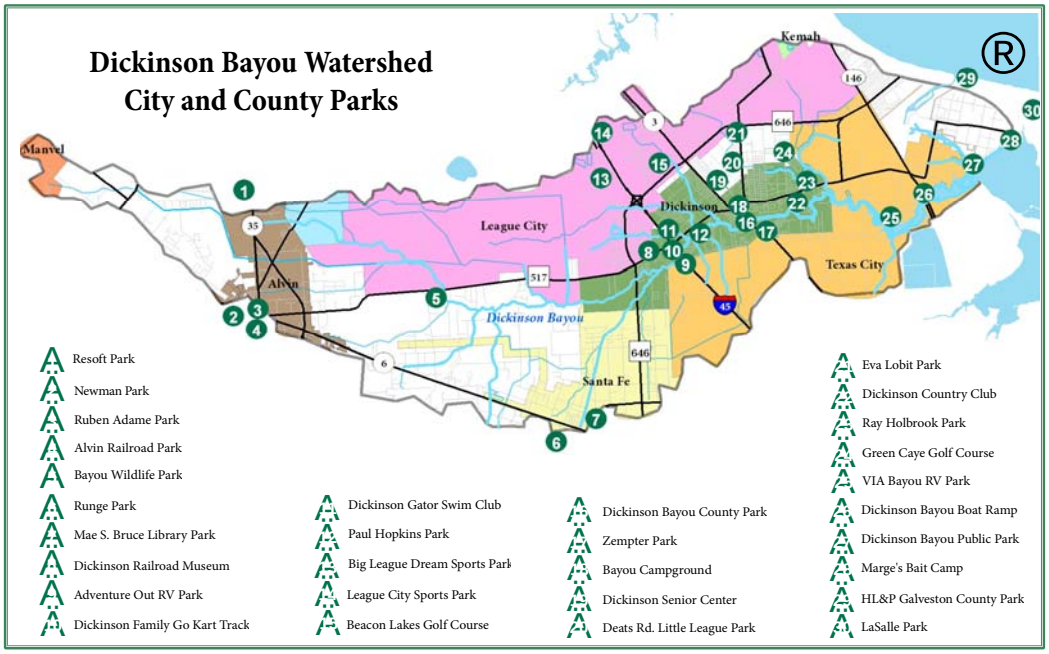
AgriLIFE EXTENSION Texas A&M System | TEXAS NEMO | Dickinson Bayou WATERSHED PARTNERSHIP | Sea Grant Texas | TEXAS COASTAL WATERSHED PROGRAM

Recreating in the Watershed

The Dickinson Bayou Watershed Needs You!

Ways YOU can protect Dickinson Bayou:

- **Place litter in trash cans – help keep the bayou and the watershed clean**
- **Empty boater waste at a pump out station, NOT into waterways**
- **Vote to support parks and natural areas in local elections**



The National Recreation and Parks Association recommends a minimum of **10 park acres/1000 people**

- The Dickinson Bayou Watershed currently has **8.5 park acres/ 1000 people**
- We **need more than 110 acres of new parks** to meet this minimum criteria

AgriLIFE EXTENSION Texas A&M System · TEXAS NEMO · Dickinson Bayou WATERSHED PARTNERSHIP · Sea Grant Texas · TEXAS COASTAL WATERSHED PROGRAM

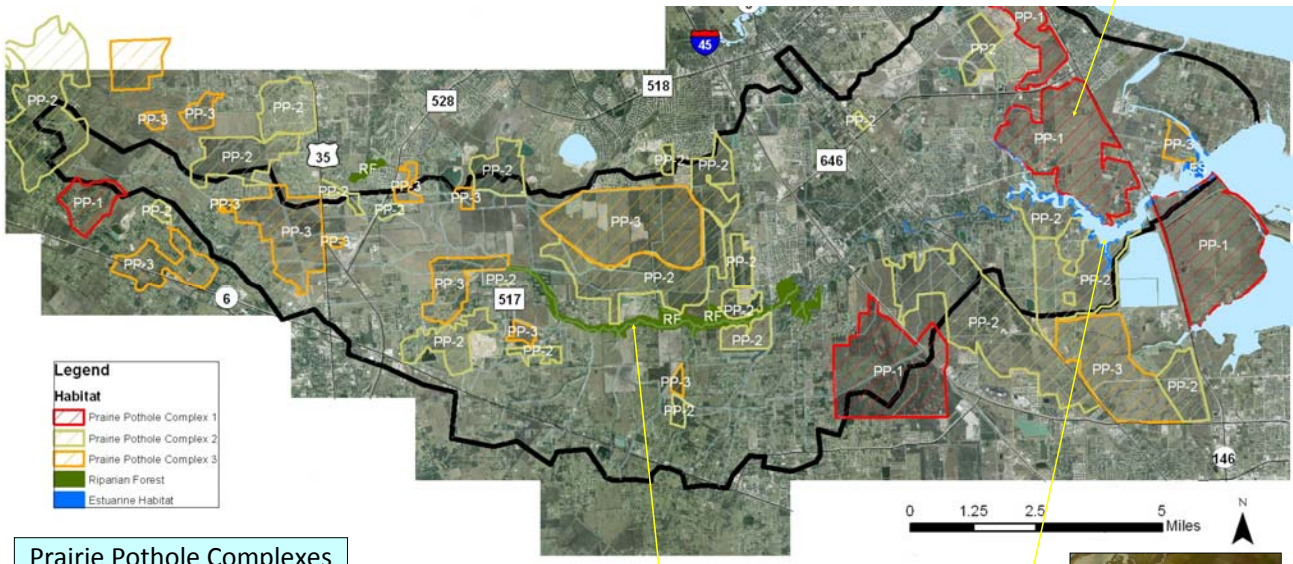
Habitats of the Dickinson Bayou Watershed

Our natural habitats provide these basic ecological services for the watershed:

- *Shelter and food sources for native animals*
- *Filtering of stormwater runoff and water quality improvement*
- *Stormwater storage and potential flood protection*
- *Natural heritage and beauty*
- *Ecotourism*
- *Critical nesting areas for important avian species*

Here's What We Have Left:

Estuarine Marsh: 46 acres *Prairie Pothole Complexes: 33,460 acres*
Riparian Forest: 899 acres



Prairie Pothole Complexes Explained:

Each complex is graded on its quality (how closely it resembles pristine or "untouched" state), so high quality prairie potholes are identified as 1, while lower quality prairie potholes are labelled 2 or 3.

Threats to your Watershed's Habitats:

Habitat Loss through Land Use conversion
- **Habitat Loss through degraded water quality conditions**
- **Invasive Species**

We Can Preserve These Habitats through:

- **Well-planned mitigation**
- **Conservation Easements**
- **Direct or Parkland purchases**

What We NEED:

Habitat Plan with Definitive Restoration Goals

AND

Decision process to preserve valuable habitats

AgriLIFE EXTENSION Texas A&M System | TEXAS NEMO | **Dickinson Bayou Watershed Partnership** | Sea Grant Texas | TEXAS COASTAL WATERSHED PROGRAM

Stormwater
Best Management Practices

Impervious surfaces such as, roof tops, concrete parking lots, roads, and driveways are some of the biggest contributors to water pollution.

What are Best Management Practices?

- A way to deal with and clean rain water on site instead of simply moving dirty water down stream

Neutralizing the damage from paved areas using Best Management Practices (BMPs) is one of the best ways to help preserve and improve the water quality of Dickinson Bayou

What is Low Impact Development?

- A stormwater management approach modeled after nature
- Uses small, cost effective landscape features at the lot level

Vegetated Bioswale

A vegetated swale (rhymes with whale) directs water and allows for more water to soak into the soil instead or running down streets and into storm drains.

Green Roof

A green roof (roof top garden) can reduce energy costs and absorb rain water that would typically flow into gutters.

Rain Water Harvesting

Rain water collected from a roof can be used for irrigation, car washing, flushing toilets or other needs that do not require potable water.

The Dickinson Bayou Watershed Needs You!

Here are some ways YOU can protect Dickinson Bayou:

Remember that storm drains run straight to the bayou and NOT to water treatment plants

Install a rain garden at your home or business

Redirect down spouts to grassy areas so water is absorbed into the ground instead of shuttled to a storm drain

Wash cars at a commercial car wash or on grass instead of driveways so water and chemicals can be filtered by the soil

AgriLIFE EXTENSION Texas A&M System · TEXAS NEMO · Dickinson Bayou Watershed Partnership · Sea Grant Texas · Texas Coastal Watershed Program

Dickinson Bayou Watershed Stormwater Wetlands

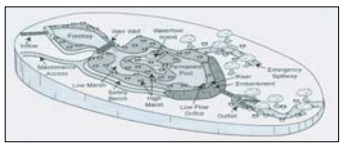
Wetland are critical habitats within our watershed.

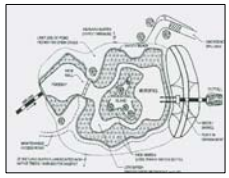
Stormwater treatment wetlands can:

- **function like natural wetland systems**
- **provide critical water quality services**
- **slow down receiving/incoming waters**
- **provide storage for stormwater**
- **provide a aesthetically-pleasing, ecologically-enhancing alternative to traditional detention ponds.**

The Mason Park Stormwater Treatment Wetland (Houston, Texas) has documented proof of the effectiveness of bacteria removal from runoff entering the wetland system.

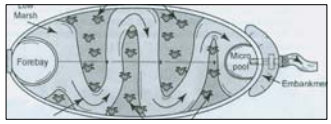
These systems work cheaply and effectively at pollution control!

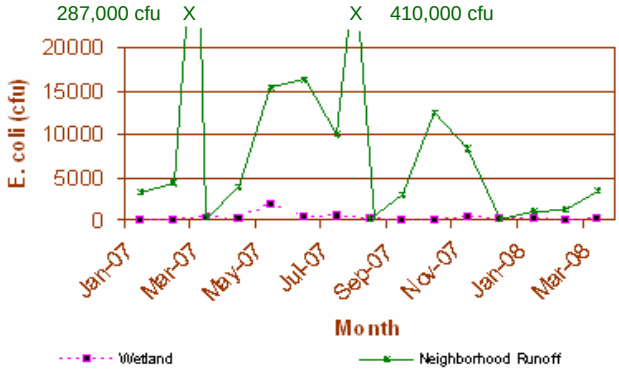




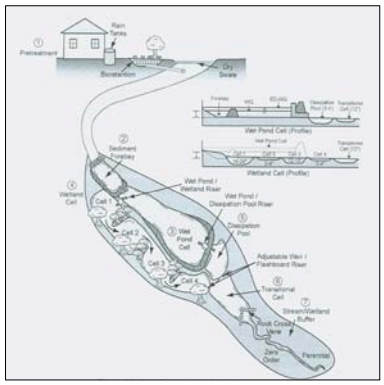
Traditional Design Schematic, Schueler 1992

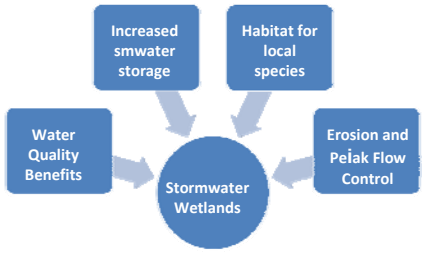
Many design choices, same principles!





How they fit into the landscape at large:





AgriLIFE EXTENSION Texas A&M System

TEXAS NEMO

Dickinson Bayou Watershed Partnership

Sea Grant Texas

TEXAS COASTAL WATERSHED PROGRAM

LIVEABLE CENTERS

Communities built for walking, in the style of our older downtowns and neighborhoods, are the most environmentally-friendly way we can build.

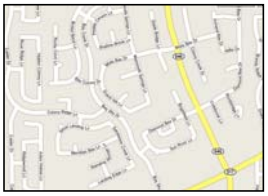
Narrow Lots

Walk to stores
Know your neighbors
Bus and transit ready
Less driving, less pollution
Uses less land—saves habitat

Large Lots

Must drive everywhere
Barely see your neighbors
More driving, More pollution
Uses more land -consumes habitat

Which pattern encourages walkability?



- Short blocks
- Narrow lots
- High street connectivity

- Large blocks
- Large lots
- Cul de sacs and dead ends

Whats the recipe for walkability in your community?

The *Popsicle Test*—the ultimate test of walkabilty!

Commuter Rail – will it bring a town or a parking lot?

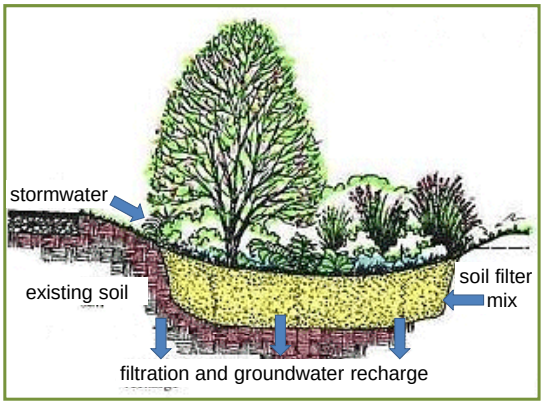
AgriLIFE EXTENSION Texas A&M System | TEXAS NEMO | Dickinson Bayou WATERSHED PARTNERSHIP | Sea Grant Texas | TEXAS COASTAL WATERSHED PROGRAM

Rain Garden:
A Beautiful Solution to Water Pollution

What is a rain garden?

A bowl-shaped depression designed as a garden that holds and absorbs stormwater from a roof, sidewalk, parking lot, lawn, or street.

….from a roof



…from a sidewalk

…from a parking lot

….from a street

….from a lawn

Rain gardens s--l--o--w the flow of water…..

…allowing the water to penetrate into the soil……

…cleaning the water before it enters the stormdrain….

....and empties into our bayous and bays.

Uses native and adapted plants

Conserves water ⚑ Protects water quality ⚑ Provides habitat for wildlife

Residential

Public

Commercial

AgriLIFE EXTENSION Texas A&M System

TEXAS NEMO

Dickinson Bayou Watershed Partnership

Sea Grant Texas

TEXAS COASTAL WATERSHED PROGRAM

WaterSmart Landscapes

Drains to bayous and bays!

Songbirds migrate through Houston!

The Dickinson Bayou Watershed Needs You!

Here are some ways to protect Dickinson Bayou:

- **Read the label carefully before applying any garden products**
- **Use compost—it builds healthy soil!**
- **Avoid chemical fertilizers and pesticides**
- **Reduce the size of your lawn**
- **"Don't Bag It"**
- **Choose plants adapted to our area**
- **Avoid over-watering to lessen the chance of runoff**
- **Plant a habitat garden**

Did you know?

- Homeowners use 9-10X more fertilizers and pesticides per acre than farmers
- 50%-60% of our water supply goes to watering landscapes

Did you know?

- 60-70 million birds are poisoned each year due to pesticides
- 2/3 of users dispose of chemical fertilizers and pesticides in the trash or down the drain

Traditional Landscapes

- Major contributors to runoff pollution
- Consist mainly of lawn (turfgrass)
- Consume lots of water
- Dependent on chemical fertilizers and pesticides

VS.

WaterSmart Landscapes

- Are non-polluting
- Use native and adapted plants
- Require less water and less maintenance
- Provide habitat for wildlife

Create a landscape to attract wildlife

Use native and adapted plants

AgriLIFE EXTENSION Texas A&M System | TEXAS NEMO | Dickinson Bayou Watershed Partnership | Sea Grant Texas | Texas Coastal Watershed Program