

# Rainwater Harvesting Educational Workshop -- Tucson Water's Incentive Program



Welcome to an online class:

- ▶ We take attendance and follow up with additional resource for all class attendees. Our moderator will contact you if we need additional information.
- ▶ During the session please use the chat window if you have a question.
- ▶ At the end of the session we will have a Q&A. You will be able to use your webcam and mic if desired or just use your chat box.



# Learning Objectives

- ▶ How to save potable water
- ▶ Select appropriate strategies
- ▶ Ensure best practices
- ▶ Enhance quality of life - grow shade and food while saving potable water
- ▶ Submit a successful rebate application



# 5 Steps to Saving Outdoor Water

1. Check your irrigation system and settings monthly!
2. Plant the water (basins) & plant low-water natives
3. Use organic mulch
4. Plan to not irrigate your native landscape after 3 years
5. Scale your veggies or fruit water use to your rain and greywater supply



# Rainwater Harvesting Systems

- ▶ **Harvest:** collect rainfall from roofs, patios, and other surfaces
- ▶ **Store:**
  - ▶ In the soil (Passive Systems) – allows plants to access moisture stored in the soil
  - ▶ In a tank (Active Systems) – allows long-term storage and distribution when needed
- ▶ **Benefit:** reduce/eliminate potable water demand for irrigation or other water needs



# Residential Resources

## Potential Annual Rainwater Supply:

- Roof, 1000sf = 6,000 gallons/yr
- Landscape, 1000sf = 3,000 gallons/yr

- Total Rainwater potential for 1/5 acre  
> 45,000 gallons/yr
- + Greywater! (~4000 - 18,000 gal)
- + AC condensate! (~200 – 500 gal)

Annual Municipal Water Demand:

Total Use = 80 gal/person/day x 3  
persons/home x 365 days =

87,600 gallons/yr

Outdoor use (~30% of total) =  
26,280 gallons/yr



# Why harvest rainwater?

- Rain and greywater is free, save \$\$\$
- Energy savings - home, city, state
  - local vegetation cooling benefits
  - less water to transport & treat
- Higher quality water for plants (rainwater)
- Reduce flooding and stormwater pollutants
- Reduce vulnerability to drought & rising price of water
- Increase vegetation without increasing city water usage
- Increased soil moisture, healthier soils



**Tucson Water**[Pay Your Utility Bill](#)[FAQ - New Online Payment Portal](#)**Customer Service**[Manage Your Service](#)[> Water Conservation Rebates, Incentives, and Services](#)[Apply for Reclaimed Water Service](#)[About Your Water Quality](#)[Contractors, Developers, and Engineers](#)[Rates and Monthly Charges](#)[Technical Library](#)[Public Policy](#)[Public Education and Outreach](#)[Community Relations](#)

## Water Conservation Rebates, Incentives, and Services

Learn more about our rebate and incentive programs for residential and commercial Tucson Water customers at the links below. Read about the current and historic overview of the budget and programs funded by the conservation fee in the [Water Conservation Program FY 2021 Annual Report](#).

[Click here](#) to learn more about our rebate policy updates implemented on July 1, 2022.

[Haga clic aquí](#) para aprender más sobre las actualizaciones de la póliza de reembolsos residenciales implementadas desde el 1 de julio del 2022.

**Residential Rebates and Incentives**

- [MaP Premium High-Efficiency Toilet](#) - \$100 rebate per qualifying toilet
- [High-Efficiency Clothes Washer](#) - Up to a \$200 rebate for a qualifying washer
- [Rainwater Harvesting Rebate](#) - Up to a \$2,000 rebate for installing passive and/or active harvesting
- [Gray Water System Rebate](#) - Up to a \$1,000 rebate for installation of a gray water irrigation system
- [Water Conservation Kit](#) - Order a free water conservation kit for your home

**Low-Income Conservation Services**

- [Free High-Efficiency Toilet Replacement](#)
- [Rainwater Harvesting Grants & Loans](#)
- [Gray Water Harvesting Grants & Loans](#)
- [Discounted High-Efficiency Clothes Washers](#)
- [Free Emergency Plumbing Repairs](#)

**Commercial & Multifamily Rebates and Incentives**

- [High-Efficiency Toilet](#) - \$100 rebate per MaP Premium High-efficiency toilet or \$150 per flushometer valve/bowl combination
- [High-Efficiency Urinal](#) - \$200 rebate per WaterSense certified or water-free urinal
- [Water Consumption Report](#) - Request a free report to learn more about water use on your property
- [HOA Landscape Transformation Incentive Program](#)

**Other conservation programs available**

- [Southwest Gas Residential & Commercial Energy Efficiency Rebates](#)
- [Tucson Electric Power Renewable and Conservation Programs](#)

## Rainwater Harvesting Rebate

*Note: Due to fluctuations in staffing during this time, rebates and credits may take up to 12 weeks to process. Thank you for your patience.*

### Tucson Water

[Pay Your Utility Bill](#)[FAQ - New OnLine Payment Portal](#)[Customer Service](#)[Manage Your Service](#)[Water Conservation Rebates, Incentives, and Services](#)[Apply for Reclaimed Water Service](#)[About Your Water Quality](#)[Contractors, Developers, and Engineers](#)[Rates and Monthly Charges](#)[Technical Library](#)[Public Policy](#)[Public Education and Outreach](#)[Community Relations](#)

### To Qualify

- Applicants must be Tucson Water customers with active service.
- Applicants must attend an approved Rainwater Harvesting Incentives Program Workshop.

### Learn more at the links below:

- [Rainwater Harvesting Guide](#)
- [Rainwater Harvesting Rebate Program brochure](#)
- [Resource List for Water Harvesting](#)
- [Water Harvesting Maintenance Video](#)
- [Low Income Grant/Loan Program](#)
- [Backflow Prevention Requirements Video](#)
- [Backflow Prevention Q&A](#)
- Call 520-791-4331 or e-mail Tucson Water's Public Information and Conservation Office (PICO).

### How to Qualify

Applicants may apply for both passive and active levels, not exceeding \$2,000 for the combination per property.

[Learn more](#)

### Frequently Asked Questions

Frequently asked questions about the rainwater harvesting rebate program.

[Learn more](#)

### Rainfall Calculator

Use our online calculator to estimate how much rainfall you can capture from your roof and begin planning your system.

### Workshop and Project Plans

A free, three-hour workshop and submission of a project plan are required to qualify. See a list of area resources for rainwater harvesting.

[Learn more](#)

### How to Apply

Complete the application, download it, and mail it with project plan and original, itemized receipt(s)

[Learn more](#)



# Incentives Program Rebate

## Who qualifies?

- ▶ Residential and small commercial Tucson Water customers
- ▶ Small commercial is a property with a single meter that is 5/8 or 3/4 inches. Commercial properties with more than one meter or meters larger than 3/4 inches do not qualify.

## Two levels

- ▶ Applicants may apply for both a passive and active rebate not exceeding \$2,000 for the combination

# Tucson Water Residential and Small Business Customers

## Rain Garden Incentive Level 1

**Total cost of eligible materials, design, and labor  
½ costs up to \$500**



## Rain Tank Incentive Level 2

- **\$0.25 per gallon for Tanks 50-799 gallons**
- **\$1 per gallon for tanks  $\geq$  800 gallons**

**Maximum rebate = \$2,000**



# Rain Garden Incentive Level 1

**Total cost of eligible materials, design, and labor  
½ costs up to \$500**

*Practices: passive earthworks include directing and retaining water in landscape using site appropriate practices such as basins, berms, terraces, swales, infiltration trenches, and curb cuts*



# Rain Tank Incentive Level 2

- \$0.25 per gallon for Tanks 50-799 gallons
- \$1 per gallon for tanks  $\geq$  800 gallons

Maximum rebate = \$2,000

*Practices: rainwater storage tank with gravity-based supply use and overflow directed to landscape passive retention feature*

*The per gallon capacity rebate amount includes tank, gutter, tank foundation, overflow, and miscellaneous materials, which make up the system*



# How to Apply

- **Submit your attendance for attending this Rainwater Harvesting Workshop**
- **Complete the rainwater harvesting rebate application form.**
- **Include a rainwater harvesting project plan with the rebate application to demonstrate the selection, use, and anticipated outcomes of the practices.**
- **Attach the itemized receipt(s) for the qualifying materials.**
- **Send your completed application to Tucson Water!**

# Tucson Water Requires a Project Plan

A project plan must be submitted with application

- ▶ Can be hand drawn
- ▶ Does not have to be to scale
- ▶ Show catchment area(s)
- ▶ Show the conveyance
- ▶ Show the storage
- ▶ Show dimensions
- ▶ Show North arrow



# Rainwater Harvesting Financing Options

[www.watershedmg.org/rainmoney](http://www.watershedmg.org/rainmoney)





Questions?







*Let's go for a virtual tour!*



# Living Lab: Courtyard

**BEFORE – 2017**



# Living Lab: Courtyard

March 2020



# Living Lab: Dodge Blvd

**BEFORE – 2012**



# Living Lab: Dodge Blvd

After - 2018



# Living Lab: Dodge Blvd

March 2020



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p  
**LAND**  
**CENTER**  
ge Blvd



# Living Lab: Rain Tank





# Living Lab: Rain Tank



# Living Lab: 10,000gal Rain Tank

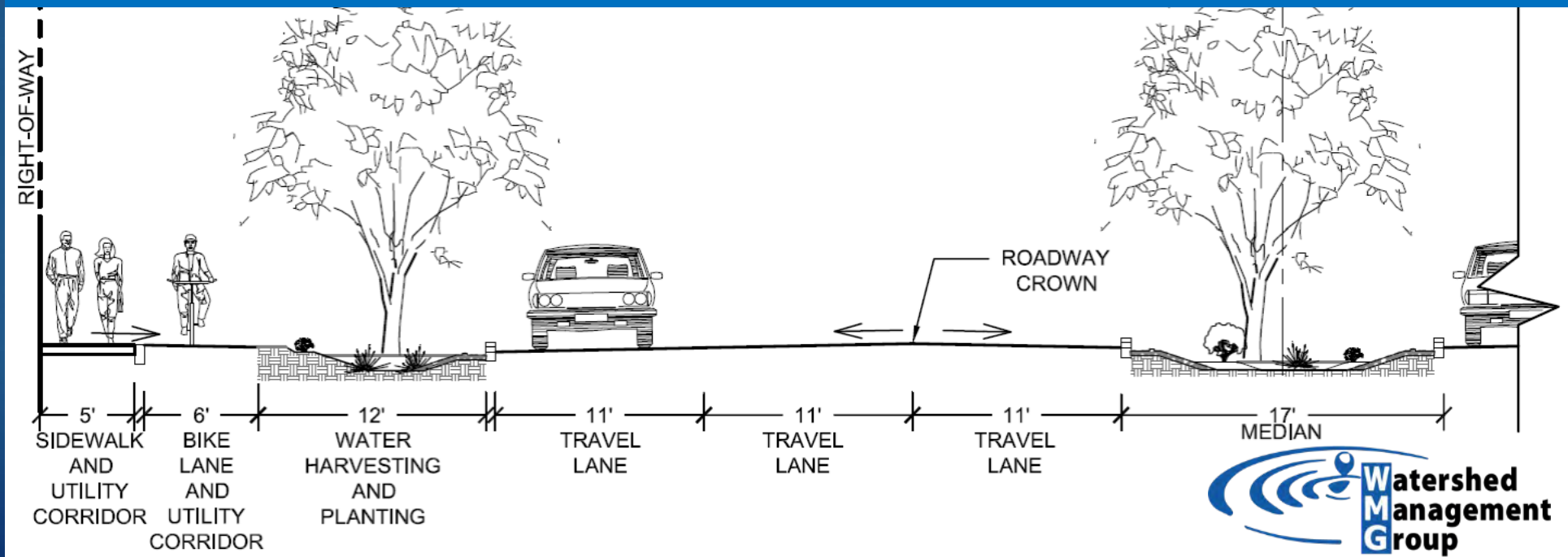


A photograph of a man in a light-colored shirt and dark pants walking away from the camera on a sandy path next to a stream. The stream is shallow and clear, reflecting the surrounding greenery. The path is made of sand and is bordered by dense vegetation and trees. The scene is set in a lush, green forest with sunlight filtering through the trees. The overall atmosphere is peaceful and natural.

Questions?



Watershed Management Group develops and implements community-based solutions to ensure the long-term **prosperity of people** and **health of the environment**. We provide people with the knowledge, skills, and resources for sustainable livelihoods.



Your home can have a positive impact to our larger community!



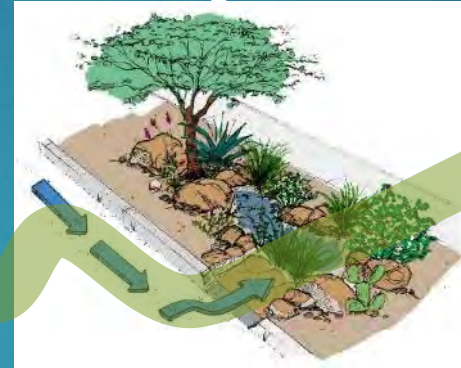
# Watershed Restoration

Enhance infiltration and recharge to restore our watersheds

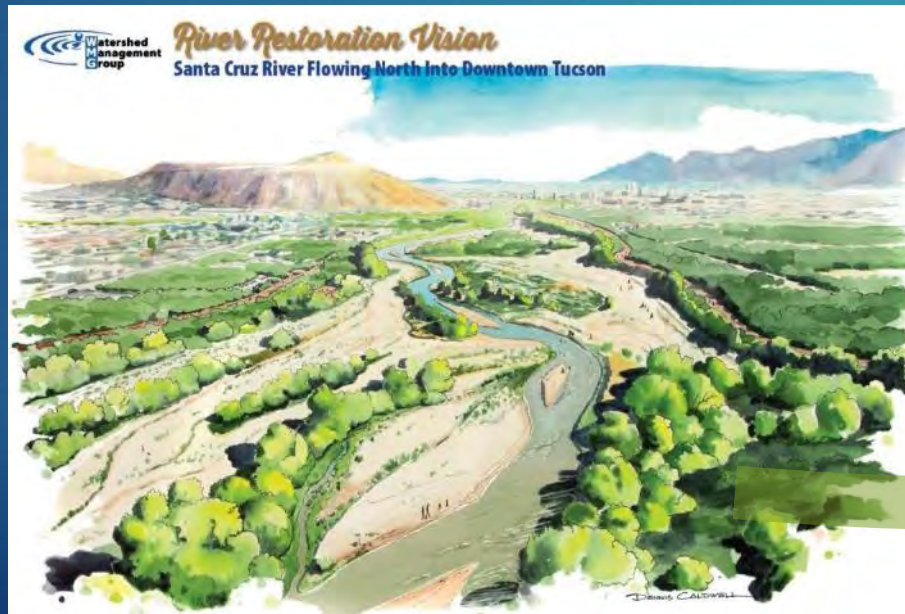
@ Homes, Churches,  
Schools, & Businesses



Along Streets



Along Upland Arroyos



Across Floodplains



Tucson, 1904. Santa Cruz River from "A"  
Mountain



# Tucson, 1981. Santa Cruz River from "A" Mountain







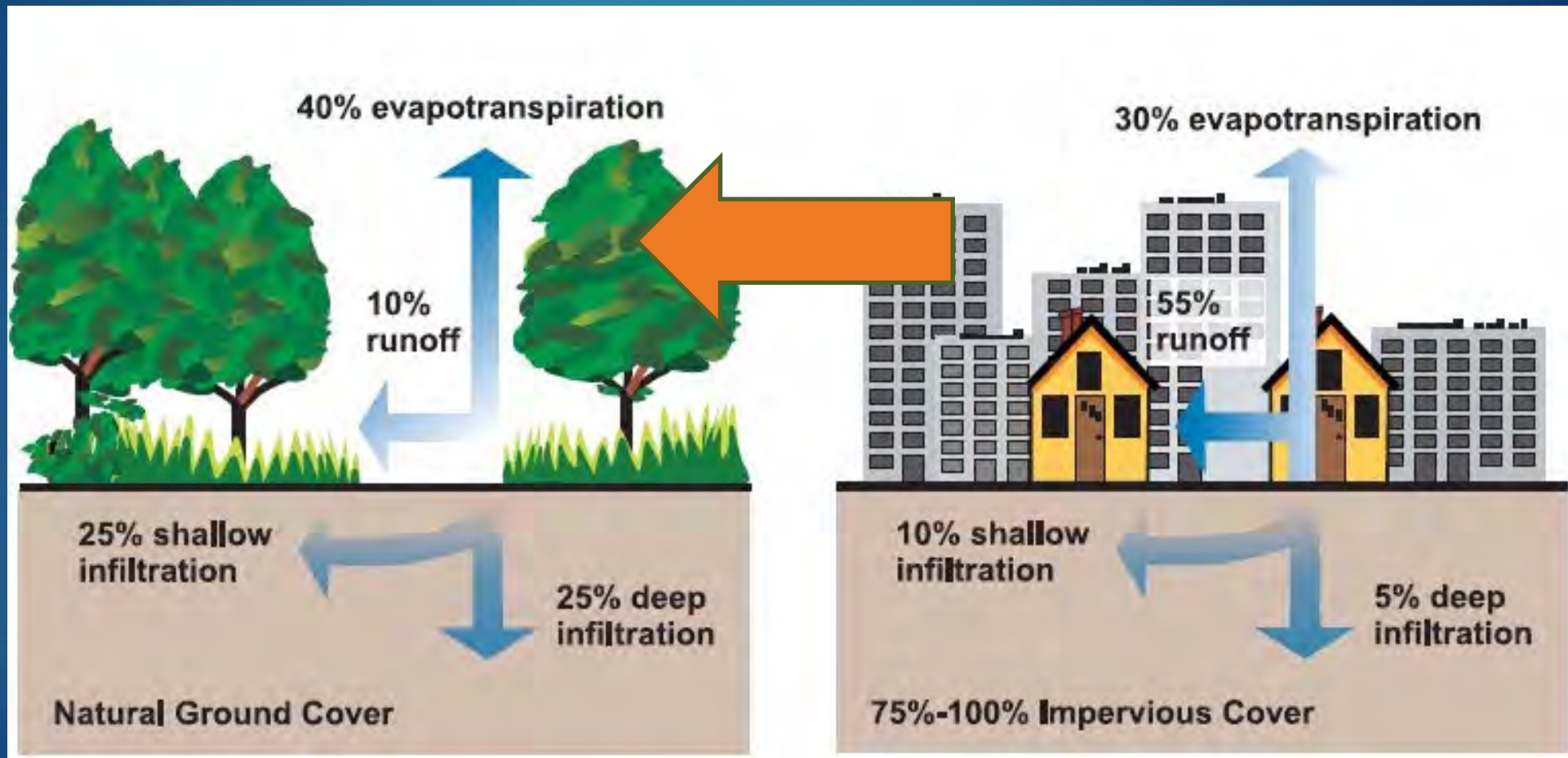
DENNIS CALDWELL 2018

# River Run Network

Working to restore Tucson's heritage by restoring flow to our perennial rivers, streams, and springs



# How does water harvesting link to watershed health?



# water harvesting restores local hydrology & can benefit our homes!



Images courtesy of Brad Lancaster, [harvestingrainwater.com](http://harvestingrainwater.com)

Harvest Rainwater in the soil and/or a tank to promote resource abundance!



**And move beyond  
resource scarcity**



*Remember those...*

# Water Harvesting PRINCIPLES

From Brad Lancaster's, [Rainwater Harvesting for Drylands and Beyond](#)



A photograph showing four men from behind, looking out a window. They are observing a garden area with a fence and a multi-story building in the background. The scene is brightly lit, suggesting daytime. The men are dressed in casual attire. The background building has several windows and a balcony with a blue railing. The garden area has some green plants and a brown fence.

# Water Harvesting Principles

1. Begin with Long and Thoughtful Observation

# Water Harvesting Principles

## 2. Start at the Top





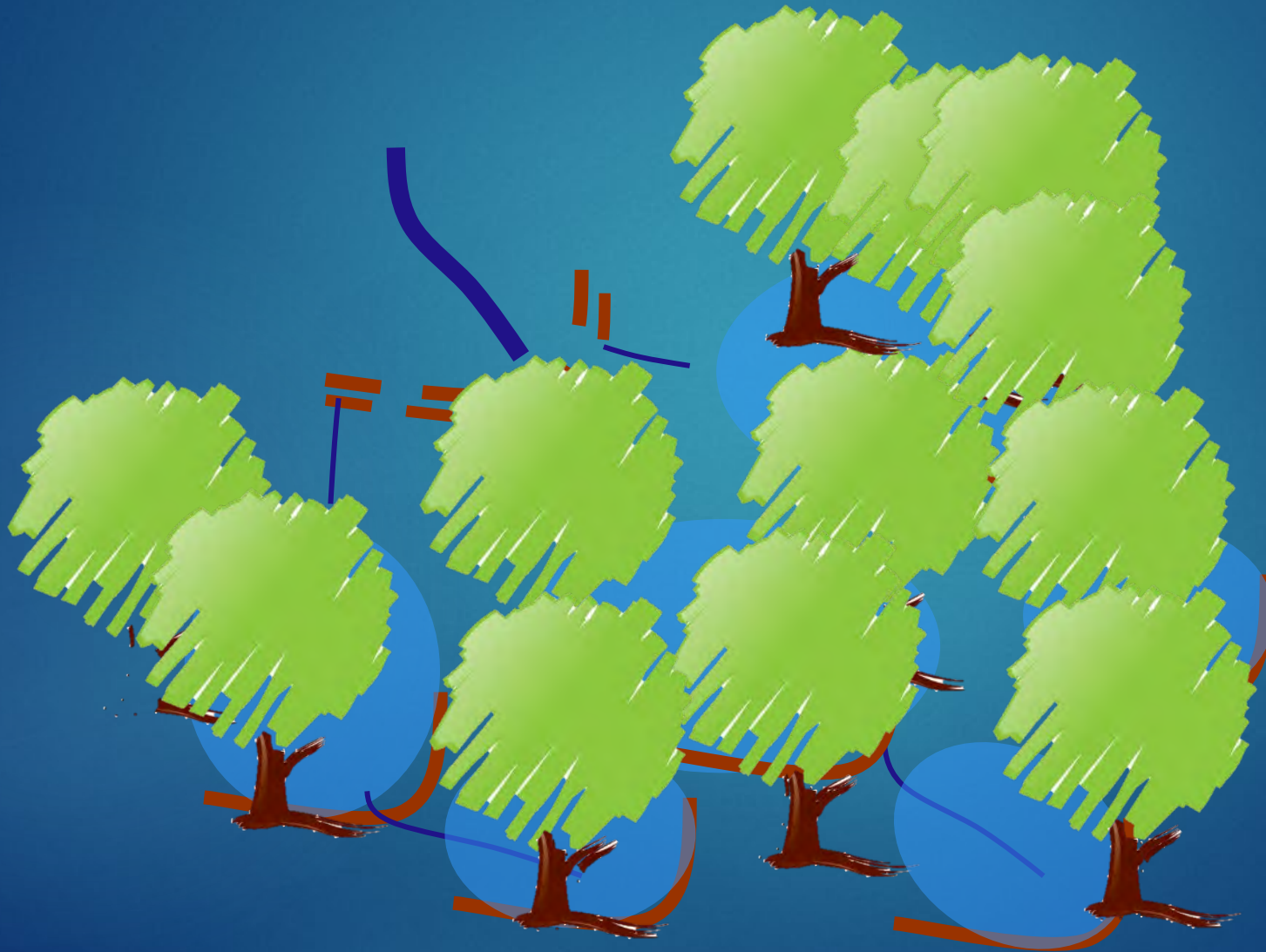
# Water Harvesting Principles

## 3. Start small and simple



# Water Harvesting Principles

4. Spread and infiltrate the flow of water





# Water Harvesting Principles

5. Always plan for an overflow route and manage overflow as a resource

# Water Harvesting Principles

## 6. Maximize living and organic groundcover



# Water Harvesting Principles

- 7. Maximize beneficial relationships and efficiency
  - STACKING FUNCTIONS



# Water Harvesting Principles

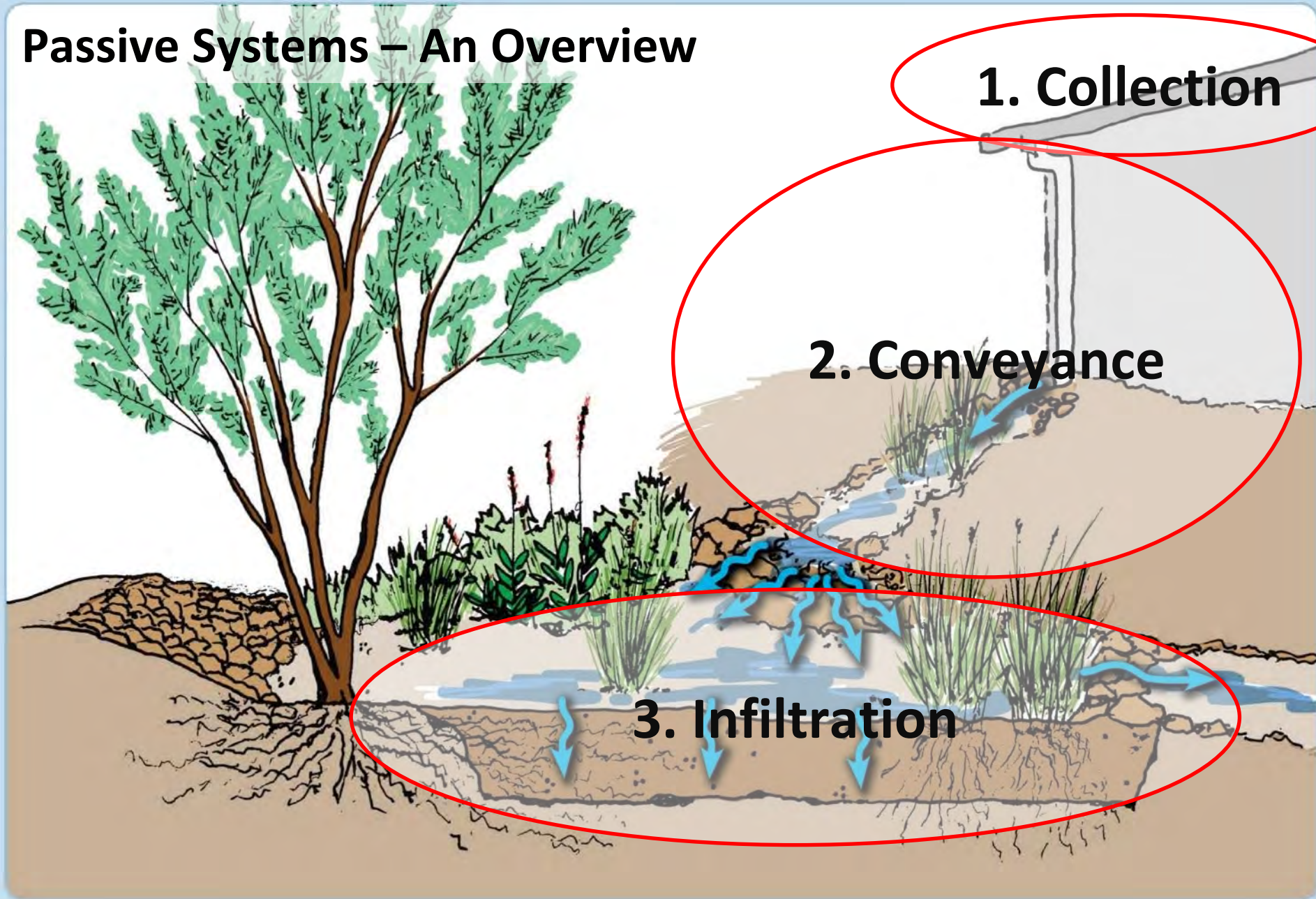
8. Continually reassess your system





And be sure to have  
FUN!

# Passive Systems – An Overview



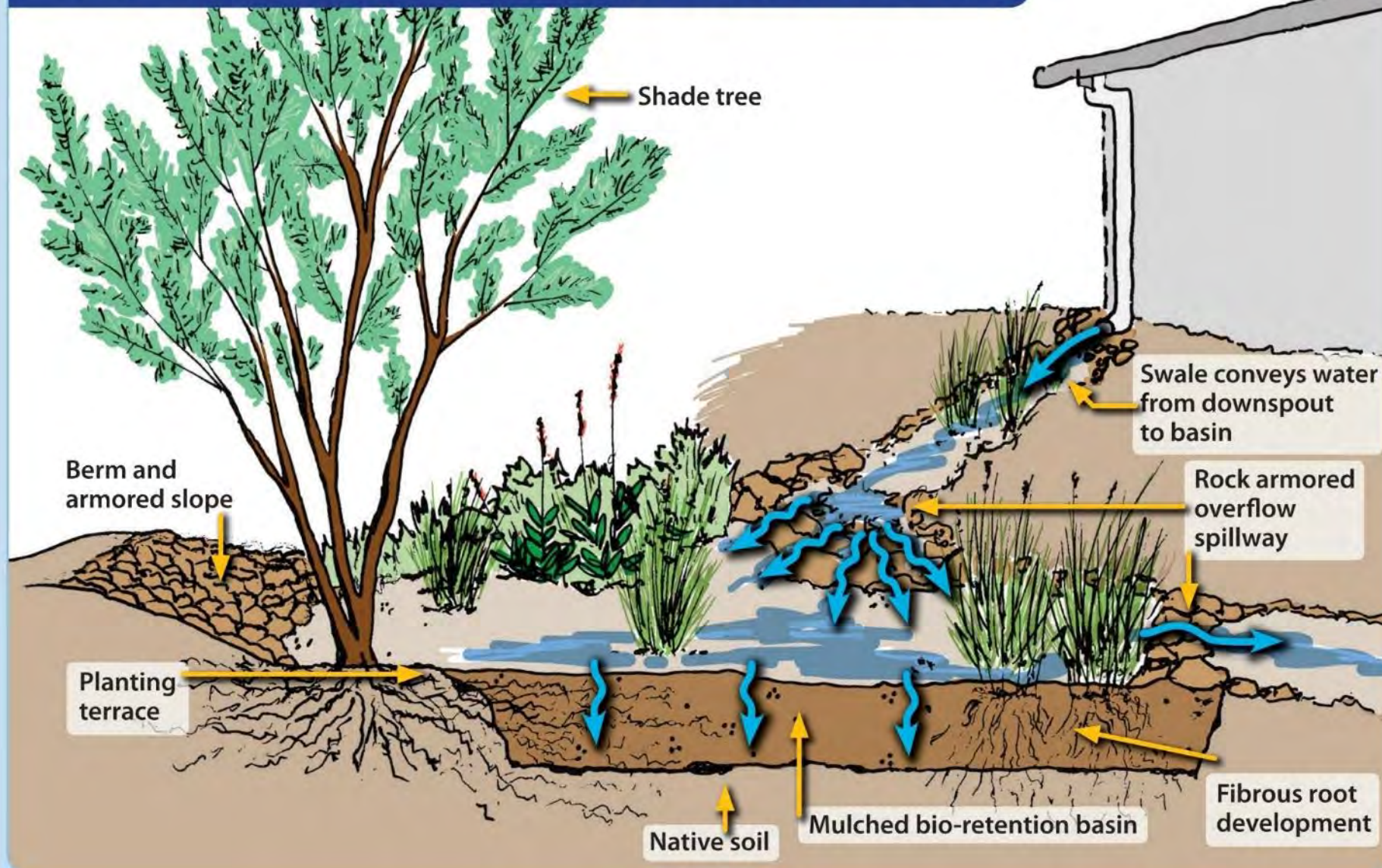
**1. Collection**

**2. Conveyance**

**3. Infiltration**



## RAIN GARDENS CREATE AN EARTHWORKS SPONGE



Organic mulch is applied to basins, 2 – 4 inches thick, to help infiltrate more water, reduce evaporation of soil moisture, and replenish nutrients in the soil.

# Passive Rainwater Harvesting

- Analyze your site
  - ▶ Where is water already gathering?
  - ▶ How can you get the water to where you need it?
  - ▶ Are there any additional sources of water (e.g. AC condensate, greywater, stormwater, etc)

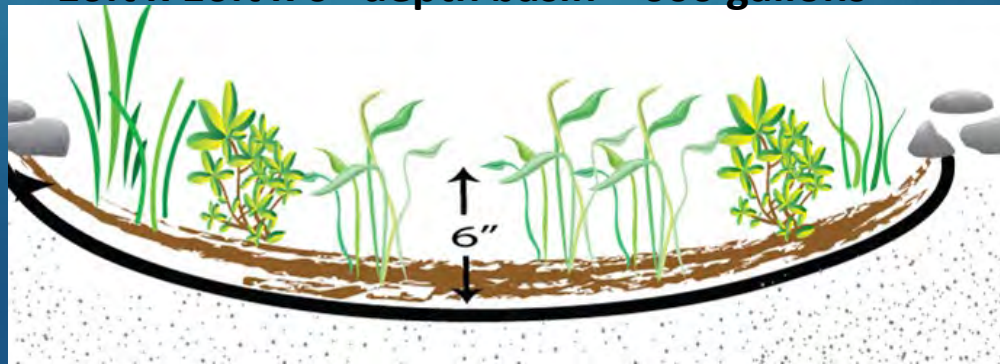


# Make your earthworks meaningful!

Size for a large rainfall event = 1" to 2.5"



10ft x 16ft x 6" depth basin = 600 gallons

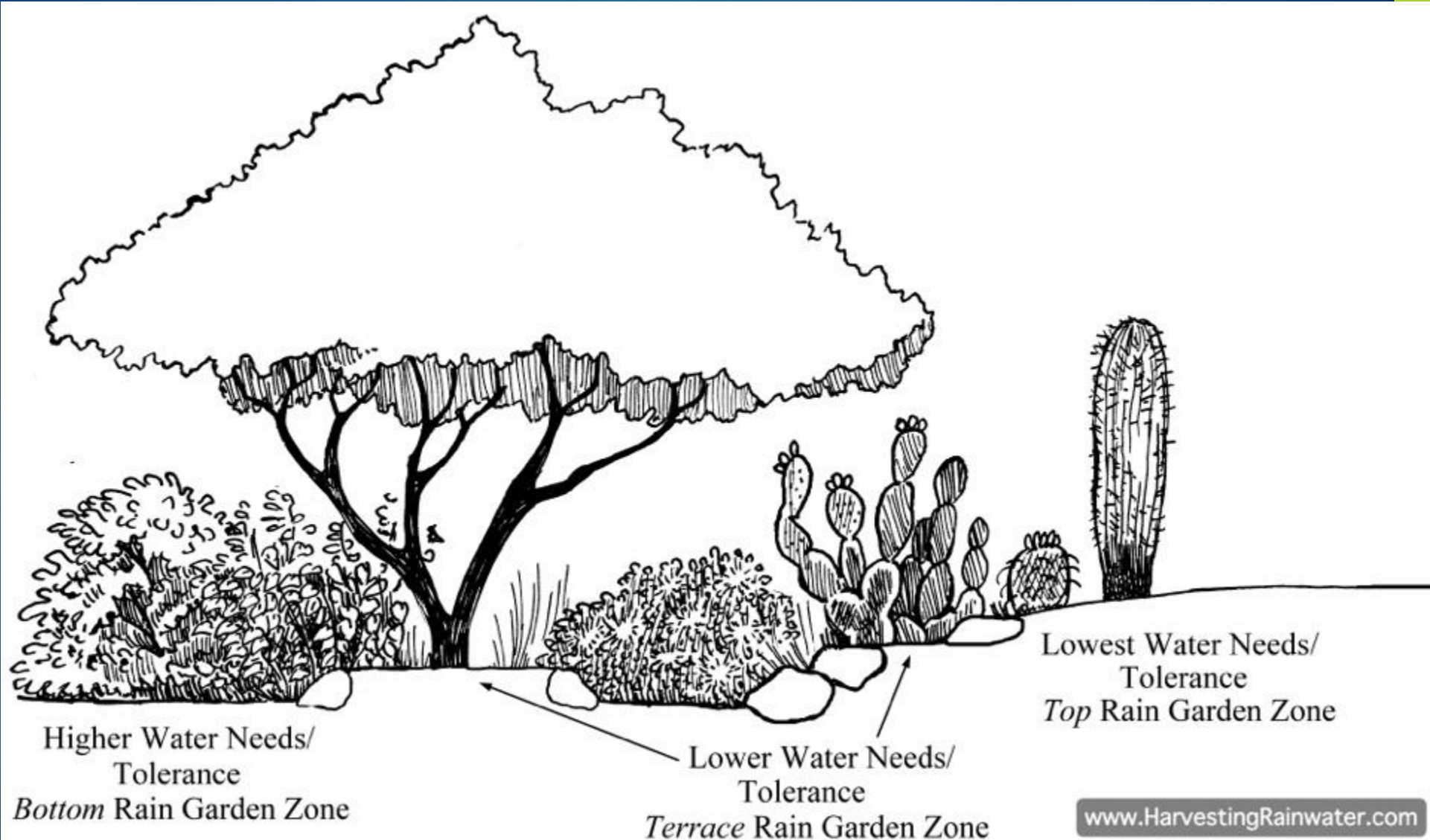




# Let's Plant the Water!

Benefit/Cost: \$4.4 returned for every \$1 invested

# Right Plant, Right Place



# Curb Cut / Core drill









**Rain Garden Care**  
 H A N D B O O K  
 backyards  
 neighborhoods  
 commercial

Watershed Management Group

## Say NO to Mow, Blow, & Go!



Grass is a water hog and is maintained with loud mowers and chemical fertilizers.



Leaf blowers are a public nuisance—they cause air and noise pollution. And they blow vital organic material off the landscape!



Chemical weed killer is sprayed frequently on public landscapes (often seen as blue/green coloring). These chemicals are harmful to our soil, water, and wildlife.

## Say YES To Hoe, Flow, & Grow!



Hand tools are the best way to remove weeds. You can be selective about what weeds you pull, and there is no noise or chemical pollution!



Plan your landscape to let the water flow through your yard and soak into the soil.



Let your plants grow and prune minimally. You'll be pleased with the results—healthier plants, unique shapes, and better wildlife habitat.



Questions?

# Active Water Harvesting: Cisterns

- ▶ Food production
- ▶ Drinking water
- ▶ Flood prevention
- ▶ Fire protection
- ▶ ....



What are your goals for a cistern?

# Tank Systems Overview

Wet Inflow

Catchment

Dry Inflow

Collection

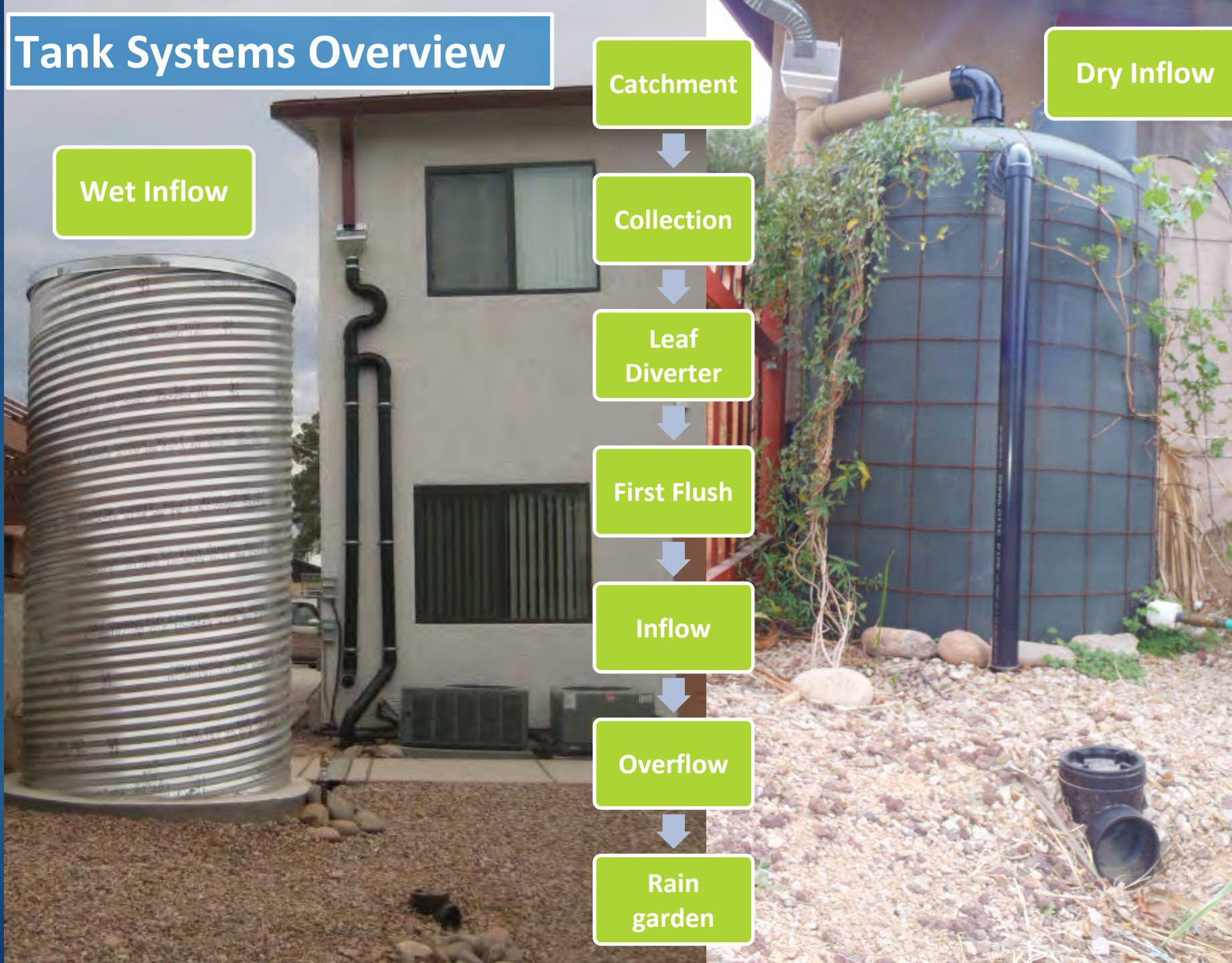
Leaf  
Diverter

First Flush

Inflow

Overflow

Rain  
garden



# Review: Rain Tank Best Management Practices

## And don't forget!

- ▶ Secured lid
- ▶ Overflow pipe
- ▶ Vent (often built in)
- ▶ Freeze protection
- ▶ Keep sunlight out
- ▶ UV resistant materials
- ▶ Inflow pipe diameter = outflow pipe diameter
- ▶ Screened entry points (critter & mosquito proof)



# City of Tucson: Do I need to permit my tank?

Requirement	Cistern size	Front Yard	Side Yard	Rear Yard	Screening
No review required	<ul style="list-style-type: none"> <li>🔹 &lt;5' in ht.</li> <li>🔹 &lt;10 sf area</li> <li>🔹 ≈ 3.5' diameter</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>no setback</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>no setback</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>no setback</li> </ul>	<ul style="list-style-type: none"> <li>⊖</li> </ul>
No review required	<ul style="list-style-type: none"> <li>🔹 &gt;5'&lt;6' in ht.</li> <li>🔹 &lt;10 sf area</li> <li>🔹 ≈ 3.5' diameter</li> </ul>	<ul style="list-style-type: none"> <li>⊖</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>no setback*</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>no setback*</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> </ul>
Site Review required**	<ul style="list-style-type: none"> <li>🔹 &gt;6' in ht.</li> <li>🔹 &gt;10 sf area</li> <li>🔹 ≈ 3.5' diameter</li> </ul>	<ul style="list-style-type: none"> <li>⊖</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>setback***</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>setback***</li> </ul>	<ul style="list-style-type: none"> <li>check zone requirement</li> </ul>
Zoning Admin. Interpretation	Part of building structure	case-by case	case-by case	case-by case	case-by case
Site Review + building permit	<ul style="list-style-type: none"> <li>🔹 residential: max. ht. 12'</li> <li>🔹 commercial: ht. of principle bldg..</li> <li>🔹 2:1 ht:width ratio</li> <li>🔹 &gt;5000 gal</li> <li>🔹 elect/pump equip</li> </ul>	<ul style="list-style-type: none"> <li>allowed in commercial (but not residential)</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>check zone requirement</li> </ul>

**County or other jurisdiction or HOA = CHECK!**



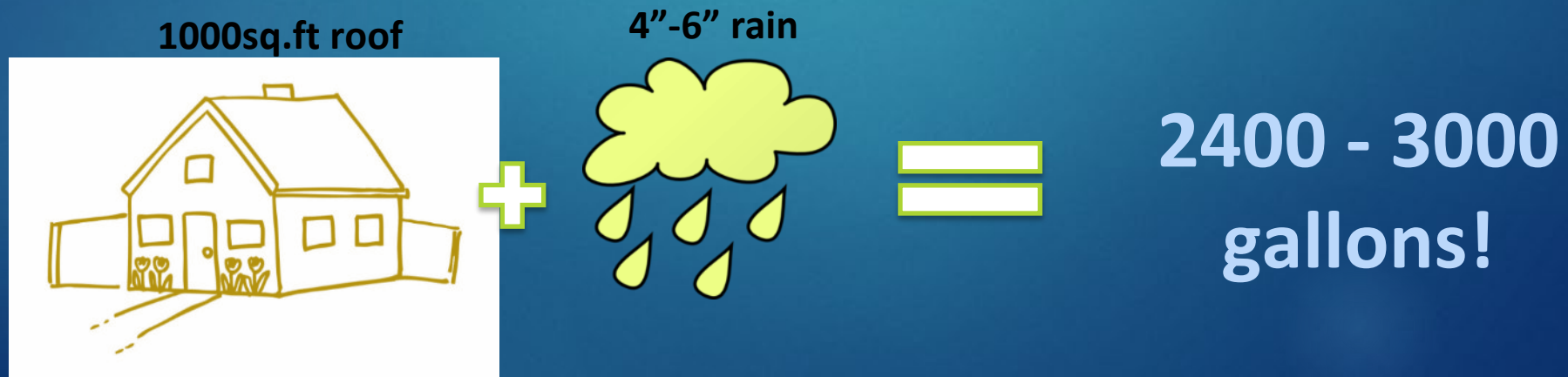
Recycled *(not eligible for rebate)* –  
not rated for potable use





# Tank Sizing Considerations

- ▶ Water demand required over length of dry period, 4 months (March – June)
- ▶ Available seasonal rooftop supply (~4-6" per rainy season)
- ▶ Available space
- ▶ Budget





# Leaf Diverters

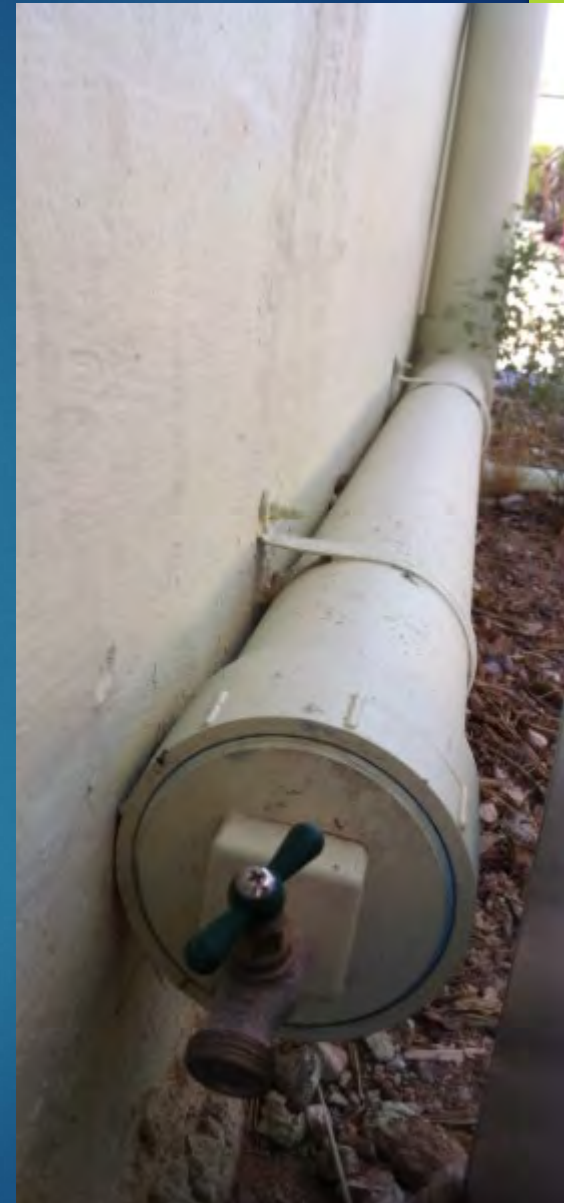
## Gutter Screens



# Strainer Baskets



# First Flush



# Overflow – End of Pipe Critter Preventers



# Red Flags in Hiring a RWH Company

Be wary of a company that doesn't heed Best Practices:

- ▶ Uses unpainted or thin-wall PVC pipe and fittings
- ▶ Fails to put a protective layer (e.g., sand) beneath cistern
- ▶ Doesn't offer or recommend debris filter (leaf diverter)
- ▶ Recommends cistern size based solely on maximizing the rebate, rather than considering rainwater supply and landscaping demand

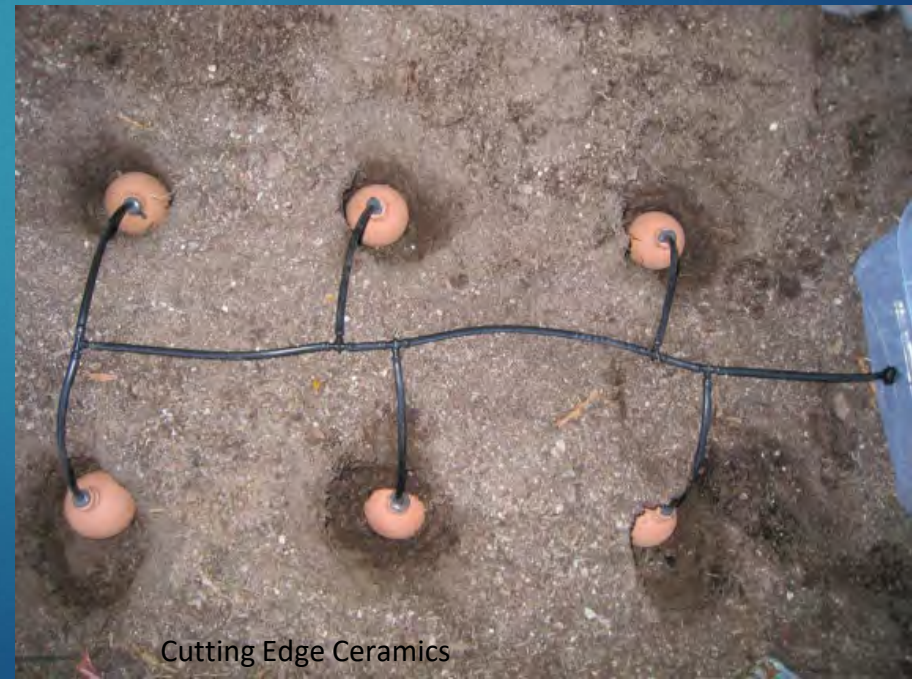
# Red Flags in Hiring a RWH Company

Be wary of a company that doesn't heed Best Practices:

- ▶ Doesn't mosquito-proof the cistern
- ▶ Proposes an overflow pipe that is smaller than the inlet pipe (i.e. less than 3")
- ▶ Doesn't consider where cistern overflow water will go
- ▶ Offers pre-built tanks that break the 2:1 (height to diameter) ratio
- ▶ Doesn't inform you of permitting requirements

# Rainwater Delivery

- ▶ Use at least 1" PVC pipe
- ▶ Use full-port hose-bibs and valves
- ▶ Locate cistern on high ground to maximize available pressure
- ▶ Use larger diameter irrigation emitters (*flag emitters* – best) for gravity-based systems
- ▶ Pump systems require backflow prevention





# Zero Pressure Gravity-based Irrigation Timers



Toro



WaterYourLandscape.com

# Below Ground Tanks





Or convert a pool!

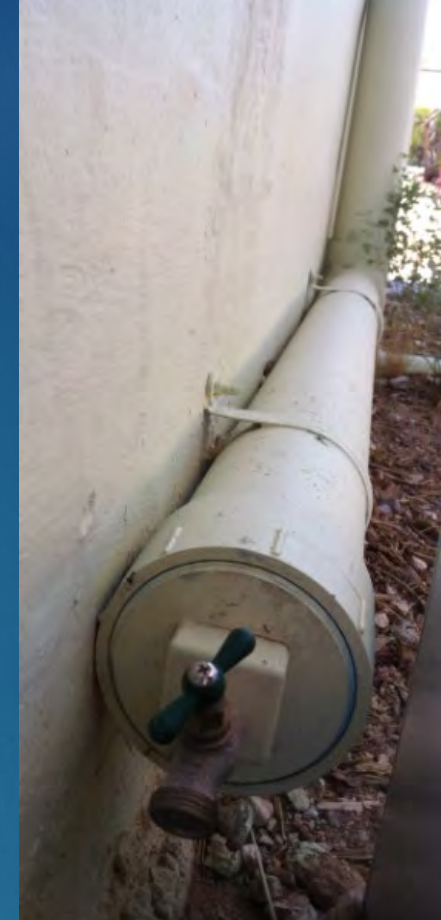


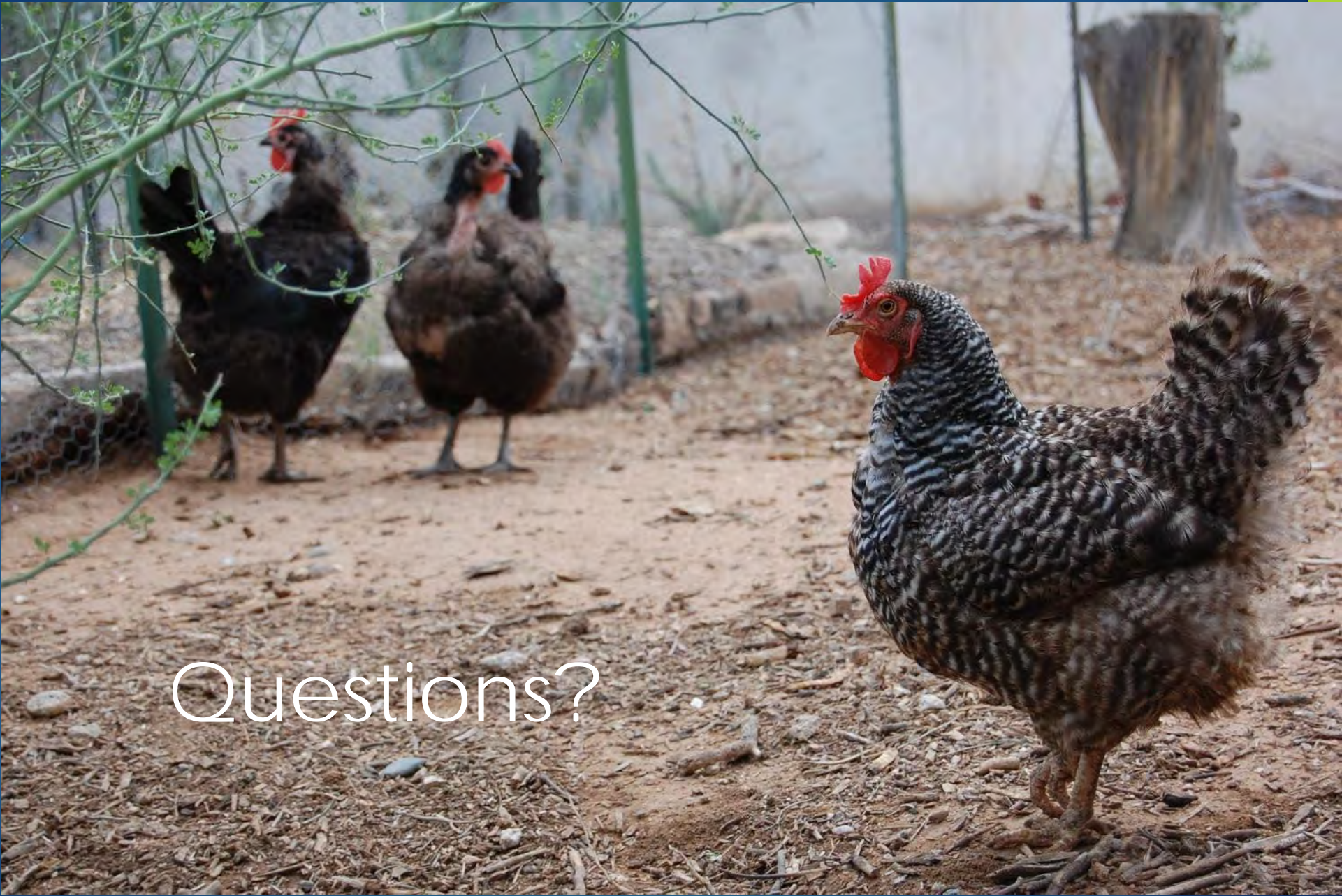


# Maintenance

Have a specific plan!

- ▶ Clean gutters and leaf diverters
- ▶ Check and reset first flush
- ▶ Check for leaks
- ▶ Inspect stability and integrity
- ▶ Clean/flush/replace filters
- ▶ Test water annually (if drinking)

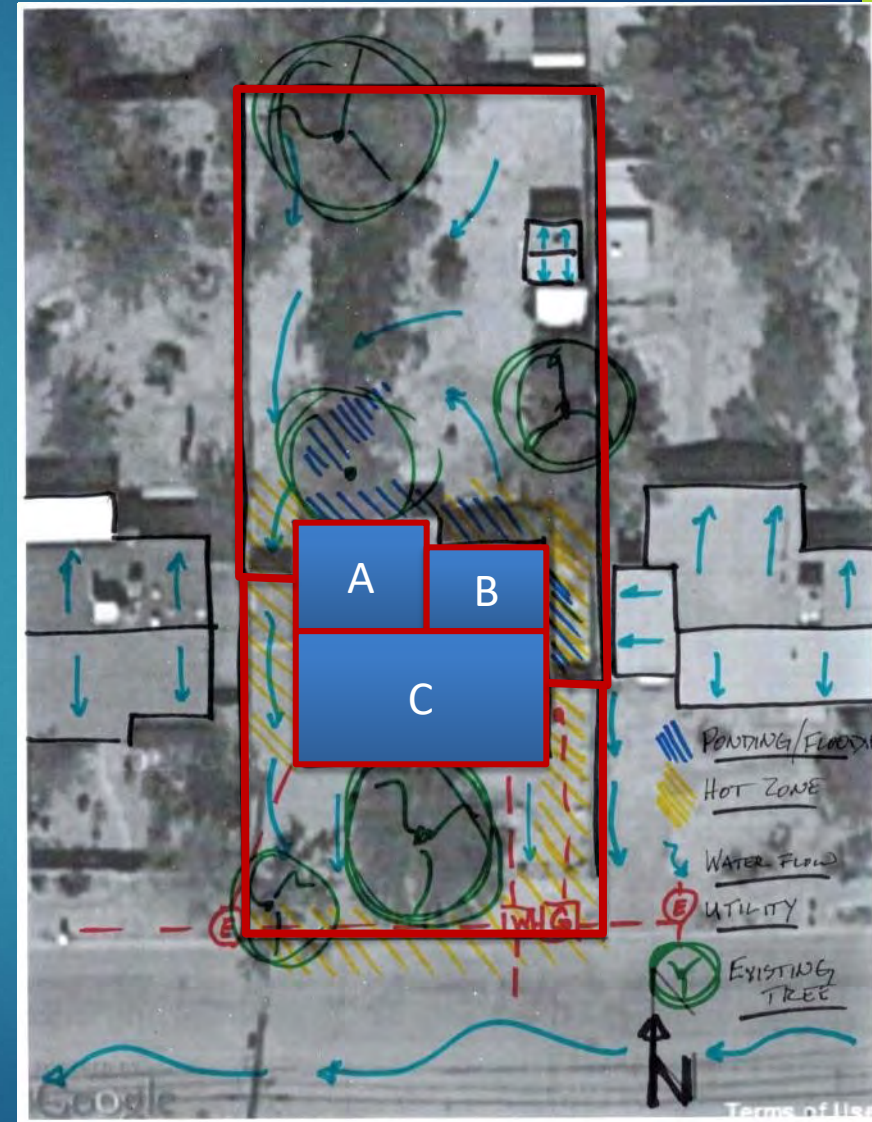




Questions?

# Let's Get Started at Your Site

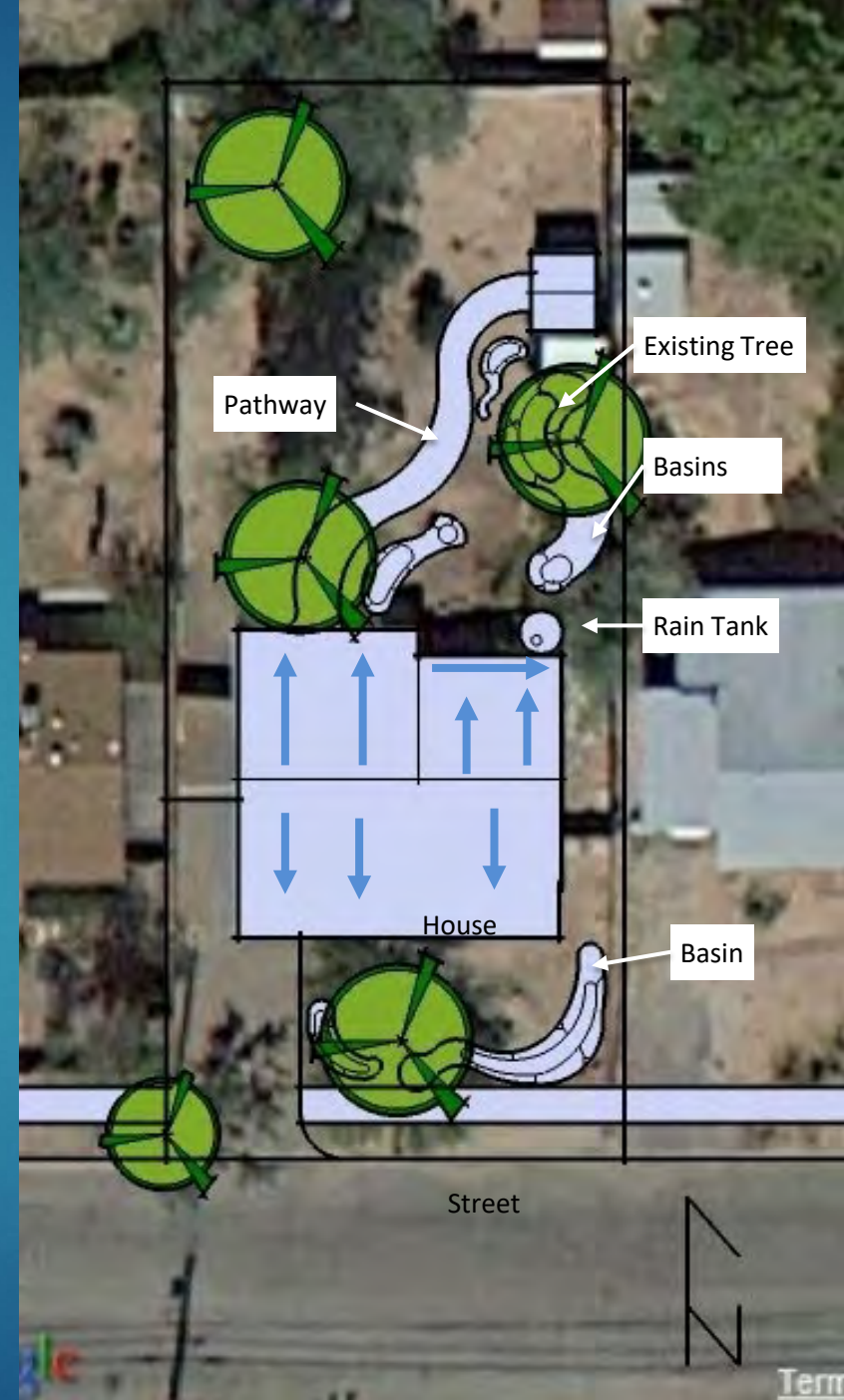
1. Observe & Assess
  - ▶ Create a base map
  - ▶ Observe Influencing Factors
    - ▶ Solar orientation
    - ▶ Utilities
    - ▶ Existing Vegetation
    - ▶ Noise and Traffic
    - ▶ Soils
    - ▶ And more...
2. Divide into subwatersheds
  - ▶ Note water sources
  - ▶ Identify desired water infiltration zones





# Create a Plan!

1. Layout uses including hardscapes and pathways
2. Place structural landscape features
  - ▶ Rain tanks
  - ▶ Large trees
3. Locate water harvesting basin extents
4. Determine spillway/overflow locations



# Create your Local Water Budget!

[watershedmg.org/water-budget-calculator](http://watershedmg.org/water-budget-calculator)

Home > Local Water Budget Calculator

## Local Water Budget Calculator

VIEW EDIT WEBFORM RESULTS CIVICRM

### How much rainwater and greywater can you harvest at your home?

Just fill in the five input fields and the calculator will show your rainwater harvesting potential in the following chart. Once you know how much rainwater and greywater you can harvest at your home, take the next steps and [join our Rain to Table campaign](#) and share your progress!

Input

What is your roof area (in square feet)? \*

Your roof area can be simply calculated by multiplying the length x width of your house.

What is your landscape area (patio and planting areas in square feet)? \*

How many persons live full time in your home? \*

What is your January total water use (from your water bill in gallons)? \*

If your monthly use is measured in CCF than multiply your monthly use by 748 gallons per CCF. (Example: 2 CCF \* 748 gal/CCF = 1,496 gallons)

What is your July total water use (from your water bill in gallons)? \*

If your monthly use is measured in CCF than multiply your monthly use by 748 gallons per CCF. (Example: 10 CCF \* 748 gal/CCF = 7,480 gallons)

# How much water do your plants need?

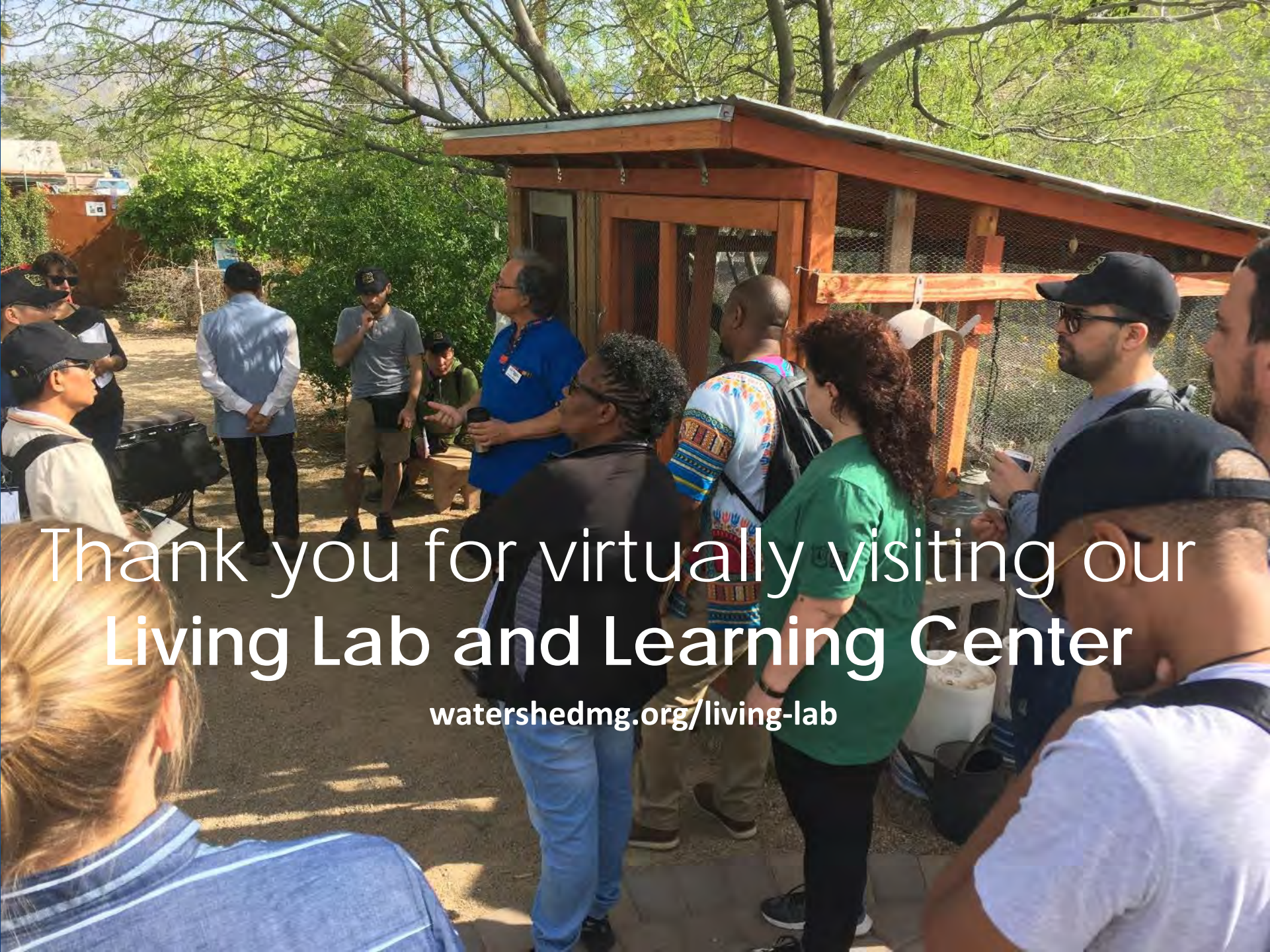
- ▶ Mesquite or Palo Verde = 4,000-5,000 gal/yr
- ▶ Full citrus, high-water use tree = 8,000 gal/yr
- ▶ Pomegranate, mod-water use tree = 3,000 gal/yr
- ▶ Lawn & Veggie Garden, very-high water use = ~40-50 gal/sq.ft/yr

If you have an existing landscape

- ▶ Review your water bill:
  - ▶ compare **winter use** with **summer use**; the difference is your landscape irrigation

# We've reached the end of the class!

- ▶ **Please fill out the survey that will be emailed to you. We value your feedback!**
- ▶ If you joined late, please text your name in the chat window so we can confirm your attendance.
- ▶ You must record your own attendance for this class using the link we provide in the follow up email.
- ▶ Don't forget to sign up for the:
  - ▶ River Run Network: [watershedmg.org/RRN](http://watershedmg.org/RRN)
  - ▶ Tucson Action e-Bulletin: [watershedmg.org/get-involved](http://watershedmg.org/get-involved)



Thank you for virtually visiting our  
Living Lab and Learning Center

[watershedmg.org/living-lab](https://watershedmg.org/living-lab)