




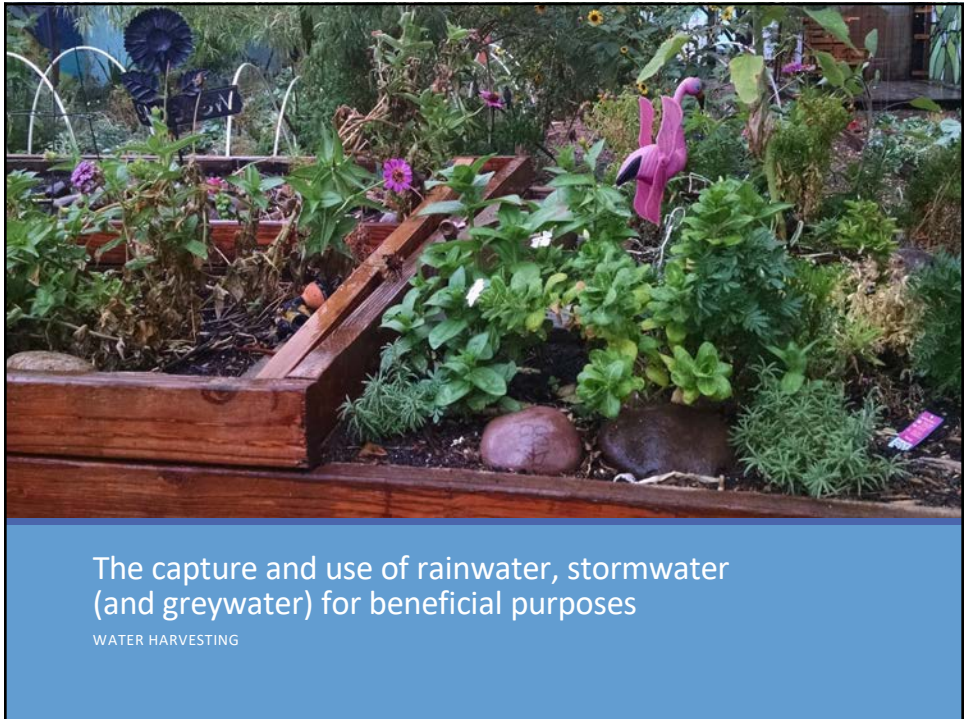
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Learning Objectives

1. Recognize types of tanks and benefits.
2. Installing a low maintenance systems
3. Pairing your storage potential with your landscape needs

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Passive vs. Active Water Harvesting

Passive: land contouring (basins, swales, berms). Requires little maintenance but cannot store water long-term.

Active: greywater, rain tanks. Requires active use of system but gives more control.

- Tanks allow collection across many rain events and storage during dry months.

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Rain Tanks through History

EL JADIDA, MOROCCO
ISTANBUL, TURKEY, INDIA
11TH – 16TH CENTURY
THOMAS JEFFERSON

Because of periodic shortages of water, Mr. Jefferson installed four cisterns. They were placed at strategic points to collect rainwater from the roof and walkways. Each held 3,830 gallons.

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5 Steps to Saving Outdoor Water

1. Check monthly your irrigation system and settings!
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

A photograph of an orange shopping cart containing black irrigation hoses. A large red 'no' symbol is overlaid on the cart, indicating a restriction or prohibition.

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<p>Active Storage of Rainwater</p>	<ul style="list-style-type: none">Reduce groundwater reliancePreferred water choice of plants – no chlorine, saltRelatively clean and soft water sourcePromote healthy soilsLong-term investmentEnergy savings/cost savings
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	<h1>Types of Rain Tanks</h1>
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Rain Barrels vs. Rain Tanks

- AVERAGE 50-GALLON CAPACITY
- ONLY CAPTURE A PORTION OF RAINFALL EVENTS
- CAN MEET SOME PLANT WATER NEEDS
- GENERALLY LOWER COST
- “TRAINING WHEELS”
- CAPACITY 300 – 1,000 GALLONS OR MORE
- CAN HOLD AN ENTIRE SEASON’S RAIN
- CAN COVER A MAJORITY OF PLANT NEEDS
- PART OF A COMPREHENSIVE WATER HARVESTING SYSTEM

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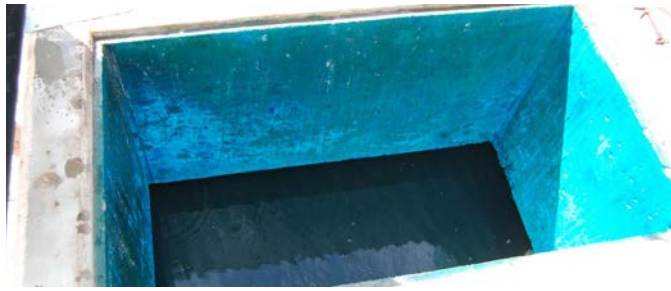


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To aspire to...



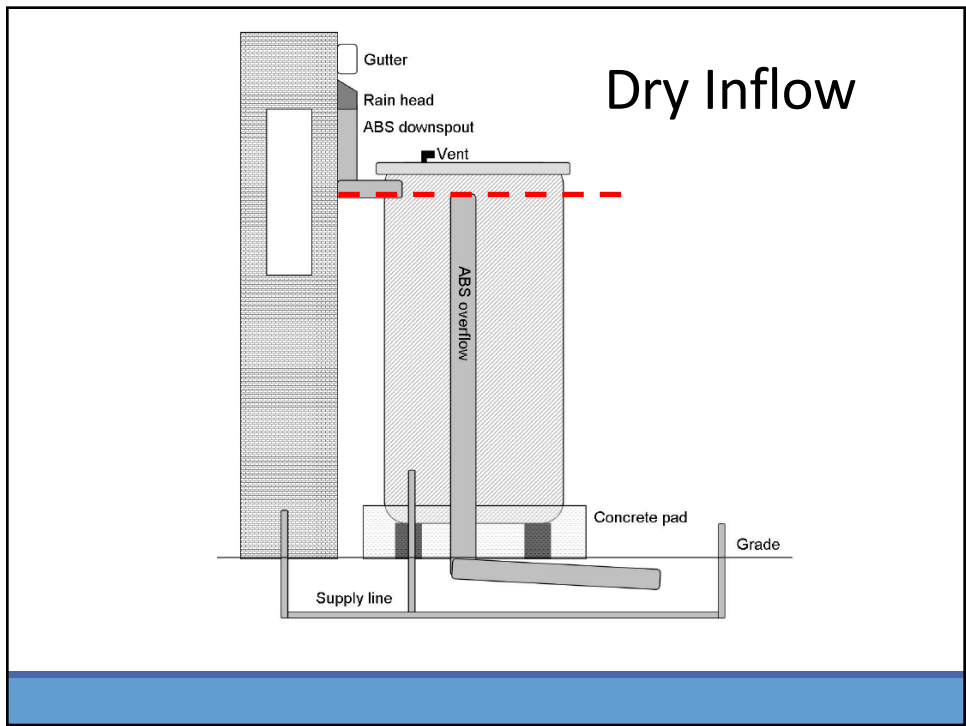
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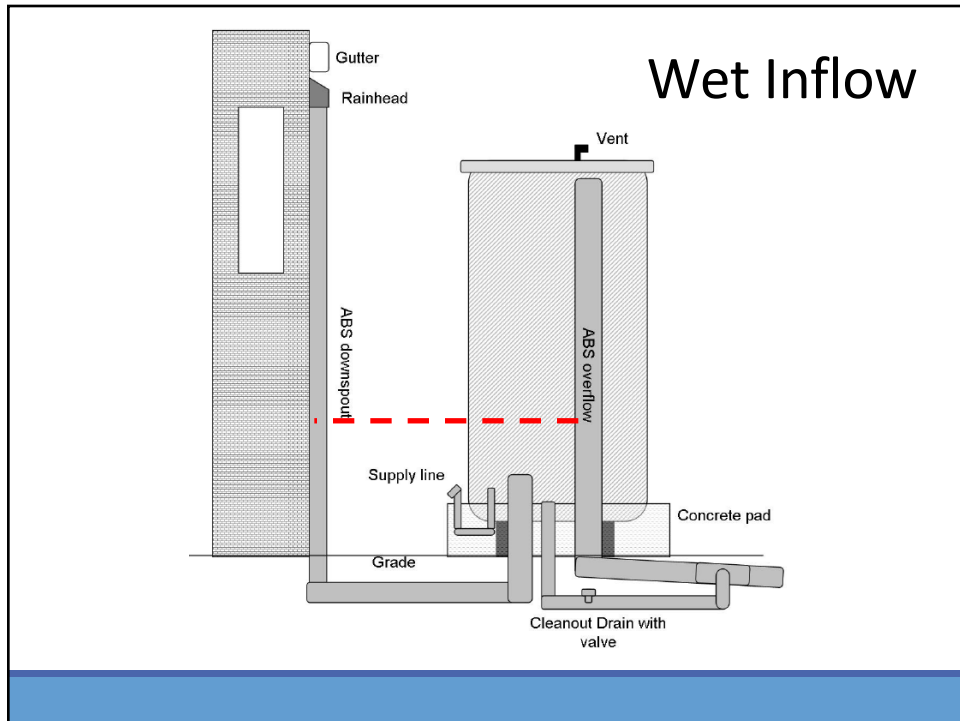
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How large of a rain tank do I need? It depends...

TANK SIZING

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Surprise Rainfall

FCDM Official Precipitation Record Updated: 10/20/21

Station Name: **Dysart Rd. @ Bell Rd.**
 Gage ID # HWY#: **80700; 5550** prior to 03/28/2018

Station Type: **Rain**
 Years Since Installation: **27** of **100** (1/20)

Data Begins: **10/25/92**

In or Near City/Town: **Surprise**
 County: **Maricopa**
 Latitude: **33° 38' 13.4"** 33.63678
 Longitude: **112° 30' 28.5"** -112.50764
 Elevation: **1,190** ft.
 Location: **Dysart Rd. at Bell Rd.**

Average Annual Precipitation for 28 Complete Years (in): **6.87**

Data - Incomplete Months: **None**
 Data - Missing Months: **None**
 Remarks: **None/No Flood**

Water-Year & Monsoon Precipitation Totals

Water-Year	Water-Year Precip. (in)	Monsoon Precip. (in)
1993	8	1.61
1994	7.06	1.26
1995	8.53	1.81
1996	4.72	2.76
1997	4.21	1.85
1998	6.97	1.42
1999	5.28	2.52
2000	2.91	0.93
2001	8.76	1.89
2002	2.02	1.81
2003	7.48	1.69
2004	5.51	0.67
2005	13.50	4.21
2006	5.59	4.23
2007	2.31	1.10
2008	7.96	2.97
2009	4.65	0.94
2010	15.94	3.07
2011	4.61	1.77
2012	4.06	2.96
2013	3.90	1.73
2014	6.35	4.88
2015	5.43	0.87
2016	6.41	1.18
2017	7.52	2.53
2018	2.44	1.77
2019	9.06	2.10
2020	9.84	0.79
2021	6.73	4.57
2022		
2023		

M. One or more months in the year/period contain partial or missing data.

Flood Control District of Maricopa County, 2801 W. Durango St., Phoenix, AZ 85009 (602) 506-1501

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- Capture events from multiple storms – cumulative rainfall over a period.
- Aim to capture rainfall from the entire monsoon or winter rain season = ~4 inches
- A tank that captures 1” of rain – good
- A tank that captures 2” of rain – better
- A tank that captures 3-4” of rain – best?

Tank sized based on catchment area

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Source: Rooftop runoff

Activity: Calculate your rooftop runoff from 1", 2", 3", and 4" of rain.

Formula: Square feet of roof x 0.623 x runoff coefficient x inches of rain

Example: Cindy Cistern has a 1,500 square foot home with an asphalt shingle roof and she wants to capture 4" of rain in her cistern.

Answer: $1,500 \times 0.623 \times 0.9$ runoff coefficient x 4" of rain = 3,364 gallons of water. Ambitious!

She will compromise on two 1,500 gallon cisterns – one on each side of her home.

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Match tank to plants' needs

Tanks may not cover the entire need of backyard gardens, but they can help greatly reduce the need for municipal water sources.

Activity: Calculate the annual water need for your garden.

Formula for vegetable garden: Square footage x 40

Example: Gardener Greg has a 5 x 10 garden.

Answer: $5 \times 10 \times 40 = 2,000$ gallons per year

Complete answer: $2,000 / 2 = 1,000$ gal *per season*

April 2011

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Calculate Discrepancies

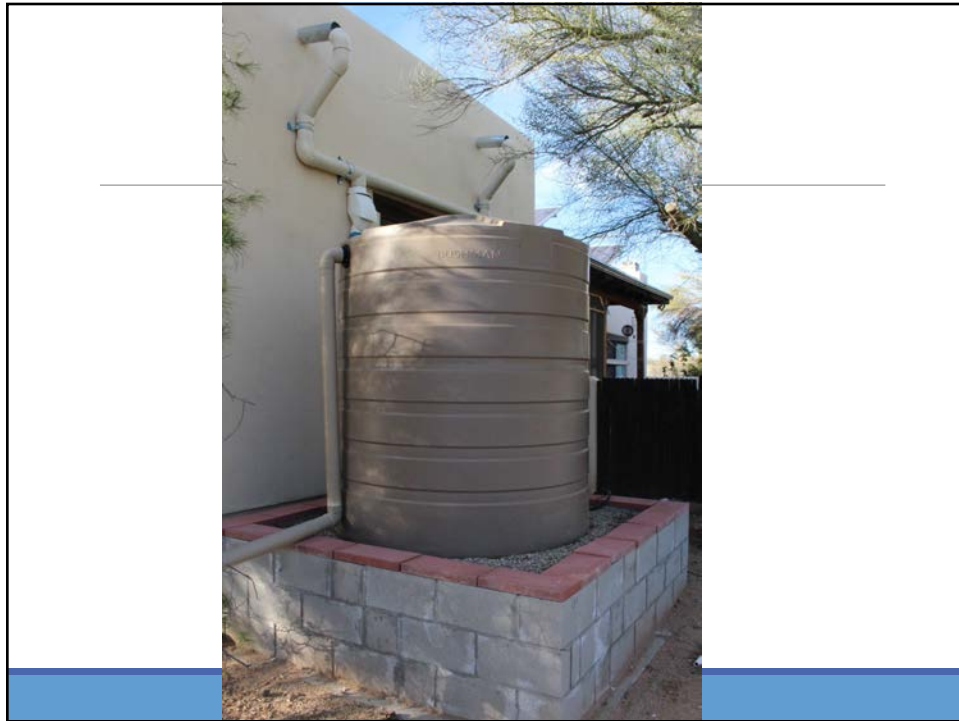
April 2011

1. How many gallons of rainwater can your cistern(s) hold per rain season?
2. How many gallons of water do your veggies need per season?
3. How much water will be needed that the cistern cannot provide?
4. How will you provide this water?
5. OR, if there is excess water, what can you use it for?

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Critical Features

- Water tight
- Light proof
- Vented
- Mosquito proof
- Critter proof
- UV resistant
- Planned overflow

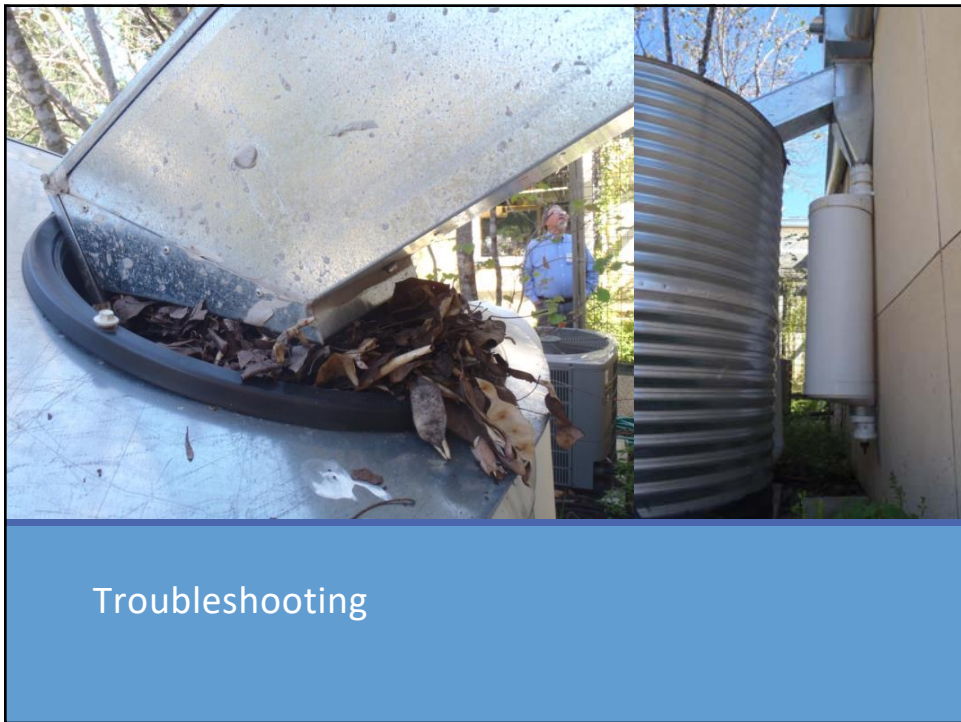


April 2011

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Maintenance

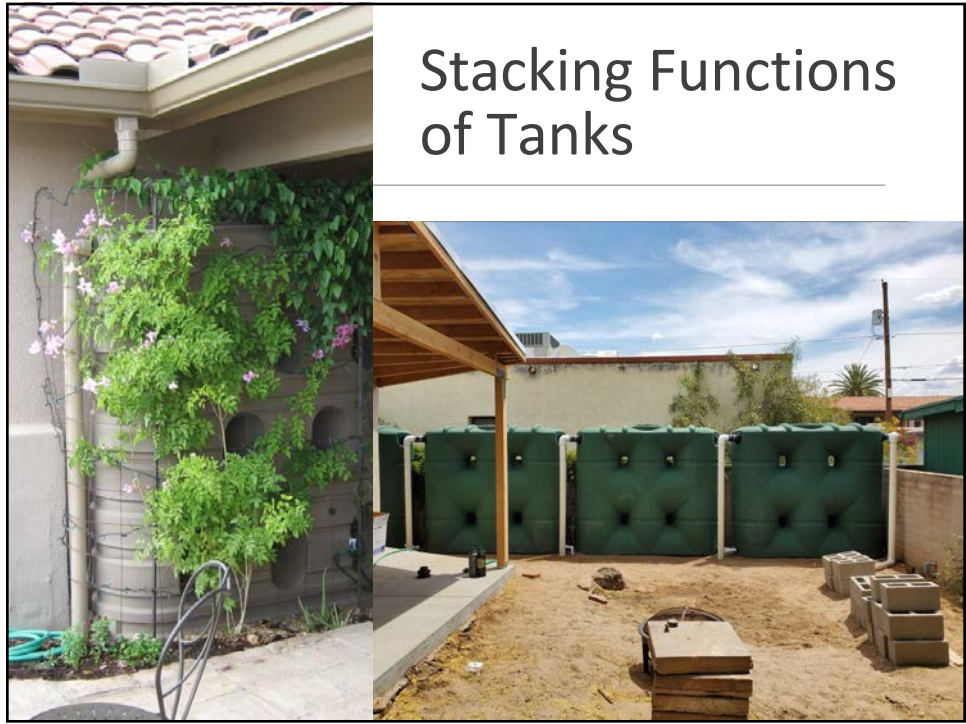
Inspection:

- Check for leaks or wet areas
- Check and clear debris from gutters and downspout, and downspout tubes are well secured
- Check overflow outlet, clear out any debris
- Check to be sure adult mosquitoes do not have access
- Empty first flush after each rainfall event
- Clean out bottom sediment layer if needed (only if >3-4" sediment layer)

Winter Preparation:

- Insulate all supply pipes and fixtures which contain water.
- In colder climates if the tank itself is not buried or insulated properly then the tank and supply lines may need to be drained completely to prevent freezing.

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Stacking Functions of Tanks

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Rain tanks as works of art

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Cistern Placement

April 2011

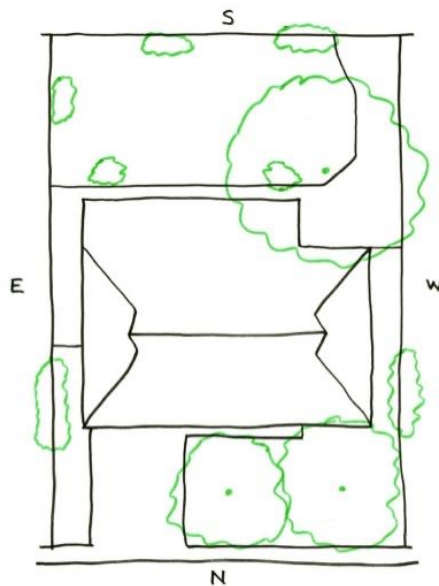
Activity: Draw cisterns into your site plan (started in Week 1).

Based on placement of gutters, human use/access, and stacking functions, where in your yard is the best spot to place your cistern(s)?

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Site Plan (from Week 1)

- Property lines
- House
- Other permanent structures (storage sheds, pool, driveway, sidewalks, etc.)
- Existing trees and shrubs
- Mark direction - North, South, East, West



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Questions?

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Thank You!!!



Phoenix Green Living Co-op Project 10/12/2013

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