Hydrate Project Series
HYDRATE YOUR FOOD: RAIN TANK SIZING AND PLACEMENT

Step one: Calculate rooftop runoff
Formula: Square feet of roof x 0.623 x runoff coefficient x inches of rain

Cumulative rainfall	Catchment area (square feet)	Conversion factor	Runoff coefficient	Volume
1 inch		0.623		
2 inches		0.623		
3 inches		0.623		
4 inches		0.623		

Will you be able to capture a full season's 3" of rain with your tank(s)? _____
If not, how many inches and gallons will you size your tank(s) to capture? _____

Step two: Plant needs
Determine how many gallons of water your fruit trees and vegetable garden need per year.

→ Formula: Area x conversion factor = annual water need
→ For rectangle, area = length x width
→ For circle, area = 3.14 x radius x radius (pi x r^2)

Conversion factor for vegetable garden: 40; for citrus trees: 28; for most other fruit trees: 19

	Food grown	Area (ft^2)	Conversion factor	Annual water need
Garden				
Tree 1				
Tree 2				

Step three: Tank Capacity vs. Plant Needs

a) How many gallons of rainwater can your tank(s) hold per rain season?
b) How may gallons of water do your garden & trees need per season? (annual need divided by 2)
c) How much water will be needed that the rain tank cannot provide?
d) How will you provide this water (irrigation, hand watering, etc.)?
e) OR, if there is excess water, what can you use it for?

Step four: Rain tank placement

a) Based on placement of gutters, human use/access, and stacking functions, where in your yard is the best spot to place your rain tank?
b) What are the benefits and drawbacks of putting the tank in this location? Are there any stacking functions?
c) Draw rain tank into your site plan.

Runoff Coefficients for the Southwest United States

Surface	Runoff Range	Notes
Roof	0.80 – 0.95	Metal: 0.95, Concrete/asphalt: 0.90, Built up tar/gravel: 0.85 – 0.80
Paving	0.90 – .95	Older irregular surfaces may be lower than 0.90.
Bare Soil	0.20 – 0.75	A best guess based on characteristics of soil and experience. Unprotected soil surfaces tend to surface seal easily unless high levels of organic material or a high content of sand is present.
Soil with Vegetation	0.10 – 0.60	Leaf litter, basal area, and roots all help increase infiltration rates and can also absorb water.
Grass/Lawn	0.05 – 0.35	A high density of leaf area and root densities help reduce runoff. If soil underneath is compacted runoff rates can be higher.
Gravel	0.20 – 0.75	Use the coefficient of the ground below the gravel

*Chart adapted from 1) Lancaster, Brad. 2006. Rainwater Harvesting for Drylands, Vol.1.Rainsource Press and 2) Waterfall, Patricia. 2006. Harvesting Rainwater for Landscape Use 2nd Ed. Pima County Cooperative Extension.

Potential Harvested Rainwater Volume (gallons)

Catchment area (ft^2) x rainfall depth (in) x 0.623 (conversion) x Runoff Coef. = Volume (gallons)

Calculating Basin Volume (gallons)

- Quick Estimate: Average Surface Area (ft^2) x Average depth (ft) x 7.48 (gal/ft^3) = Volume (gallons)
- More Accurate Ballpark: Depth (ft) x ([L1 x W1] + [L2 x W2]) / 2 x 7.48 (gal/ft^3) = Volume (gallons)
- Most Accurate: CAD or GIS based delineation and calculation

PLANT WATER NEEDS CALCULATION

Annual water need = area x conversion factor

Area = 3.14 x radius x radius (pi x r^2)

Water Use and Conversion Factors

Very low water use = conversion factor of 4
Low water use = conversion factor of 10
Moderate water use = conversion factor of 19
High water use = conversion factor of 28
Very high water use = conversion factor of 40