LESSON 5: IRRIGATION PART II
Constructing and Maintaining a Rain Basin

What is a Rain Basin?

A rain infiltrating basin or bio retention feature is an excellent way to capture, store and infiltrate rain water in the landscape instead of losing it as runoff to storm water drains. A basin planted with native vegetation and lined with mulch acts like a sponge that not only soaks up water but also filters out storm water pollutants.

Step by Step Guide to Installing a Rain Basin

1. Identify your water sources. Where is water coming from (roof, patios, roads, pathways, etc.) and where does it flow to/is it going? Is there a potential to redirect it to a rain infiltrating basin or planted area?

2. Calculating storm runoff.
    a. How much water is falling on the hardscape that you want to capture runoff from? For example, your roof:
        i. Measure the square footage of your roof. Remember it's just the footprint of the roof, doesn't matter the roof pitch.
        ii. Multiply the area by the amount of rain in inches.
        iii. Multiply by 0.623. Each square foot sheds 0.623 gallons per inch of rain.
        iv. That will give you the gallons that are being shed off your roof, the potential capture

Catchment area FT^2 x rainfall (in) x 0.623 (gallons/inch of rainfall per FT^2 = maximum runoff

**You can add a runoff coefficient to be more precise. The runoff coefficient factors in leaks/evaporation/not perfect runoff. To include it, simply multiply the total gallons by a factor of 0.8 – 0.95 depending on roof surface. Same goes for water falling on the ground but adjust the efficiency for the medium the water is falling on.

An average sized rainfall event in southern California is 0.5" of rainfall, so try to size for this as a minimum. A large rainfall event in southern California would be 1.5 – 2". Note the difference in gallons of rainfall for these different rainfall events.

For quick calculations, a good rule of thumb to use is - 600 gallons are shed in one inch of rain per 1000 FT^2 of roof!

3. Size the basin appropriately. Given the approximate rainfall runoff amounts for your site determine what size basin you need to maximize rain capture. Try to match the volume of gallons shed in an average rainfall event to the total basin capacity. The depth of the basin will depend on the soil's percolation rate. The slower draining the soil the shallower you want to make your basin. Usually the range for depth is 6" -12".

Surface area of basin FT^2 x depth of basin (in) x 0.623 (gal/in•FT^2) = volume (gallons)

**This volume will be an underestimate since the sides of the basin are sloped.

4. Decide where to place the basin. Where do we want all this water to go? And how to convey water to where we want? We can convey water via gutters, downspouts, pipes, swales, berms, rock-lined channels, etc.
    a. Where NOT to locate your rain basin
        i. Not within 10 ft. of building foundation, not over utility lines, not near steep slope, not in poor drainage zone (Do a percolation test!), not in areas with >10% slope, not where groundwater is shallow.
    b. How to convey the water?
        i. If conveying the water over the landscape, try to promote infiltration along the way by creating a meandering pathway with gravel or small stones that gently slopes toward the basin. It is important to prevent water from running quickly off of the landscape which leads to erosion. Brad Lancaster uses the helpful adage about water: “Slow it, spread it, sink it.” Water can also be conveyed via pipes above or below ground. Whether or not the water is delivered through pipes or not, the ground below the water being conveyed should have a gentle slope of at least 1-2% (1/8” - 1/4” drop per foot). It is ideal to have gradually sloping swales, not narrow channels, to encourage slow distributed rainwater percolation.

5. Get to work-
    a. Clear area of any debris before starting.
    b. Measure out the proposed basin and mark the borders with chalk or flour.
    c. Excavate basin.
        i. The excavated soil can be used to grade the surrounding earth to slope toward the basin or to create berms to direct water or increase basin capacity. The basin bottom should be as level as possible to encourage even water distribution. It is helpful to tamp any recently moved and graded soil, especially berms and elevated areas. It is not necessary to tamp the bottom of the basin.
    d. Smooth the edges and sides of your basin
        i. The basin's side walls should have a gradual slope (ideally 3:1), not sharp angles.
    e. Create/Route an overflow outlet
        i. The overflow outlet is critical in the case of a large rain event that fills your basin to beyond capacity. The overflow should be a 3-4" depression approximately 12" wide from the top of the berm, located at the natural low point of the basin and directed toward existing drainage. The depth from the overflow to the bottom of your basin is your basin's depth (ponding capacity).
    f. Stabilize the basin inlet and outlet
        i. The inlet is the point where water enters the basin and outlet is the overflow point where water would leave the basin when the basin is full. Both the inlet and the outlet are points of water flow and potential erosion. Reinforce the inlet and outlet with a rock splashguard and/or several rocks, respectively, to slow the water flow and reduce erosion.
    g. Verify the critical basin elevations/system
        i. Use a water level to check the different basin elevations. Make sure the water is moving the way you want it to by either using a water level to check the different basin elevations or by simply running a hose at the inlet point.
        ii. The basin edge or berm should be at least 4" lower than the foundation of your home or any existing structure.
        iii. The overflow should indeed be lower than the basin edge or berm by 3-4"
        iv. The basin bottom should be lower than the overflow by 3-4"
    h. Plant the basin
        i. Select appropriate plants for the differing "microclimates" of the basin. The bottom is the lowest and therefore wettest zone and best for moisture loving grasses, etc. The top berm and the sloped sides of the basin will receive relatively less water and plants that prefer better drainage and drier conditions will be more appropriate
    i. Mulch the basin
        i. Line the basin with a 3" layer of organic mulch.

j. Observe how the basin functions in a rain event and make any necessary adjustments

Works Referenced

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