

How To

Swaling Tips

by *Tim Murphy*

Q: How big are swales?

A: If you dig a big depression and it holds a lot of water then it's a big swale. If you dig a small depression and it holds and infiltrates less water then that's a small swale.

—Bill Mollison, *Permaculture Design Course*, 1988

The distance between swales can be from 3 to 20 times the average swale width (depending on rainfall). Given a swale base of 1 to 2 metres, the interswale space (area between swales) should be 3 to 18 metres. [In drylands, distance between swales should be greater than in humid climates.]

—Introduction to *Permaculture*, Mollison and Slay, 1991

Permaculture emphasizes that each site has a different climate, solar aspect, soil, slope and other characteristics. Each site has unique needs and requires a unique assessment and approach. Prolonged and thoughtful observation is needed to make such an assessment. To avoid wasting resources and time in the long run, it's best to start out slowly and to carry on a wide array of small land use experiments based on your best initial site assessment. Watching one small swale for an entire year's cycle will give valuable information and prevent large-scale mistakes.

Tim Murphy teaches permaculture throughout the southwest. He is chief designer for SLS, Inc., an environmental design firm in Tucson, Arizona.

Right: A small swale, 2 feet wide and 6 inches deep, created with hand tools.

Far right: A big swale, 8 feet wide and 2 feet deep, created by a grader.

Next page: Aerial view of really big swales near Tucson. They were created by the Civilian Conservation Corps in the 1930's using buckets drawn by draft horses. They are 400 feet long, 8-12 feet deep, and 50-60 feet wide. Left unattended for some 60 years, they have maintained themselves while supporting a diversity of lush native vegetation.



Photos: Vicki Marvick

When deciding where to place this initial swale, some key questions emerge.

- Is a concentration of water needed here?
- Can a significant change be made here with relatively little effort or investment?
- Can the berm of the swale also serve as a functional path if placed here?
- Is it safe, energy efficient and practical to build here?

If the answers are all "Yes," this place would be an ideal nucleus for the birth of a system.

It's easiest to begin measurements for swale placement at a spot where you want the swale to end or in a convenient relationship to idealized locations indicated on a plot sketch. For instance, a good place to start measuring the contour line for a first swale is a spot that is as high as possible in the landscape, near the headwaters or a divide. Or it could be a favorable spot near an existing home. Using a bunyip (water-level), mark points on-contour in both directions, if possible, from this spot. [See PDJ #5, pg. 8 for more on using a bunyip.]

If the idealized location doesn't work out—for instance, if you start at the place where you want a swale to end and the actual contour line turns out to be shorter than desired because it leaves the lot too soon, goes through a large tree, the underground utilities, or an artesian mineral spring—don't worry. Without moving, look for a spot just up or down slope that avoids the problem, then move to the new spot and measure a contour line (parallel to the former) that avoids the obstruction or shortfall.

Watch what happens to this initial swale through a complete annual cycle and adjust its size or length to meet the demands of the landscape. To determine how much a swale fills, observe it during or just after a rain. If you get an inch of

rain in an hour (a rain gauge is helpful) and the swale fills three-quarters of the way to the brim you need more capacity. An unusually heavy shower, or a series of closely spaced smaller showers, will cause your catchments to overflow, wasting an opportunity and a resource and requiring repairs.

Bearing in mind that it's important to design for the extremes in an area helps in deciding how much capacity to add to a swale. If an average rain almost fills the swale, doubling the capacity gives a cushion so that a record rain

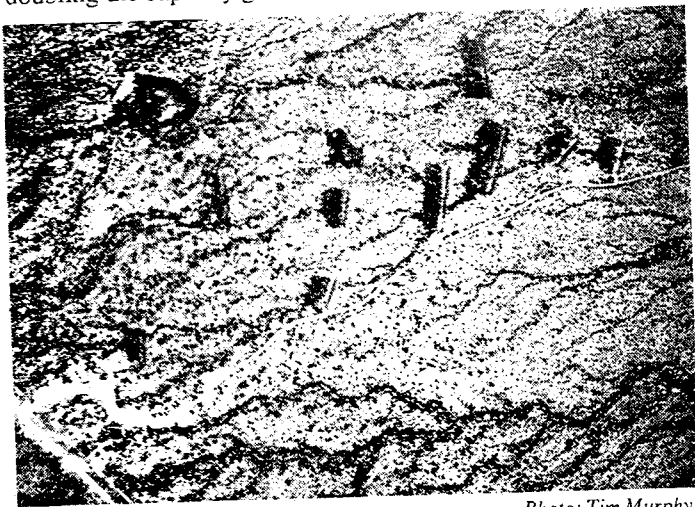


Photo: Tim Murphy

doesn't overwhelm the system. (A friend once received a 4 inch downpour in 30 minutes in an area of an average of 12 inches of rainfall per year. Two of his swales blew out and one made it.) It pays to size swales for the most extreme possible scenario—and to be generous in estimating what is extreme.

Capacity can be increased by widening, deepening, or lengthening a swale, or even adding other swales higher in the collection or runoff area. Deciding which to do depends on what will work in that place while complementing what you are trying to accomplish in the total design.

Extrapolate from what you observe so that you can build on what was successful. It's a good idea to measure or stake all planned swales so that you know where they will be, even if you don't place them right away. Then you can place other elements in beneficial relationships immediately and the swales can be constructed later without compromising those benefits.

An array of swales is the skeleton that supports a unique organism—the living landscape. While we may wish for recipes that tell us where to place the skeleton, placement and sizing of swales is part of the non-linear process of design and design implementation. Direct observation and experience is a crucial part of this process. ♦