Soil for Water???

I recently attended the first in a symposia series entitled “Soil for Water: Maximizing the potential of healthy soil to catch and hold rainwater.” The symposium was sponsored by the National Center for Appropriate Technology, the Hill Country Alliance and the Dixon Water Foundation. When I first saw the title it made me think of the book on the history of J. David Bamberger and the Bamberger Ranch Preserve, which is entitled “Water from Stone”.

I have always assumed that the title of the Bamberger book was a play on the old saying, “you can’t get water from stone”, which I have always interpreted to mean you can’t get something if it is not there. In the Bamberger case, it referred to the fact that by applying many good land management practices, Bamberger was successful in getting springs to flow where none had for many years.

I can’t say I learned anything at this meeting I had not known before, but sometimes that in itself is satisfying. The principles expressed by the speakers, however, are important for everyone to understand as they relate to land management and our water supply.

The basic premise of the symposium was that, “Healthy soil acts like a sponge: holding rainwater for long periods of time and slowly releasing it to plants, springs, creeks, rivers and aquifers”.

It takes healthy vegetation to make healthy soil, and vice versa for that matter. Healthy vegetation has a healthy root system, and that in turn requires a healthy collection of micro and macro organisms from bacteria and fungi to nematodes, earthworms, beetles and ants. A symbiotic relationship exists between the soil organisms and plant roots in which the roots provide food for the other organisms and the other organisms make certain nutrients available to the roots.

This relationship is not static but dynamic as some roots die and others grow as do all components of the living organic matter, all of which makes the soil porous. As the living organisms die and as dead leaf litter degrades and becomes incorporated into the soil, the organic matter in the soil increases. This is important because the porosity of the soil and the organic matter determine how easily water soaks into the soil and how much water the soil can hold.

Healthy vegetation with healthy soil can capture and hold a lot of water. Bare soil has no vegetation, nor roots, very little other organisms and of course very little organic matter and it is not porous. Around 80% of the rainwater that falls on an oak mote or native bunchgrass infiltrates into the soil, whereas only about 25% soaks into the soil under bare ground.

The above-ground vegetation is also important because it shades the soil surface with its leaves, both living and dead, thus lowering the temperature of the soil. When the soil temperature is 70 degrees or lower, virtually all of the water that infiltrates into the soil is used for plant growth or seeps deeper underground to feed springs and aquifers. When the soil temperature is over 100 degrees, (as in unshaded areas) a large amount of soil moisture is lost to evaporation. And when the soil temperature is over 115 degrees (as bare soil can be), the soil microorganisms begin to die.

So, healthy vegetation above the soil is capable of growing healthy roots as well as slowing down the overland flow of water (allowing it more time to infiltrate) and shading the soil surface. A healthy root structure is capable of forming symbiotic relationships with soil organisms for the mutual benefit of the plants and the organisms, and this in turn makes the soil porous and the soil organic matter high. All of which allows the capture and beneficial use of rainwater, either for vegetation of feeding springs and aquifers.

At the other extreme, bare soil has no vegetation, low porosity, few roots, low organic matter, low soil moisture, and unshaded hot soil temperatures which causes rainwater to runoff, down the creeks, silting the reservoirs and into the Gulf.

One final point. I have written in the past about the importance of biological diversity. One of the reasons diversity is desirable is that diversity in above-ground vegetation means diversity in soil organisms, some of which will be better able to withstand drought, hard freezes, etc., so that even if some species are lost, some will survive.

Until next time…

Jim Stanley is a Texas Master Naturalist and the author of the books “Hill Country Landowner’s Guide” and “A Beginner’s Handbook for Rural Texas Landowners: How to Live in the Country Without Spoiling It”. He can be reached at jstmn@ktc.com. Previous columns can be seen at www.hillcountrynaturalist.org.