Water Wise Gardening (and landscaping in a dry climate).

There are very easy ways to use less water, pull fewer weeds while enjoying more growth from your plants. This is a rather high-profile aspect of sustainable gardens and landscapes.

Landscaping Basics

For some, landscaping is a means to an end, for others, the process is an end in itself. A landscape is often described as static; a garden as dynamic. Our sage-shrub-steppe ecosystem can be beautiful but not everyone wants a bitterbrush - sagebrush yard.

A little basic knowledge of our region can go a long way toward increasing your successes. Some basic understanding of ecology and the many natural interrelations between climate, topography, geology, exposure, altitude, soils, microbes, animals and much more is essential to gardening well. Plants must survive heavy Sierra snows (Sierra cement) and no Sierra snow (winter drought), rapid and extreme temperature swings (winter and summer), absent top-soil and acidic or basic base-rock (the reason our soils are acidic or basic), high-altitude sun and low humidity, to name a few. There are also many insects and diseases not to mention our troublesome and plentiful vertebrate neighbors including rabbits (Lagomorph), beaver, marmots, gophers, rats, squirrels, voles (Rodentia), moles (Insectivora), bear, raccoons (Carnivora), deer (Artiodactyla) and Birds (Aves). And then, of course, your landscape must be able to survive the ravages of sleep-deprived snowplow drivers, sliding metal roofs, and rude neighbors who think your trees and shrubs are there for their snow storage.

Our native plants have obviously adapted well enough. We encourage you to walk and hike often and to learn about the native plants and observe their habitats. This knowledge will help you tremendously with your gardening endeavors.

Water is essential to all life and most of us take it for granted. It is neither unlimited nor free. Many people pointlessly waste water and there are many easy ways in the house and in the garden to conserve a much larger percentage than we currently do.

I love my oasis, my little patch of green in this high-desert. Winters can be so long and a house gets to feel so small. A garden gives us extra rooms each summer.

Climate

In the northern Sierra Nevada Range we have a Mediterranean climate to the west. Our Pacific ocean gives us almost all of our moisture in winter and very little in summer. The eastern slope (Truckee) is the Sierra “rain shadow”, the semi-arid to Great Basin, “high desert”. Storms leave most of their moisture and warmth on the west side of the range. The Martis Valley is a basin in the Great Basin’s basin-and-range physiography.

Local climate variations occur within these broader regions depending on aspect, exposure, slope, elevation, topography, vegetation, rock formations, streets, buildings, soil depth, soil type, and proximity to water, etc…, etc... Every town and every garden has microclimates. Microclimates may be as “micro” as the south-facing wall next to your front door or as large as the entire west-shore of Lake Tahoe.

The growing season of a region is often equated with the frost-free period. According to NOAA, our frost-free period in Truckee is Mid-July – Mid-August. Always have “floating row cover” (a commercial grade, spun polyester frost guard) ready to protect your tender plants from spring, summer and fall frosts. Frost fabric may also be used to harden tender seedlings, as a shade-cloth to prevent excess moisture loss in heat, and to protect gardens from summer hail.

Plants aren’t using much water when they are dormant but they are alive and they need some. Every summer in our Mediterranean climate we have a drought and every winter it rains and snows, some. Some truly drought tolerant plants only pop up and bloom early, while the soil is still moist, then they die back to the root or go to seed and die as soon as summer drying begins. Some plants have very deep roots that follow silent water down as the surface moisture is sucked up and away by the dry air. Many other plants only survive in or near perennial streams or wet meadows.

We frequently hear: “Where are your natives, I want a landscape that I don’t have to water” and “How long will I need to water this plant?”. Not all native plants are drought tolerant and many non-native plants are

extremely drought tolerant. The survival rates of native plants is actually very low. Out of a million seeds produced by a plant only a handful may actually grow into seedlings and out of those surviving seedlings only a couple, if any, will survive to maturity. In our own landscapes we do whatever we can to improve on Nature's odds. Occasional summer irrigation of some kind (i.e. simulated thunderstorms) will always be helpful (particularly in July, August and September).

Large rocks, logs and building foundations shade the ground, slow snow-melt, concentrate moisture, and hold reservoirs of water for thirsty plants well into summer.

Soil

Soil is the "unconsolidated mineral and organic material on the immediate surface of Earth that serves as a natural medium for the growth of land plants". Our ground has little or no organic matter and barely qualifies as a medium; it is usually just some form or combination of rock. Were it not for the bacteria and essential fungi that associate with plants and actually digest the rock or gather nutrients from the air, few native plants would live in the Sierra. The "top soil" that contains organic matter, if any, breaks down quickly with freezing and drying and often washes or blows away. Our Truckee soils are usually slightly acidic and of silt with sand, micronutrients, ample phosphorous and potassium, with no organic matter and no nitrogen. Our soils also frequently lack ample calcium and sulfur.

While some books and professionals, from climates and conditions far different than ours, discourage the use of amendments when planting trees and shrubs, we, in difference, find their use essential. The heavy, high-Sierra snowpack quickly re-compresses soils that have been merely turned. The use of some amendments prevent compaction, retain moisture and nutrients, provide aeration, allow water infiltration and create a transition between the very coarse soils of most container grown plants to the fine textured native soils.

Composted organic matter is the "miracle panacea" for all that ails of our mountain soils. Good compost supports plant life and maintains a balanced population of microbes, slowly digesting the soil and releasing essential nutrients to the plants. Organic matter holds the water and nutrients that would otherwise leach away in rocky soil and it helps loosen and aerate heavy silt or clay soils. Humus is the amorphous mineral goo that results from completely digested (mineralized) organic matter. Humus is essential for improving and maintaining soil structure. Humus glues fine particles into aggregates that create better aeration and drainage. It is immensely important to "top-dress" (spread fresh compost on top = mulch) a little every year in order to replace the organic matter that has been completely reduced, leached or blown away. The woody mulch atop the soil, many feet from your trees and shrubs slowly becomes compost and will improve the soil ahead of the expanding root system.

If you take the time to prepare a hole with ample mature compost, your plants will grow faster, require less watering, resist diseases, require less fertilizations, suffer less salt damage and generally thrive far better than a plant without the benefit of compost. "Put a two dollar tree in a ten dollar hole" don't put a ten dollar tree in a two dollar hole.

For additional drought endurance we use water-absorbing (and releasing) gel around roots. These "synthetic sponges" hold up to 400 times their weight in water and release it back to plants' roots, as the roots demand it. The use of these polymer gels can reduce the need to water by as much as 75%. Alternatively we have also been adding naturally porous aggregate diatomaceous earth with some fairly impressive results.

Fertilize for drought

Don't forget nutrients, a healthy plant will withstand drought better than a weak one. Always use naturally slow releasing organic fertilizers to promote vigorous root systems and sturdy top growth, improve soil texture, structure and aeration, promote beneficial organisms and reduce the soil salt concentrations. Most organic fertilizers will not pollute rivers, lakes or our groundwater. Using organic fertilizers with added soil microbes will help populate your soil with billions of beneficial microorganisms. Beneficial microorganisms in the soil work endlessly to digest dead roots, decaying bark, grass clippings, the mulch at the surface as well as other dead microorganisms. By this process they produce vast quantities of plant food. Biosol, for example, is an organic fertilizer made primarily from fungi fed on organic soybean and cottonseed meals. Biosol Forte is flush in the two components our soils

lack. It contains ~20% humic acid and 15% fulvic acid making it a very concentrated compost, and it has an ample dose of long-lasting, slow-releasing nitrogen.

Mycorrhiza are symbiotic associations, between plant roots and species of fungi, where both partners benefit . The fungi connect with roots while also spreading hundreds or thousands of feet out through the soil. The plant gives the fungi carbohydrates and proteins and the fungi gives the plant water and raw nutrients that it would otherwise be unable to acquire. The fungi and many of the other beneficial microorganisms help protect the plant roots from invading pests and pathogens. It is estimated that nearly 90% of all plants require mycorrhizae to survive, and mycorrhizae likely enabled, once solely aquatic, plants to colonize land some 450 million years ago.

The use of pesticides, herbicides and many chemical fertilizers will kill many of the beneficial organisms and effectively destroy the natural sources of water and nutrients in the soil.

Most chemical fertilizers are highly soluble and wash through the soil quickly. They may cause temporary excessive growth that requires extra water. Chemical fertilizers may harm healthy soil structure (and thus the moisture and nutrient holding capacity) that in turn means plants need more water and fertilizer. The increased salt concentrations in the soil reduce the plants ability to take in water and in some cases; will cause the water to move out of the plant and into the soil (physiological drought).

Mulch

Mulch : from the Greek molsch, soft or soften. THE best natural way to improve your soil over time and to decrease watering by protecting soil moisture.

Our high elevation sun, low humidity, and frequent prevailing winds conspire to suck the water out of our plants and out of the soil. Somewhere between 80-95% of all plants' roots are in the top 18" of soil. In drought, as the shallow roots begin to dry, the plant stops taking in much of its water and nutrients and growth slows or stops. When you water again over the exposed soil, the plant begins to restart the giant metabolic machine and prepares to start "drinking and eating" again. Meanwhile the sun is beating down, the dry winds are blowing and by the time the plant "wakes-up" enough to begin uptake, much of the water is already gone, evaporated or wicked into the surrounding bone-dry soils. When your plants have a thick layer of mulch over the soil, the roots are shaded from the sun's heat and protected from the drying winds. The roots are able to do their jobs all day, every day and without the stops and starts, plants may grow 3-4 times as fast while needing ⅓-½ of the water. Our growing season is short enough, there is no point stunting the growth by skimping on mulch.

Mulch can also reduce or eliminate weeds around your plants, thus removing competition for water and nutrients. As the mulch slowly breaks down, the underlying soil is improved and nutrients are released for the always expanding root systems of your landscape plants. In areas of minimal snow, mulching before winter will protect the shallow roots from freeze-thaw cycles that can severely damage even the hardiest plants. In early spring, a fresh topping of a dark colored mulch will make all the plants in your garden appear vibrant.

Mulch 3-5" of loose compost or wood chips well out past the drip-line of every tree, shrub or perennial in your garden. To cover all the roots, mulch trees as least as wide as the trees are tall and mulch shrubs twice their diameter. Exposed dry soil 10' away from your plants is wicking away moisture from your plants. Mulching is essential. I should not be optional. Imagine the hard working shallow roots of your plants just under the soil surface reaching far out from the plant. While we do everything possible to encourage the deeper roots, the majority of the nutrient and water uptake still occurs within a few inches of the soil surface. Mulching over any bare ground is always a good practice.

When you plant, dig and amend your hole with compost, 2-3 times wider than the pot. Mulch 2-3 times wider than the hole. Do NOT mulch over the original root-ball, but from the edges outward. Amendments are mature finished composts used IN the soil. Mulches, composted or not, are used ON top of the soil.

Gromulch is our most nutrient rich composted mulch. Sometimes we use a thin layer of Gromulch compost over the soil before using arborist wood chips for the bulk of our mulching. The composting microbes in the Gromulch have been digesting woody material for months and their addition will speed the eventual decay

process of the wood chips we put on top. Composted wood chips (wood chips after one winter) are very difficult to ignite. (UNCE: https://naes.agnt.unr.edu/PMS/Pubs/1510_2011_95.pdf)

Lawn

A word or two about lawns: Keep them relatively small. Aerate lawns grown from seed every 3-4 years. Plug /aerate sod lawns once or twice each year. Top-dress your lawn every spring with 1/8th inch of fine, mature compost (Kellogg's Topper or manure after aerating). Fertilize with a bio-active organic fertilizer once or twice in the summer to inoculate the soil with fresh living microbes that will digest lawn clippings, improve soil structure and provide nutrients (G&B Lawn). Use a long-lasting organic fertilizer in late fall to provide for early lush lawns the following spring (Biosol). Mow higher, 3-4", throughout the summer. Taller grass does not need to grow as much, requires less fertilizer, holds more moisture in the soil by shading the ground and suppresses weeds by blocking their sun. Use a mulching mower; add lime to bluegrass and clover lawns and avoid using "weed+feed" or "plus" herbicide-type chemical fertilizers.

An argument for a small lawn:
Cool Season Turfs…

*Can use less water than many xeriscape plants.
*Are very traffic tolerant.
*Can survive heat stress.
*Produce more oxygen than trees, shrubs and flowers.
*Remove dust and dirt from the air.
*Act as a natural filter, it reduces pollutants by purifying water passing through the root zone.
*Green spaces can play a big role in modifying temperatures and controlling climate.
*Eight front lawns have the cooling effect of a 70 ton air conditioner.
*Strategic planting of lawns and landscape plants could reduce the energy required for air conditioning by 25%.
*2500 sq. ft. of turf grass releases enough oxygen for a family of 4, every day.
*On a hot day, turf areas will be 15-30 degrees cooler than decks, patios, shrub beds and walkways.
*Bluegrass, when placed on properly prepared soil and irrigated correctly and fertilized organically, can be one of the most xeric plants in your landscape. No other single plant can provide as many environmental benefits and increase property values as dramatically.
On the other hand…
*According to US Water Resources Council, lawn watering, swimming pools and automobile washing activities combined account for 27.5% of household total water usage.

Irrigation

"Low and Slow" - Irrigation is essential but should be done wisely. Automatic irrigation systems offer the most efficient use of water. We tend to under and then over-water when dragging hoses around the garden. Automatic systems let you fine tune watering for specific areas of your garden that may need more or less. Drip irrigation and micro-sprayers are the most water conservative methods. With drip irrigation we use the lowest volume emitters for the longest periods of time with the greatest infrequency. Low volumes of water over a long period of time gets the water deep into the soil where it is less apt to evaporate and where it will encourage plants' deeper roots. Infrequent watering encourages deeper roots while reducing plants' dependence on surface roots. Irrigation is best done early in the morning before the heat of the day to reduce loss from evaporation.

The larger a plant's root system, the greater its resources and reserves are. Encourage wider root systems by placing drippers just outside the original pot's size and then later, just at the drip-line of the plant (below the outermost branches). Be sure to mulch well past the drip-line.

Natives

Dispelling a myth: "Natives don't need water". All life needs water. Some native plants are drought tolerant, others like alder, willow and dogwood won't live a week without water. Even very drought tolerant native species need water for the first few seasons in order to survive. Lilac and apple are two of the most drought tolerant species that thrive, neither one is native. "Established" - is a term……

The survival rate of native plants is very poor. Out of millions seeds produced by a plant only a few may actually grow into seedlings. Natural seedlings develop a root system many times larger than their foliage area.

This high root to low foliage ratio is essential to survival. Even so, out of the surviving seedlings only a few, if any survive to maturity.

Did we mention MULCH?

What you can do in the garden? Garden organically (because it is cheaper, easier and better for all of us), take care of your soil and MULCH. If you still don't know what we're talking about, listen well. Never allow bare soil in your garden, it breaks down, it washes away and it blows away. Mulch is insulation, a source of nutrients and a salve for your soil. You can use rocks, or gravel as mulch, if you like that sort of landscape. We prefer organic mulches, composted wood chips, bark mulch, cocoa mulch, Gromulch, compost. Organic mulch goes on top of the soil. It should be loose and full of air spaces for better gas exchange with the roots and to better insulate the soil surface from heat, drying winds and frost.

Most plant roots are near the soil surface. If the roots become dry, the plant stops getting water and nutrients and growth halts. When the soil is wet again the massive chemical metabolic machine slowly starts working again. With mulch, the soil never completely dries and the growth never halts.

Resources

Great sources of information include our surrounding forests and meadows and the people too. Visit the Villager Nursery, visit with your neighbors who have yards which you admire; most gardeners love to talk about their gardens. Go to the Library, look up gardening, landscaping, soils, composting, wildflowers, nature, and more. Hike often and look for habitats in the wild that remind you of places in your yard and take pictures

Plants

Select plants that are appropriate; "The right plant in the right location" as any competent landscaper will tell you. Plants with large stomata (the holes in the leaves that plants "breath" through) are not so great in the hot sun. Plants with gray or silver foliage are often more drought-tolerant. Succulents are adapted to drought, Spring bulbs like Daffodil and Tulip (and Autumn Crocus) are drought avoiders. They grow, bloom and use the sun's energy while the soil is moist, then lie dormant in the heat and drought of summer.

Trees and Shrubs (just a few)

Trees
Amur Maple
Apple
Chokecherry
Crabapple
Modoc Cypress
Hawthorne
Western Juniper

Shrubs
Creeping Oregon Grape
Currant
Elderberry
Gooseberry
Juniper
Lilac
Manzanita: Colorado, Bear-berry,
Mugo Pine
Potentilla (Diasphora)…when well established
Rabbitbrush
Rockspray
Woods Rose
Sagebrush
Serviceberry
Snowberry: Rotundifolia, Alba, Mollis
Spiraea: Birchleaf, Mt. Pink, Douglas'

Perennials

(X = Thrives in slightly dry conditions, XX = dry conditions, XXX = very dry conditions)

X - Rated	XX - Rated	XXX - Rated
Bellflower	Aster	Allium (bulb)
Bugleweed - Ajuga	Balloon Flower	Blanket Flower
Candytuft	Basket of Gold	Blue Fescue
Columbine	Bearded Iris	Blue Flax
Dead Nettle	Black-eyed Susan	Butterfly Weed
Delphinium	Catmint	California Fuchsia
Edelweiss	Cinquefoil	Cushion Spurge
Fireweed	Creeping Phlox	Daffodil (bulb)
Foxglove	Creeping Thyme	Evening Primrose
Gayfeather	Day Lily	Fringed Sage/Silver Mound
Hard Fescue	English Lavender	Globe Thistle
Hardy Geranium	False Indigo	Hardy Perennial Sage
Lady's Mantle	False Sunflower	Hens & Chicks
Lungwort	Geum	Hop
Maltese Cross	Globe Thistle	Iceplant
Painted Daisy	Goldenrod	Jupiter's Beard
Periwinkle / Vinca	Hardy Baby's Breath	Mount Atlas Daisy
Plantain Lily	Hardy Bachelor Button	Narcissus (daffodil var's.)
Purple Cone Flower	Hardy Ice Plant	Oriental Poppy
Rudbeckia	Hardy Salvia	Partridge Feather
Self Heal	Hollyhock	Penstemon
Shasta Daisy	Jacob's Ladder	Perennial Sweetpea
Sweet Woodruff	Lamb's Ear	Prairie Cone Flower
Tickseed	Lavender Cotton	Pussytoes
Verbena	Leadwort	Silver Mound
Windflower	Mountain of Gold	Soapwort
Yellow Archangel	Oregano - Marjoram	Statice - Sea Lavender
	Pasque Flower	Sulfur Buckwheat
	Peony	Sun drops
	Pincushion Flower	Wooly Thyme

Pinks - Dianthus

Poppy

Red Hot Poker

Rock Cress

Rose Campion

Russian Sage

Sandwort

Sea Holly

Sedum - Stonecrop

Sun Rose

Veronica

Yarrow

Yucca