

## Sustainable Landscape

### Getting Started

This document is provided as a complement to today's presentation: Sustainable Landscape Basics. Along with some of the principles provided today, additional resources are included to allow you to dig a bit deeper into how to evaluate your own landscape to build towards sustainability.

### A SUSTAINABLE ECOSYSTEM

Sustainable landscapes are designed to thrive in local temperatures, rainfall and weather patterns. A good sustainable landscape works with nature, not against it, and does well with little or no human help. The landscape is planned for the **right plant** in the **right place**. A sustainable garden is designed to be both attractive and in balance with the local climate and environment and it should require minimal resource inputs. Outputs such as stormwater runoff that carries excess fertilizer, yard waste to a landfill and use of gas-powered equipment is limited.

Left to its own devices, any area becomes a complex ecosystem, which is basically a group of plants and animals in the same area that rely on each other to prosper. Plants attract insects, which in turn attract birds and animals. Everything lives off something else in the ecosystem, and everything you do in your yard has a bearing on how that ecosystem evolves. The more you nurture your outdoor space with the right plants, and without the use of chemicals and greenhouse-gas-emitting tools, the greener your garden becomes.

Plants, and trees in particular provide ecosystem services in your landscape. Measurable benefits to humans include:

- Energy savings: heating, cooling and wind breaks
- Stormwater runoff reduction
- Reduced air pollution through particle uptake
- Carbon sequestration
- Reduced soil erosion

### LIGHT, SOIL AND WATER

Other than the walkways, driveways and patios that make up your hardscape - light, soil and water are your basic building blocks for growing a healthy landscape. They are the **Place** in *Right Plant Right Place*

#### Light

Light pattern is really about understanding microclimates in our garden and then finding the right plant that will thrive in the right spot. Plants have adapted over time to favor a particular condition for best growth. It is our challenge to mimic these conditions if we want the most from our investment. For more detail on light conditions from full sun through shade (light, partial, full and dense) please refer to the following sites to help you determine what kind of light you have in each of the areas in your landscape, and how it can change through the day.

The Kansas state site provides a lengthy explanation of light conditions

<https://www.johnson.k-state.edu/lawn-garden/agent-articles/miscellaneous/defining-sun-requirements-for-plants.html>

<https://extension.umn.edu/planting-and-growing-guides/gardening-shade#amount-and-quality-of-sunlight-1218962>

## Soil

Soil assists a plant's natural resistance to pests and diseases. Along with stabilizing a plant's roots it filters the rainwater and regulates the discharge of excess rainwater, preventing flooding. Large amounts of organic carbon can be stored in soil. Healthy soil contains Mycorrhizal fungi which colonize the roots of many plants. They develop a "symbiotic" relationship that helps the plant be more efficient at obtaining nutrients and water. In return, the plant provides energy to the fungus in the form of sugars.

Understanding your soil type and pH is key to ensuring whatever you plant will be successful and thrive. You can top dress your soil with good quality compost - but do not work into the soil. Use organic fertilizers sparingly. Keeping the soil covered with a ground cover or a light mulch may help with retaining moisture but take care not to pile up the mulch and create disease issues.

Check your local extension service for soil testing options. For Minnesota use the link below

<http://soiltest.cfans.umn.edu/>

Type	Texture	Water	Add Organic Matter
Sand	Coarse and gritty, does not remain in a ball when small amount squeezed.	Infiltrates quickly which is a benefit to prevent flooding but also requires more watering for plants that like a moist soil	The holding capacity for water can be increased - but must be repeated frequently
Loam	Medium and variable	Can vary locally due to topography	
Clay	Fine particles tightly compacted. Squeeze some and it sticks together easily.	Water will collect on clay soil and take longer time to infiltrate. While this is good for plants that like wet roots it spells disaster for those that love well-drained soil.	The compaction in clay can be lessened, and it also increases air space.

## Water

The amount of water in your landscape may vary depending on the topography, tree canopy and runoff from your house and your hardscape. Dips and valleys may retain water, while hills and flat sunny areas will dry more quickly. The amount of water each plant needs will vary and is a key factor in plant choice. A plant may need more water when it is just planted, or for the first several years in the case of trees. Being aware of the early needs is important to get the plant established for longevity.

Water is needed for

- for photosynthesis to create energy (Light + CO<sub>2</sub> + water = carbohydrates )
- healthy growth and full development
- flowering and seed production
- plant defense mechanisms
- to provide transport of nutrients and minerals through the plant's vascular system

Design to manage water

- Rain gardens and dry creek beds capture and hold runoff. They may also alleviate drainage problems
- Water cascading off your roof can do considerable damage to plants and mulch in severe storms- observe the impact of gutters or no gutters - and determine where to redirect
- Consider using permeable hardscape surfaces in patios, walkways and driveways - particularly if they drain directly towards the storm sewer
- Lessen the need for irrigation, and if you need to use it choose drip irrigation

## DESIGN FOR PLANT HEALTH AND HABITAT

### Choosing Plants

Wherever possible source locally and ensure the grower or nursery does not use neonicotinoids in their plants. Make sure you match up the plant with the right place - right soil, right amount of light and right amount of moisture needed for a long life.

### Native Plants

- Over thousands of years, wild plants have grown naturally, adapting to each region's unique soil and weather conditions.
- Native plants are the foundation of life and provide quality food for wildlife like caterpillars, as well as shelter for birds, butterflies, pollinators and other wildlife.
- Many natives are deep-rooted, slowing down stormwater and improving water quality as well as reducing erosion, carbon and excess nutrients. They also need no fertilizer or extra watering once established.
- They act as natural pest controls and reduce the need for pesticides; many are deer-resistant.

### Other Plant Types

- Cultivars from natives (sometimes called nativars) are bred for human desires or disease resistance and may or may not prove useful to pollinators. They are generally not as long-lived or may revert (color).
- Non-native: many of our ornamental plants are from Europe or Asia such as hosta and lilies. Over 11,000 species used in the US are non-native. Non-natives also have cultivars that have been developed for shape, color, disease resistance - but do not typically improve their attractiveness to pollinators.
- Invasive plants are non-natives that have previously been introduced and proven to be super-spreaders, creating havoc in ecosystems.

## Design Considerations

A landscape is frequently many small 'gardens' with varying growing conditions

- Embrace the existing microclimates
  - Choose low-mow or no-mow plants for hills or lawn replacement
  - Create rain gardens and dry creek beds for flood-prone areas to redirect the water to plants that love wet feet
  - Try xeriscaping for drought-prone areas - cactus does grow in Minnesota! Rock gardens can fun to design.
  - Consider prairie planting for heat-prone areas where deep rooted plants will need little to no watering, and also for wide expanses
- Install raised beds or use large containers to plant your vegetables and annual flowers- allowing you to fertilize the plants that need it to produce food.
- Choose trees to provide the ecosystem services you need such as absorbing water, providing shade or blocking the wind. Trees are a huge investment in time and money. Make sure they have plenty of space to grow and thrive
  - Prune trees for letting light into the center of the tree as well as for shape.
  - Crowding trees can shorten their life or kill them.
- Layer the landscape to lock out the weeds and hold the soil
  - Use understory shrubs such as dogwoods and witchhazel
  - Ground covers such as creeping thyme for sun, or penn sedge for shade form a living mulch.

## Design for Habitat

When you design with habitat in mind you will provide food, space, shelter and safety.

- Plant a diverse array of forbs that provide food throughout the season (early spring to late fall)
- Clusters of the same plant make it easy to find the food - and also are a design element (think drifts of color)
- You may seek out specific plants for birds, bees and butterflies such as shrubs with berries, pollen-rich forbs such as sunflowers and milkweeds. Native grasses support many butterflies and moths throughout their lifecycle.
- 70% of native bee species nest in the ground - so leave some bare soil; the rest will use stems or holes to lay eggs and provision for their young.
- Leave the leaves; rotting wood, twigs brush as shelter - many butterflies and moths depend on these to overwinter - as adults, larva, pupae or eggs
- The sound of bubbling water is soothing in the landscape, and also provide water to wildlife
- Provide a poison free environment - think about this on all surfaces. Just because you don't directly spray flowers does not mean that bees are not coming into contact with pesticides

## IMPACTS OF CLIMATE CHANGE IN THE LANDSCAPE

Causes of climate change include natural variations, landscape changes and chemical emission. Minnesota is changing faster than predicted and is most apparent in the northern half of the state where there are significant changes in tree species, and recorded temperature and precipitation changes.

Temperature changes include warmer winter days and warmer evenings overall. Fewer extremely cold days, more freeze-thaw cycles, less snow cover and more will lead to changes in plant, insect and wildlife populations. While a longer growing season may appear to be a good thing it will lead to more pest and disease activity.

Precipitation changes include more precipitation in general with greater unpredictability. Unpredictability leads to localized flooding, and fire hazards due to drought. It also leads to an increase in plant damage due to wind, ice and snow.

In the garden it will have an impact on a plants' growing season along with increased temperature stress. It is even more critical to ensure you understand your microclimates and design your landscape to weather the unpredictability. Healthy soil, good water management and the right plant in the right place will be key.

BWSR: Board of Water and Soil Resources

<http://bwsr.state.mn.us/climate-resiliency-urban-landscapes>

## RESOURCES

### University of Minnesota

UMN has resources directly addressing designing for sustainable landscape as well as native plant lists. Consider searching for something similar in your state.

<https://extension.umn.edu/lawns-and-landscapes/landscape-design#videos%3A-the-5-considerations-of-sustainable-landscape-design-1561810>

<https://extension.umn.edu/find-plants/native-plants>

### Plant Databases

<https://www.nwf.org/nativeplantfinder/plants>

<https://www.audubon.org/native-plants>

USDA Natural Resources Conservation Service has a robust plant database that also includes links to invasive and noxious weeds

<https://plants.sc.egov.usda.gov/java/>

### Native Plant Nurseries

Search in your state for an updated list of local nurseries or look for organizations that support native plants that may also hold plant sales such as Wild Ones

<https://wildones.org/>

### **Books to Inspire your Landscape Design**

- Planting in a Post-Wild World: Designing Plant Communities for Resilient Landscapes by Thomas Rainer and Claudia West
- Landscaping with Native Plants by Lynn Steiner
- The Living Landscape by Doug Tallamy and Rick Darke
- Bringing Nature Home by Doug Tallamy
- Nature's Best Hope: A New Approach to Conservation that Starts in Your Yard by Doug Tallamy
- A New Garden Ethic by Benjamin Vogt

### **Other sites of interest**

Minnesota Wildflowers: A field guide to the flora of Minnesota  
<https://www.minnesotawildflowers.info/>

Circle of Life YouTube short video on ecosystems  
[Circle of Life by Prairie Moon](#)

Sustainable Landscaping Quiz from Fine Gardening  
<https://www.finegardening.com/article/how-sustainable-is-your-landscape>

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[www.hennepinmastergardeners.org](http://www.hennepinmastergardeners.org)