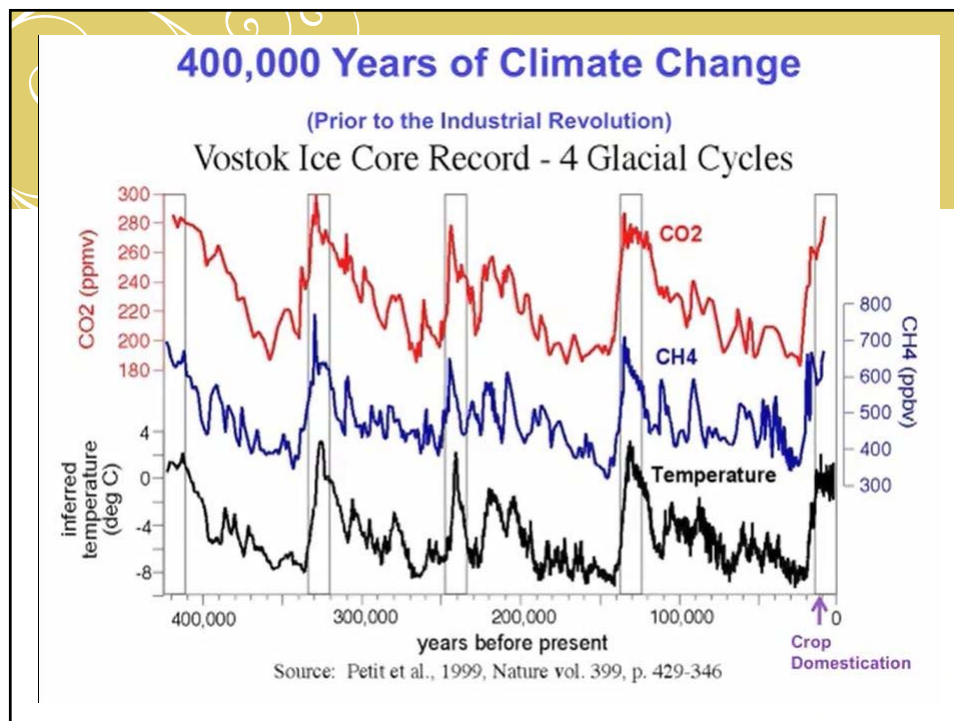


Adaptable gardening: how to plan for weather extremes

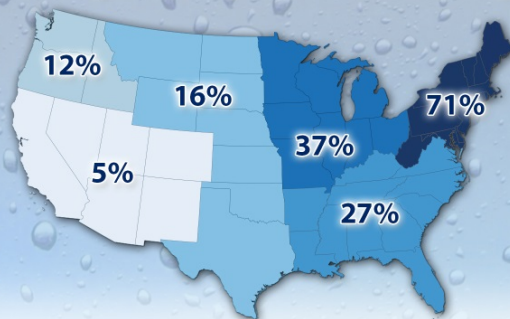
Winter Garden Seminar, 2016

Erin LaFaive, horticulture educator
Univ. of WI - Extension, Eau Claire County



Heavier Rain Events

Heavy Downpours Increasing

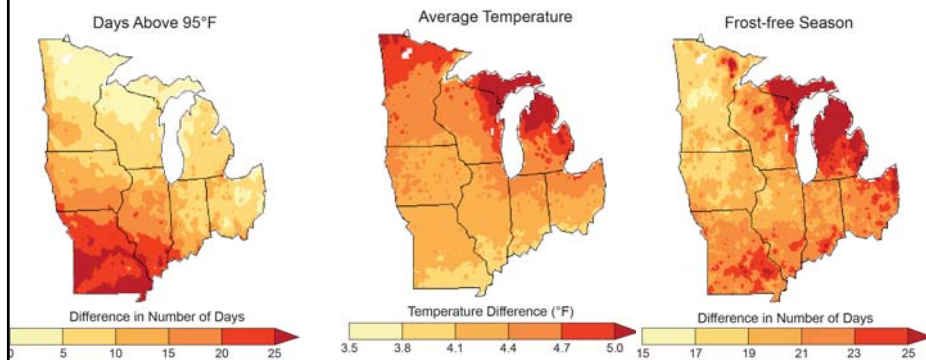


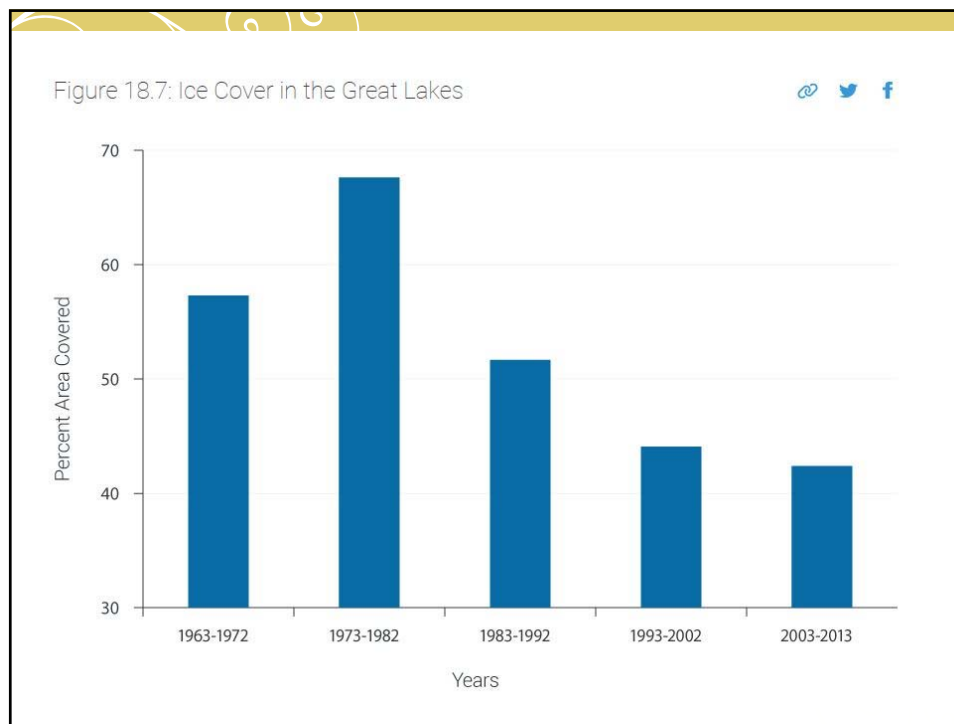
Percent increase from 1958 to 2012 in the amount of precipitation falling in very heavy events.
Very Heavy Precipitation is defined as the heaviest 1% of all daily events from 1958-2012.

Source: Kenneth Kunkel, Cooperative Institute for Climate and Satellites, North Carolina State University and NOAA NCDC

CLIMATE CENTRAL

Temperature changes

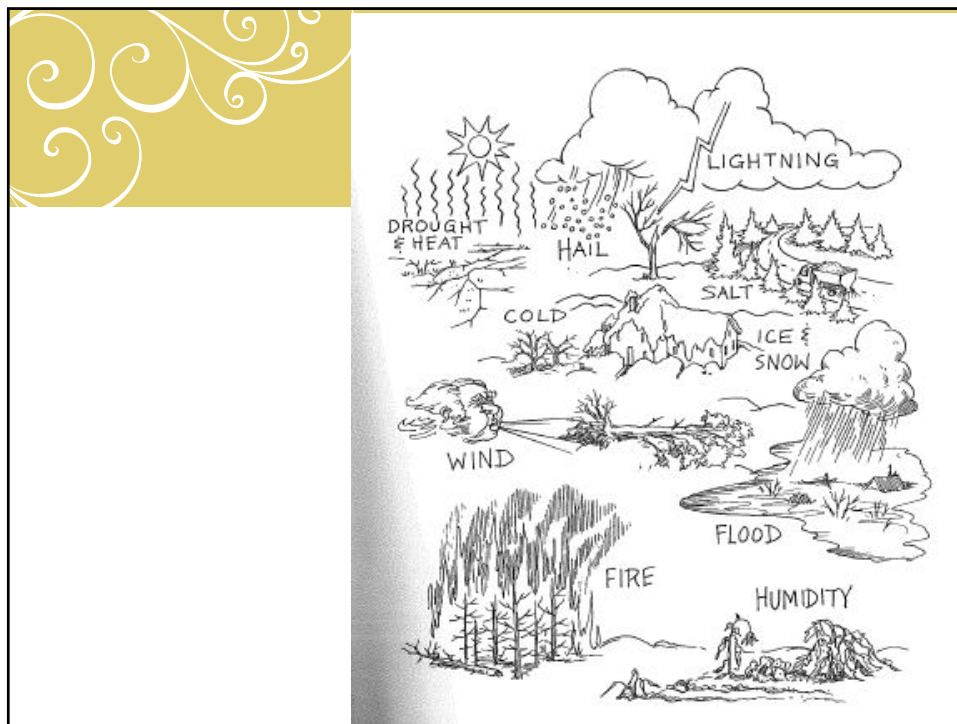




OBSERVABLE CHANGE

“It is not just weather instruments telling us the climate is changing. The living world (plants, insects, birds, and other animals) are responding to change.” David Wolfe, Cornell University

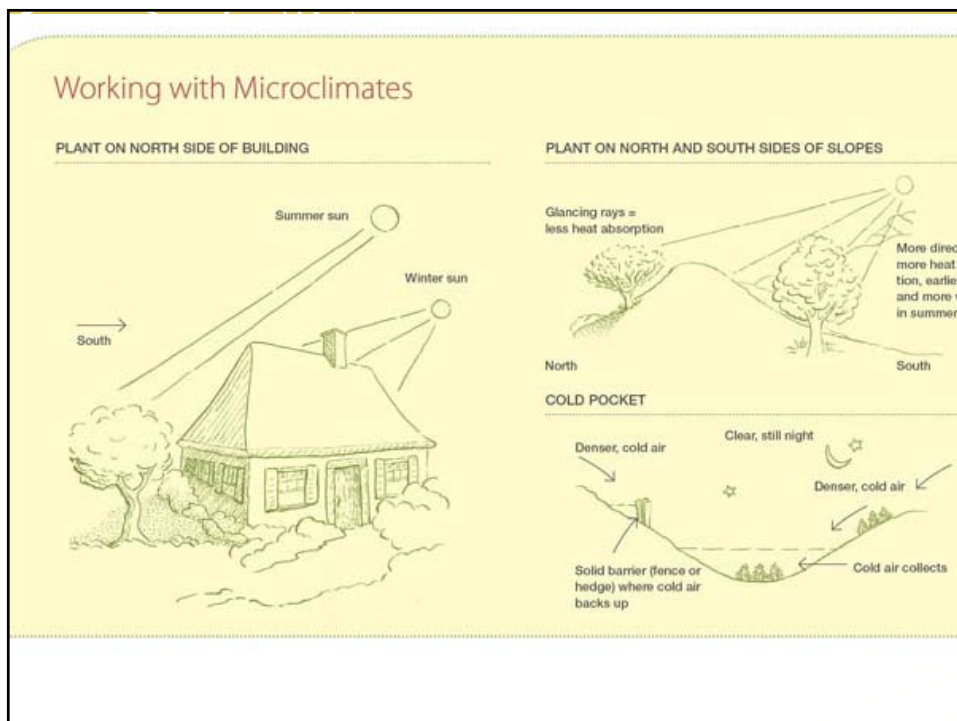
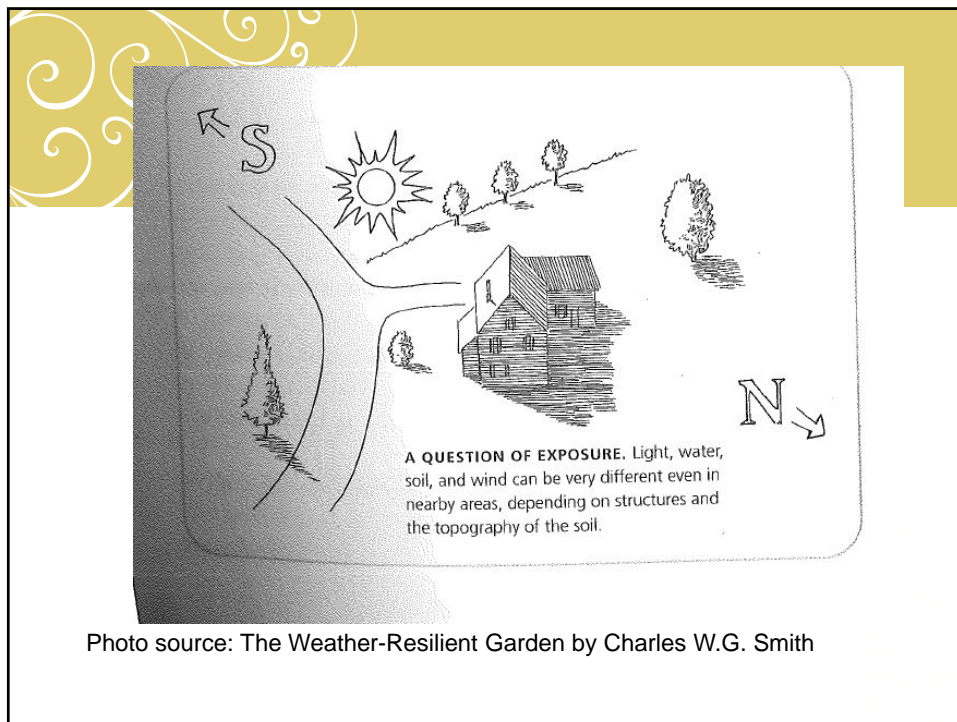




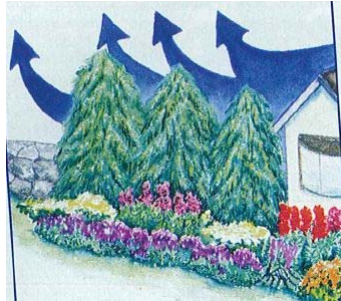
Challenges gardeners face with increased variability from weather

- Water supply extremes
- Intense storms
- Increased rate of growth
- Temperature changes
- Lack of snow cover
- Zone uncertainty





Microclimates – Wind Screen



- Reduce force of wind
- Best if evergreen to help with winter winds.

Wind
Screen

Fences
Walls
plants

Photo Source: *Fine Gardening*, 2001 page 54-55, "Cheating Your Zone" by Carlo A. Balistrieri

Wind Breaks

HEDGES, BARRIERS, AND SCREENS

SCIENTIFIC NAME COMMON NAME

Screens (best if allowed to grow naturally)

<i>Abies</i> spp.	Firs
<i>Juniperus virginiana</i>	Eastern red-cedar
<i>Picea</i> spp.	Spruces
<i>Pinus</i> spp.	Pines
<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	Douglas-fir
<i>Thuja occidentalis</i>	Arborvitae, white-cedar
<i>Tsuga canadensis</i>	Eastern hemlock

Formal hedges (tolerates shearing)

<i>Buxus</i> spp.	Boxwoods
<i>Taxus</i> spp.	Yews
<i>Thuja occidentalis</i>	Arborvitae, white-cedar
<i>Tsuga canadensis</i>	Eastern hemlock

Informal hedges (do not shear)

<i>Cornus</i> spp.	Dogwoods
<i>Forsythia</i> spp.	Forsythias
<i>Spiraea</i> spp.	Spireas
<i>Syringa</i> spp.	Lilacs

Barriers

<i>Berberis</i> spp.	Barberries
<i>Crataegus</i> spp.	Hawthorns
<i>Rosa</i> spp.	Shrub roses

Microclimates – Slopes & Berms



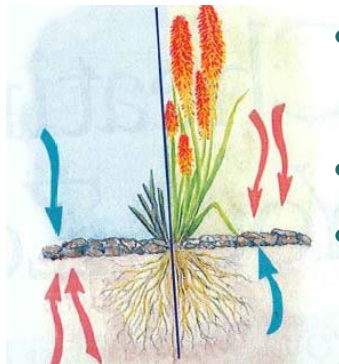
- **South = more light & warmth**
- **North = shade & cooler temps**

Slopes & Berms

For plants sensitive to moisture
South = more light & warmth
North = shade & cooler temps.

Photo Source: *Fine Gardening*, 2001 page 54-55, "Cheating Your Zone" by Carlo A. Balistrieri

Microclimates – Mulch



- **Protects moisture in soil**
- **Cool in summer**
- **Prevents frost heaving**
- **Reduces weeds**

Mulch

Protects moisture in soil
Cool in summer
Prevents frost heaving in winter
Reduces weed growth

Photo Source: *Fine Gardening*, 2001 page 54-55, "Cheating Your Zone" by Carlo A. Balistrieri

Microclimates – Air drainage



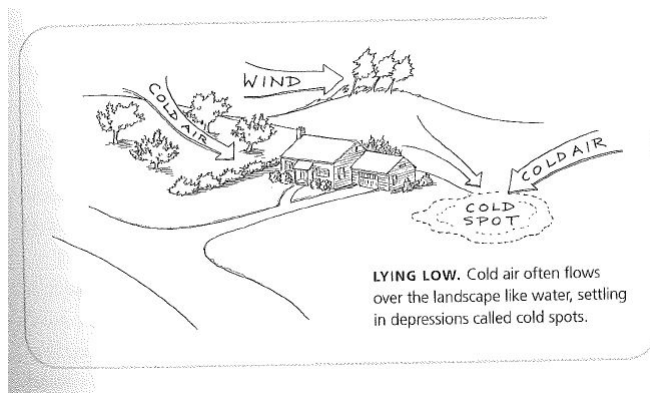
- Cold air sinks & pools

Air
Drainage

Cold air
sinks &
pools

Photo Source: *Fine Gardening*, 2001 page 54-55, "Cheating Your Zone" by Carlo A. Balistrieri

Microclimates – Air drainage

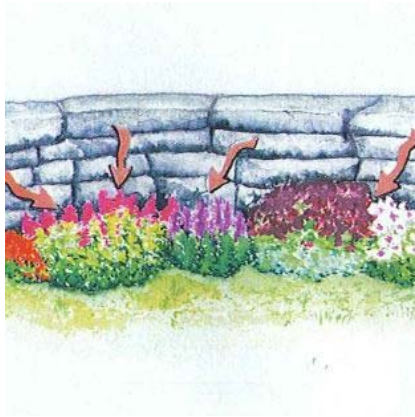


Air
Drainage

Cold air
sinks &
pools

Photo source: *The Weather-Resilient Garden* by Charles W.G. Smith

Microclimates – Heat Sinks



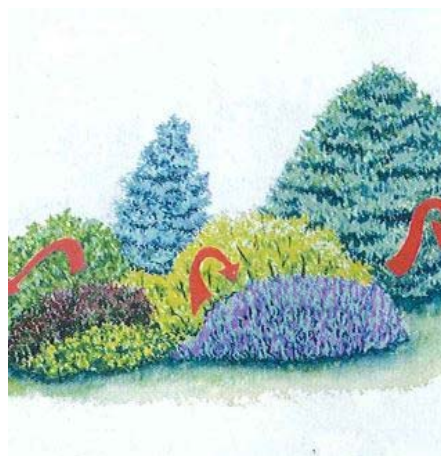
- other elements of sufficient mass
- Absorb & store solar heat & release it at night

Heat Sinks

Stone, water, other elements of sufficient mass
Absorb & store solar heat & release it at night

Photo Source: *Fine Gardening*, 2001 page 54-55, "Cheating Your Zone" by Carlo A. Balistreri

Microclimates – Plant Proximity



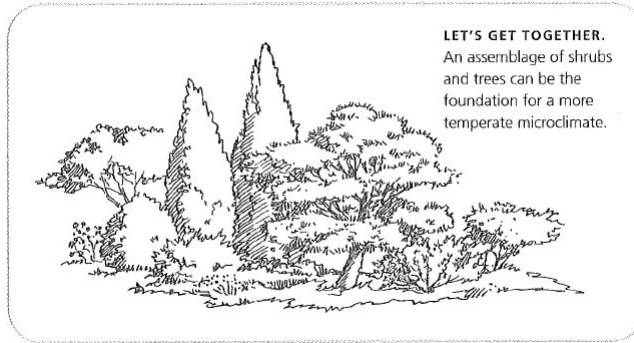
- Close plants trap & retain heat
- Supports other plants

Plant proximity

Close planting traps & retains heat
Support each other against wind & shade each other's roots

Photo Source: *Fine Gardening*, 2001 page 54-55, "Cheating Your Zone" by Carlo A. Balistreri

Microclimates – Plant Proximity



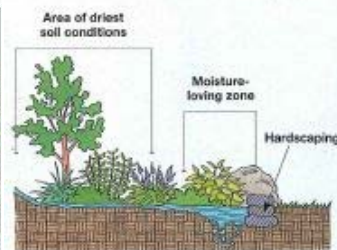
LET'S GET TOGETHER.
An assemblage of shrubs and trees can be the foundation for a more temperate microclimate.

Plant proximity

Close planting traps & retains heat
Support each other against wind & shade each other's roots

Photo source: The Weather-Resilient Garden by Charles W.G. Smith

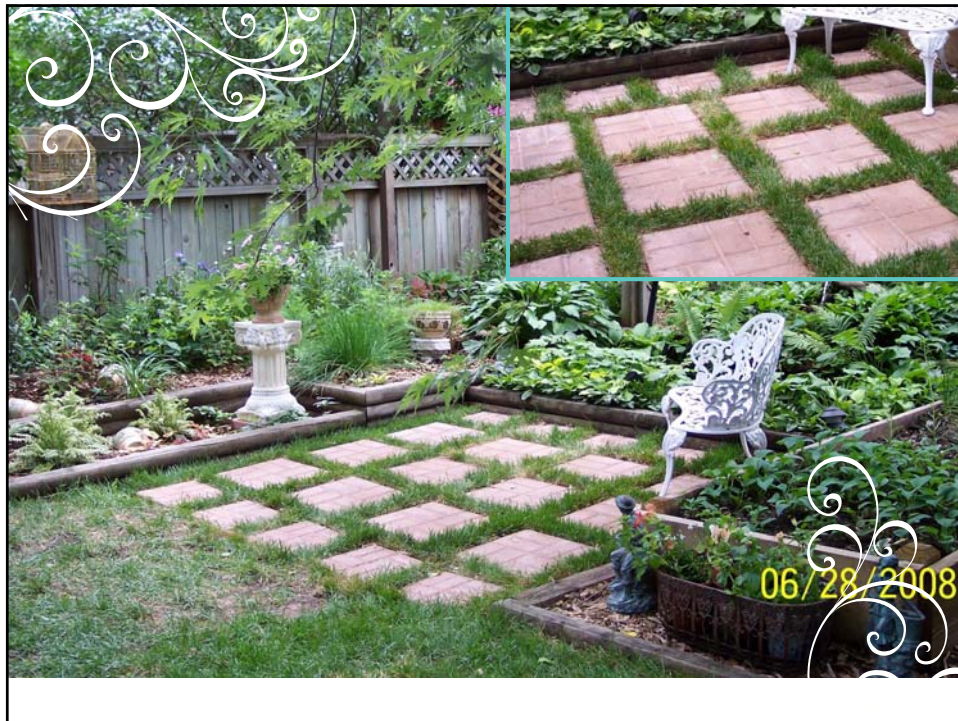
Working with rainfall variability



Create saturation zones

Think of hardscaping as a way to block rainfall from flowing across the earth like a fast-moving river. The stones or brick pavers work like mini retaining walls and help the water pool before sinking in slowly.

Photo credit: Fine Gardening, "Dealing with Dry Shade" by Robyn Brown, page 27

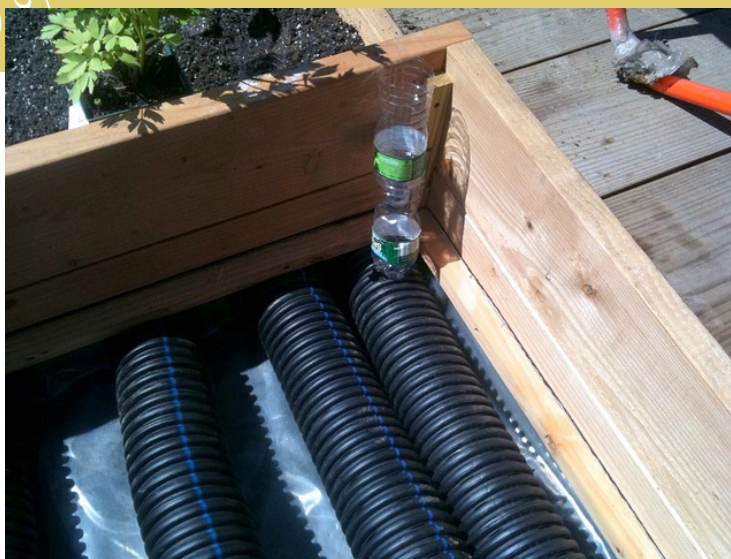


Working with rainfall variability Sub-irrigated Planter



30

Working with rainfall variability Sub-irrigated Planter



31

Working with rainfall variability Sub-irrigated Planter



32


Working with rainfall variability Cover crops

- Add nutrients to soil
- Reduce erosion
- Smother spring and fall weeds



XHT1209

Home Garden Facts




UW Extension
University of Wisconsin-Extension

Provided to you by:

Using Cover Crops and Green Manures in the Home Vegetable Garden

Doug Higgins and Kristin Krokowski, UW-Extension Waukesha County,
and Erin Silva, UW-Agronomy



What are cover crops and green manures? Cover crops are plants grown in a garden to improve a soil's physical structure and fertility. As cover crops grow, they become reservoirs for important plant nutrients such as nitrogen, phosphorus and potassium, as well as micronutrients. Cover crops also help prevent soil erosion, reduce weed problems, and provide a habitat for beneficial insects. Working cover crops into a garden returns nutrients to the soil making these nutrients available to future vegetable crops. Working cover crops into a

Table 1. Recommended cover crops and green manures for the home vegetable garden.*

Cover Crop	Sowing Time	Seeding Rate Per 100 sq. ft. (10' x 10' Garden)	Does This Plant Fix Nitrogen?	Growth Rate	Primary Uses/ Comments
Buckwheat	Spring, Summer	2 lb	No	Fast	Is easily worked into the soil. Attracts pollinators and beneficial insects. Re-seeds prolifically. DO NOT allow to go to seed.

Temperature Changes



- Season Extenders
 - Cold frame
 - protection from the elements
 - Grow salad crops
 - Store root vegetables
 - Overwinter plants that are tender

Temperature Changes

- Season Extenders
 - Hoop house
 - Extend growing season by 6-8 weeks
 - 6 milimeter polyethylene



36

36

Temperature Changes

- Season Extenders
 - Floating row cover
 - 5-10 degrees
 - Protection from wind, insects



37

37

Temperature Variability

- Expect the unexpected: frost and freeze damage in a warmer winter world?
 - Mist irrigation
 - Freeze blankets
 - Pruning schedules modified



Temperature Variability

- Expect the unexpected: frost and freeze damage in a warmer winter world?
 - Mist irrigation
 - Freeze blankets
 - Pruning schedules modified



Increased Carbon Dioxide

- Increased rate of growth
 - From higher temps and carbon dioxide
 - Requires more nutrients and water from the soil





Photo Credit: Carol Cox

Cover crops

- Add nutrients to soil
- Reduce erosion
- Smother spring and fall weeds



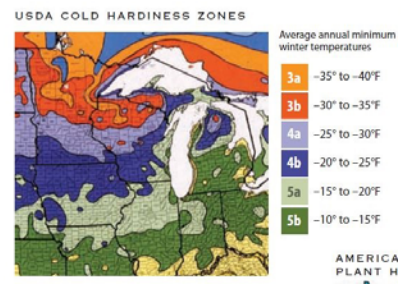
Working with variable snow cover

- Less snow cover



Zone uncertainty

“Remember that zone ratings are gardeners’ devices, not nature’s. They are based on the most successful human management of the plant to date – or a best guess. Nature, and the plants, may have other ideas.”



Carlo Balistreri, Cheating your Zone, *Fine Gardening*, page 55

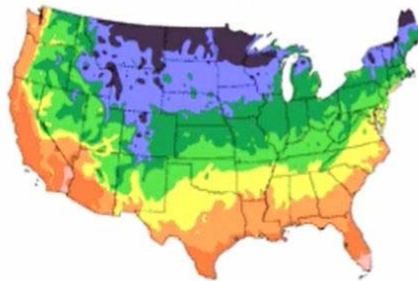
The New "Plant Hardiness Zone Map"

Climate change is already here
(maps based on minimum winter temperatures;
prior 15 years of weather station record)

Source: www.arborday.org

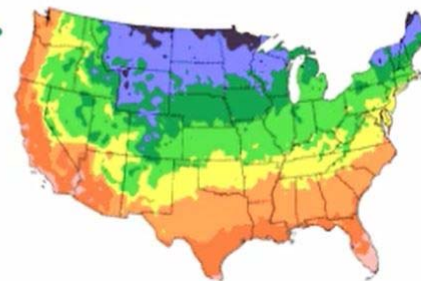
Zone	Avg. Annual Low
2	-40° through -50°
3	-30° through -40°
4	-20° through -30°
5	-10° through -20°
6	0° through -10°
7	10° through 0°
8	20° through 10°
9	30° through 20°
10	40° through 30°

1990 Map



After USDA Plant Hardiness Zone Map, USDA Miscellaneous
Publication No. 1475, Issued January 1990.

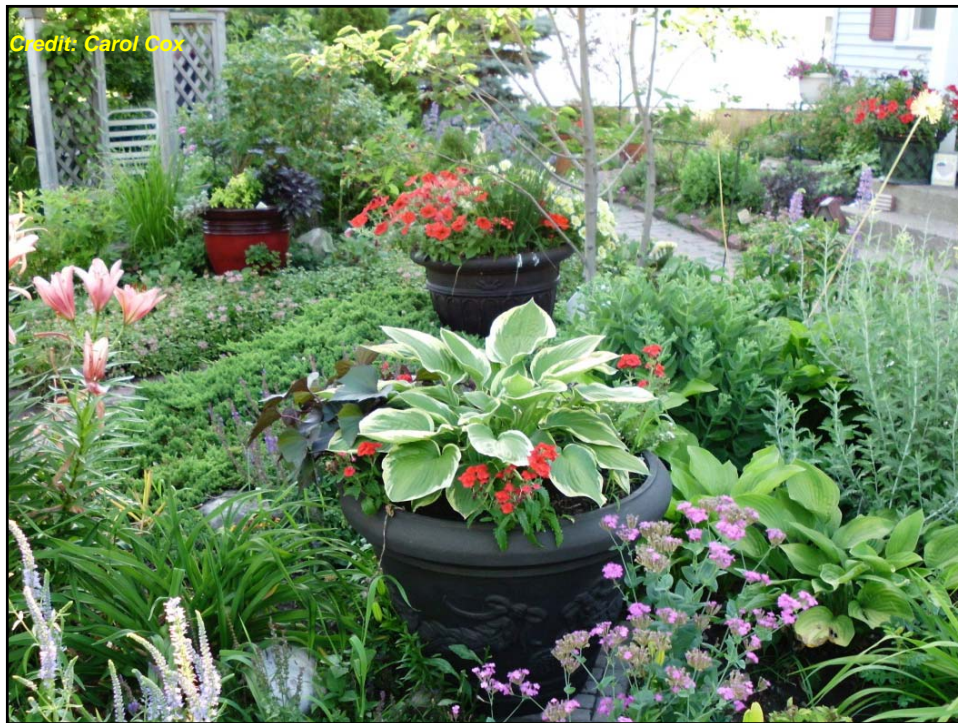
2006 Map



National Arbor Day Foundation Plant Hardiness Zone Map
published in 2006.



Photo Credit: Carol Cox



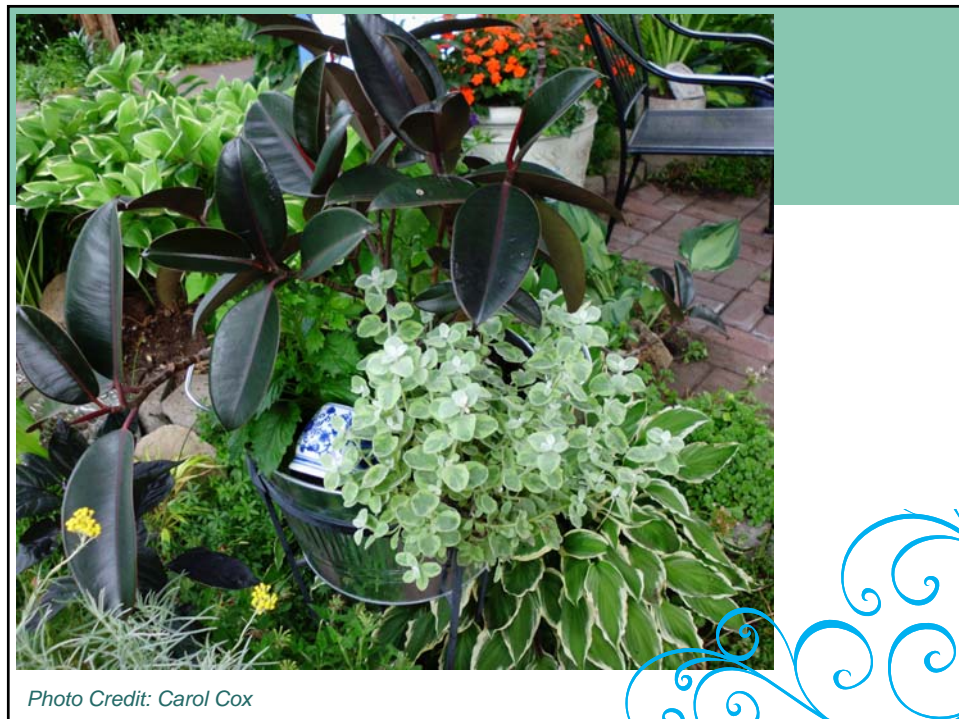




Photo Credit: Carol Cox

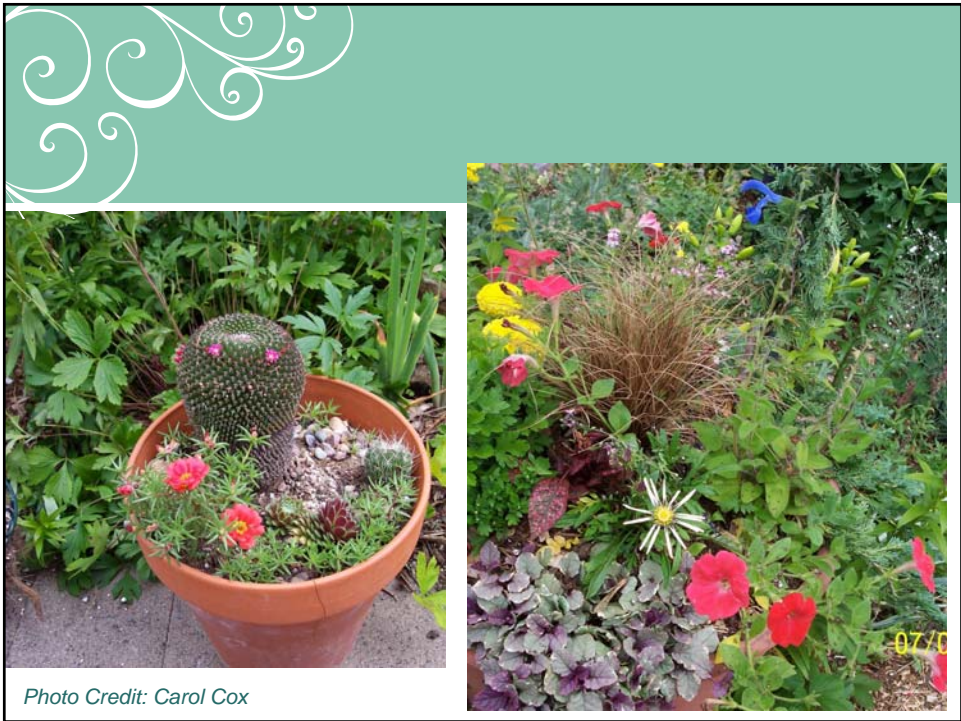


Photo Credit: Carol Cox

Challenges gardeners face with increased weather variability

- New pest pressures and patterns
 - Increased severity and ranges
 - Some pesticides will be less effective



Photo Credit: Carol Cox

- As each species responds uniquely to climate change: How will this affect the synchrony between organisms?
 - Plants and pollinators?
 - Natural enemies of insect pests?





Turf - Cultural Practices

- Mowing
 - Use sharp blades
 - Use 1/3 rule
 - Mow high
 - (no shorter than 3")

As mowing height decreases

Depth of rooting decreases
and maintenance increases

Alternatives to Turf



Image Source: <http://www.finegardening.com/creating-low-maintenance-garden>


Woody Plants

- damage from one year can last 3-5 years—not only drought, also from heat
- Expect borers, especially on ash, oak, lilac, fruit trees, black-locust, pine, etc.
- Expect some die-back over winter. If we don't get a lot more snow and spring is dry, start watering in April. Especially, water evergreens (not juniper) and make sure they go into winter well-hydrated
- If more drought, also expect spider mites




Woody Plants

- Species Selection (for drought-resistance and low maintenance)
 - Trees:
 - Use MALE ginkgo, MALE Kentucky coffeetree, serviceberry, Serbian spruce and Norway spruce






Trees- drought-resistance and low maintenance

- Species Selection
 - Use MALE ginkgo,
 - MALE Kentucky coffeetree,
 - serviceberry,
 - Serbian spruce
 - Norway spruce



Trees- drought- low maintenance

- Species Selection
 - MALE Kentucky coffee tree,

Shrubs - drought-resistance and low maintenance

- Species Selection
 - lilac (only disease-resistant species and varieties),
 - St. Johnswort,
 - juniper (dwarf varieties),
 - dwarf ginkgo,
 - dwarf forsythia,
 - viburnums mentioned in previous slide,
 - birch-leaved spiraea 'Tor',
 - hibiscus

MAKE A PLAN

- ☐ Take inventory of current microclimates
 - ☐ Structures
 - ☐ hard surfaces
 - ☐ current plantings (Focus on height, spread, and orientation of trees)
 - ☐ topography (soil, slopes, water drainage)
- ☐ Inventory ratio of evergreen, deciduous, perennial
 - ☐ Of those, are any struggling?
 - ☐ Of those struggling, which could you create a microclimate for or move to a different part of the yard with that microclimate?
 - ☐ Identify needy garden/lawn areas
 - ☐ add easy-going shrubs, herbs, bulbs, and ornamental grasses
 - ☐ replace thirsty fusspot plants with drought tolerant natives.
- ☐ Where to start with improvements?
 - ☐ Where do you spend most of your time enjoying the yard?
 - ☐ What part of the yard is suffering (erosion, compacted soil, etc.)
 - ☐ What are your budget and time constraints?

Fine Gardening, "Dealing with Dry Shade"
by Robyn Brown, page 27

"I finally started paying attention to what plants really

wanted and not what I hoped they would like. I don't care how cool a plant is - if it's struggling, it's always going to look pitiful."



Photo Credit: Carol Cox

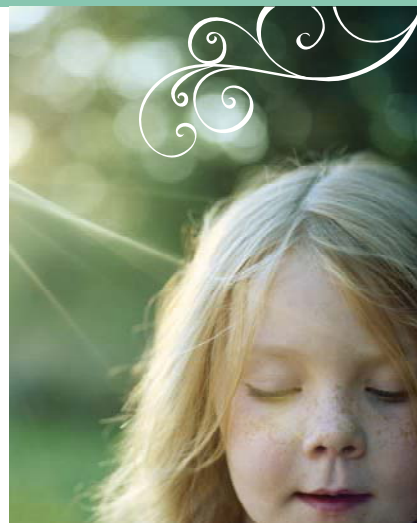
“Most traditional garden design has been based on principles of control rather than cooperation.”

Fine gardening, creating a low maintenance garden

<http://www.finegardening.com/creating-low-maintenance-garden#ixzz3xFlcr66B>



About a third of the plants are evergreen, and half to a third are native. The others are chosen for drought-tolerance, adaptability, and a long season of good looks.



Solutions

- Diversify
- Increase pest monitoring
- Improved water and soil management



Picture Source: http://www.greencurbs.com/?page_id=480

Keywords

- Defensive landscaping
- Low-maintenance gardening
- Sustainable gardening/landscaping
- Weather resistant gardening

SHADE-LOVING PLANTS

SHADE-LOVING PLANTS

SCIENTIFIC NAME COMMON NAME

Daphne x burkwoodii Carol Mackie daphne
'Carol Mackie'

Hamamelis spp. Witchhazels

Hydrangea arborescens Annabelle hydrangea
'Annabelle'

Taxus spp. Yews

Tsuga canadensis Eastern hemlock

PLANTS FOR DRY, SANDY SOILS

PLANTS FOR DRY, SANDY SOILS

SCIENTIFIC NAME COMMON NAME

Carya ovata Shagbark hickory

Celtis occidentalis Common hackberry

Juniperus horizontalis Creeping juniper

Juniperus virginiana Eastern red-cedar

Morella (formerly *Myrica*) Northern bayberry
pensylvanica

Pinus resinosa Red pine

Quercus velutina Black oak

Rosa rugosa Rugosa rose

Yucca spp. Yuccas

PLANTS TOLERATE MOISTURE EXTREMES

PLANTS THAT TOLERATE MOISTURE EXTREMES

SCIENTIFIC NAME COMMON NAME

Tolerates dry soils (once established)

Cornus racemosa Gray dogwood

Cotoneaster spp. Cotoneasters

Juniperus spp. Junipers

Quercus macrocarpa Bur oak

Tolerates wet soils

Cornus stolonifera Redtwig and
yellowtwig dogwoods


Quercus bicolor Swamp white oak

Salix spp. Willows

Taxodium distichum Baldcypress

References

- Gardening in the Global Greenhouse: The Impacts of Climate Change on Gardens in the UK, Richard Bisgrove and Paul Hadley, technical report, November 2002
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.131.6205&rep=rep1&type=pdf>
- **David W. Wolfe, Cornell University**
<https://s3.amazonaws.com/assets.cce.cornell.edu/attachments/1177/factsheet-2753.pdf?1405498164>



References

- University of Maryland Extension
 - <https://extension.umd.edu/hgic/earth-friendly-climate-change>
- National Climate Assessment
 - [Global Change. Gov](http://globalchange.gov)
 - <http://nca2014.globalchange.gov/report/regions/midwest#image-tab3>
- Lisa Johnson, Horticulture Educator, Dane County UWEX
- Cornell Cooperative Extension, Seneca County
 - <http://seneca.cce.cornell.edu/environment/climate-change/climate-change-gardening>
- David Wolfe's talk on Gardening in a Changing Climate
 - <https://vimeo.com/17448511>