

trees for all people!

an accessible guide to everything trees
presented by knowlton landscape

credits

trees for all people studio
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choosing a tree
isabella bertolini, spencer wolverton & molly mccahan

purchasing a tree
rosh nair & johnathan kleshinski

where to plant a tree
muyao zhou

watering and caring for a young tree
ellie frey, marley renner & julia cheung

ecological benefits
jeff haussler, emily loomis & bailey krouse

physical health benefits
priya ramakrishnan & trecia amor

health benefits
colin cunningham & michael mccoy

financial benefits
letha ilmer

graphic direction
ezra royce

mission

trees are for all people,
period.

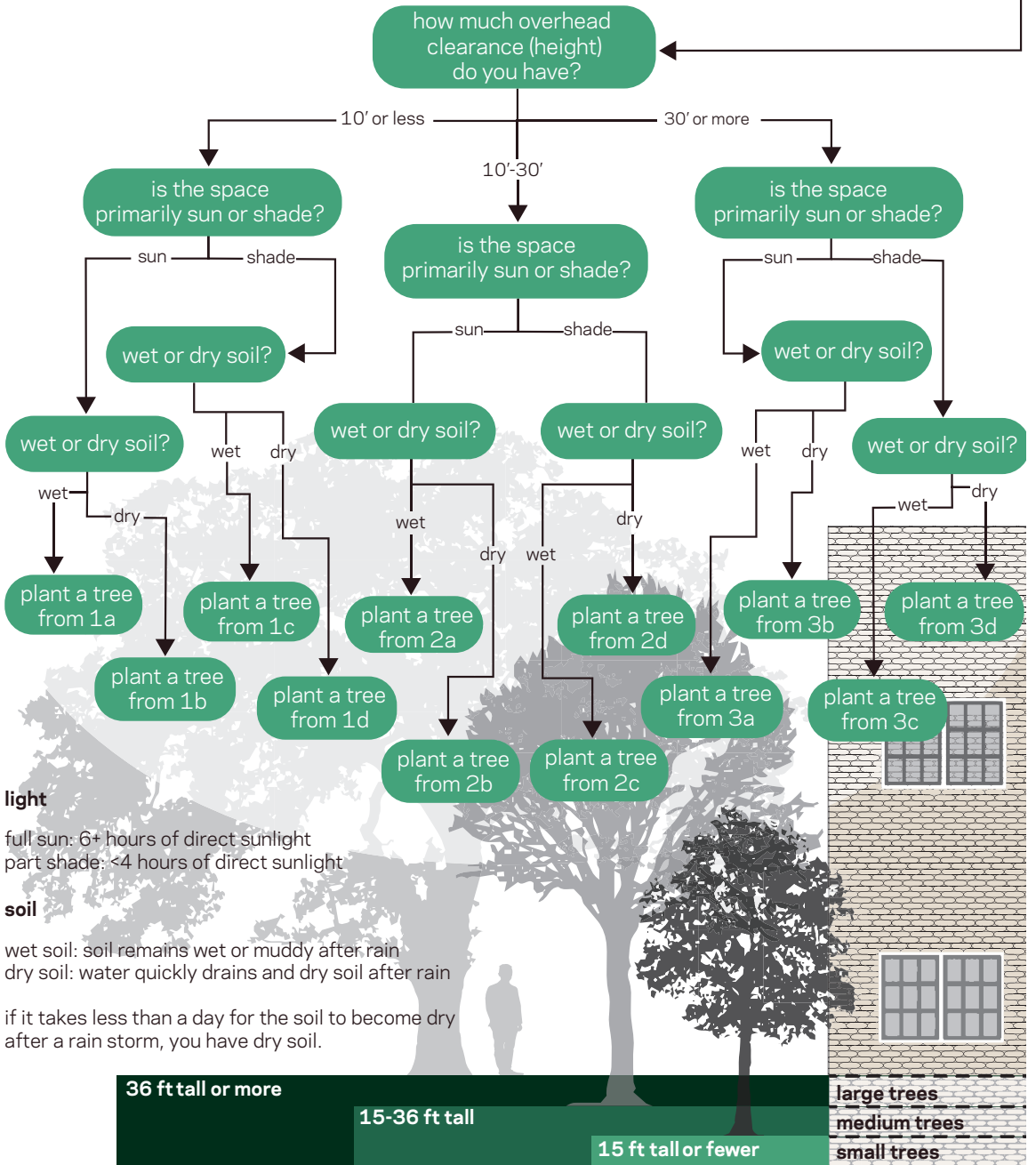
knowlton school of architecture
275 w woodruff ave, columbus, OH 43210



choosing a tree

let's plant a tree!

there are many factors that can help decide what species of tree will thrive in certain conditions. observe your site to determine the general light availability, overhead clearance for the tree, and soil drainage / moisture levels. then, follow the flow chart to find the right tree for your yard!



light

full sun: 6+ hours of direct sunlight
part shade: <4 hours of direct sunlight

soil

wet soil: soil remains wet or muddy after rain
dry soil: water quickly drains and dry soil after rain

if it takes less than a day for the soil to become dry after a rain storm, you have dry soil.

36 ft tall or more

15-36 ft tall

15 ft tall or fewer

large trees

medium trees

small trees

SOURCES

Missouri Botanical Garden. [online] Available at: <http://www.missouribotanicalgarden.org>



ut urban tolerant (compacted soil, salt, pollution)

b blooming

n native

eg evergreen

qg quick growing

ct extreme cold tolerant

1 small

ruby falls redbud **ut b**
rising sun redbud **ut b qb**
peve minaret bald cypress
allegany serviceberry **b n**
sweet bay magnolia **b n**
dwarf river birch **ut qb**
american hazelnut **b n ct**

sargent crabapple **ut b ct**
sargentina crabapple **ut b ct**
weeping cherry **ut b**
rising sun redbud **ut b qb**
rubyfalls redbud **ut b qb**
big cis flowering plum **ut b qb ct**
dwarf hinoki cypress **eg**
little girl hybrid magnolias **ut b ct**
jade butterfly ginkgo **ut**

american hazelnut **b n ct**
ruby falls redbud **ut b**
rising sun redbud **ut b qb**
lavender twist redbud **ut b qb**
allegany serviceberry **b n**
red twig dogwood **b ct**
hydrangea tree **ut b qb ct**

rising sun redbud **ut b**
rubyfalls redbud **ut b qb**
lavender twist redbud **ut b qb**
big cis flowering plum **ut b qb ct**
american dogwood **b n**
hydrangea tree **ut b qb ct**

2 medium

american musclewood **n**
white satin birch **ut qb ct**
royal frost birch **qb ct**
sweet gum
american persimmon **b n**
june snow giant dogwood **b**
eastern redbud **ut b qb n**
paw paw tree **b n**
musashino Zelkova **ut qb**

perisan ironwood **ut**
crimson sentry maple **ut ct**
pacific sunset maple **ut ct**
ornamental cherry **ut b**
pink weeping cherry **b**
redbud **ut b qb n**
hedge maple **ut ct**
kentucky coffee tree **n**
purple robe locust **ut b qb**
ivory silk lilactree **ut b ct**

crimson sentry maple **ut ct**
june snow giant dogwood **b**
rastern tedbud **ut b qb n**
kousa dogwood **b**
american fringe tree **ut b n ct**
maaknificent maackia **ut b ct**
seven sun flower **ut b ct**
eskimo sunset maple **b**
tricolor beech **ct**
winter king hawthorn **b ct**

american musclewood **n**
american persimmon **b n**
gray dogwood **b n ct**
june snow giant dogwood **b**
eastern redbud **ut b qb n**
forest pansy redbud **ut b qb**
paw paw tree **b n**
cucumber magnolia **b n ct**

3 large

scarlet oak **n ct**
swamp white oak **n ct**
amur cork tree **ut qb**
rver birch **qb n**
plane tree **ut qb ct**
american sycamore **qb n ct**
green vase zelkova **ut qb**
nothern hackberry **ut n**
dawn redwood **qb**
red maple **ut qb n**
sugar maple **ut qb n ct**

chinkapin oak **n ct**
burr oak **ut n ct**
red oak **ut b qb n ct**
tulip poplar **qb n ct**
quaking aspen **ut ct**
norway maple **ut b ct**
regal petticoat maple **ut ct**
autumn gold ginkgo **qb**
hardy rubber tree **ut qb**
thornless honey locust **b n**
northern catalpa **b n ct**

scarlet oak **n ct**
swamp white oak **n ct**
amur cork tree **ut qb**
green vase zelkova **ut qb**
nothern hackberry **ut n**
dawn redwood **qb**
red maple **ut qb n**
sugar maple **ut qb n ct**
tulip poplar **ut b qb n ct**
sienna glenn maple **ut qb ct**
princeton elm **ut qb ct**

chinkapin oak **n ct**
red oak **ut n ct**
tulip poplar **ut b qb n ct**
quaking aspen **qb n ct**
wichita osage orange **ct**
european beech **ct**
sienna glenn maple **ut qb n ct**
northern catalpa **b n ct**
princeton elm **ut qb ct**
frontier elm **ut qb ct**

sources

Plant.usda.gov 2021. Welcome to the PLANTS Database USDA PLANTS (online)
Available at: <http://plant.usda.gov/java/>. MissouriBotanicGarden.org



tree purchase

tree selection

hardiness zone determines what plants will thrive in any given location. (columbus, oh - zone 6a)

check your site's hardiness zone by entering your zip code on usda.gov

assess the soil to estimate the ph of the soil on site. knowing the ph will help you choose an appropriate tree species (columbus, oh - usually neutral or alkaline)

check out "do it yourself" soil testing with things you probably already have, or find a testing kit

observe your space. make note of any slope, sunlight, water sources or pipes near the spot you want to plant a tree.

certain species are more tolerant of wetness or shade than others, so choosing the right tree can help mediate problems and save you money

transplanting

- + variety of size and price
easy transportation
- may dry out
roots may become bound

- + usually mature trees
developed large roots
- relatively expensive
harder to transport

- + inexpensive
easy to transport
- smallest in size
easily stressed or dry



container



ball and burlap (b&b)



bareroot

tree sizes

tree prices depend on the species, size, and transplanting methods. listed here is the price range for the catalpa tree.

- b&b = **\$261**/tree
 - 6+ ft tall
 - instant satisfaction
- 3 gal container = **\$21.95**/tree
 - 4-6 ft tall
 - visually pleasing, grows
- bareroot seedlings = **\$3.50**/tree
 - 2-3 ft tall
 - good for mass planting

*price quotes for northern catalpa (*catalpa speciosa*)



sources

<https://planthardiness.ars.usda.gov/>
Warner, Z. (n.d). "Container, burlap, or bare root?"

Riversidenativetrees.com (pricing info)
Todaysnursery.com (pricing info)



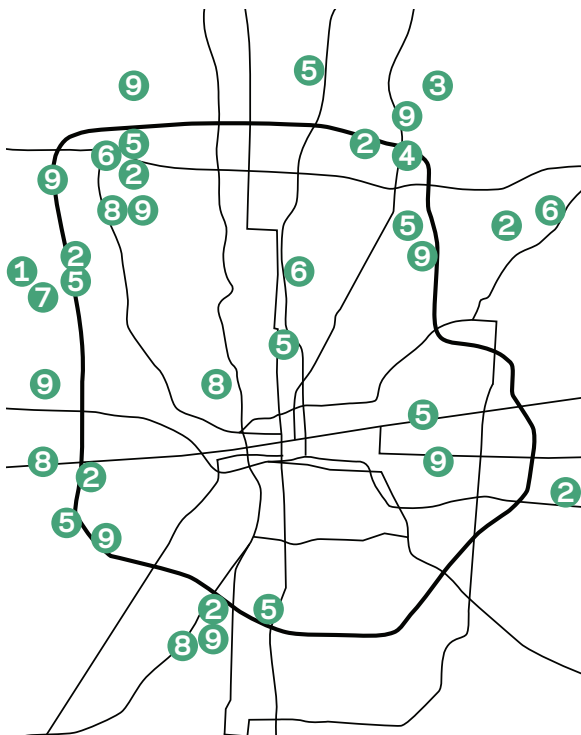
tree purchase

local free or discount trees:

- spring registration at communitybackyards.org to receive \$50 rebate for trees.
- register your address at greenbus.org and receive a free tree.
- register with olentangywatershed.org and receive free native tree.

purchase local trees: columbus, oh

- 1 darby creek nursery & landscaping
- 2 home depot garden center
- 3 hoover gardens & gift center
- 4 kurtz bros. mulch & soils nursery
- 5 lowes garden center
- 6 oakland nurseries
- 7 seely's landscape nursery
- 8 strader's garden center
- 9 walmart garden center



order online:

- brighterblooms.com
- fast-growing-trees.com
- naturehills.com
- plantingtree.com
- soonerplantfarm.com
- springhillnursery.com
- waysidegardens.com
- wilsonbrosgardens.com

tips for shopping:

signs of a healthy young tree:

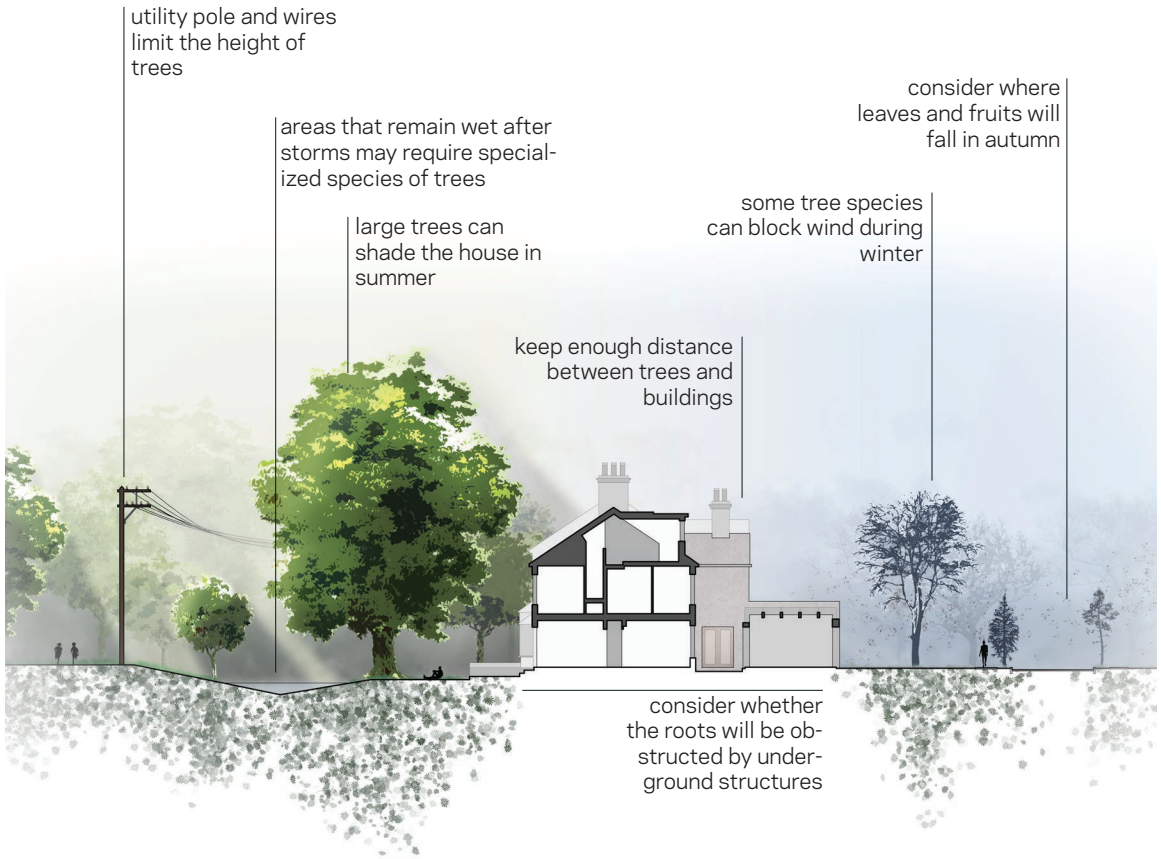
- lush and **green leaves** (not brown, curly leaves or needles).
- a single **leader branch** or trunk.
- **flexible twigs** that don't easily break in the winter.
- uniform bark.
- **even distribution of branches** around the trunk.
- **trunk tapers uniformly.**

definitions and language:

- **caliper** is the tree's trunk diameter. Usually d.b.h.
- **d.b.h.** (diameter at breast height) is the trunk's caliper at 4 feet high.
- a tree's **common name** is normal text (ex. red maple).
- a tree's **latin name** is italicized and includes genus and species (ex. *acer rubrum*).
- a **family** is a group of trees that are close in appearance.
- **genus** refers to what each species fundamentally have in common.
- **species** narrows down trees that have similar traits but appear different.
- **variety** narrows down the species through small variations.
- **hybrids** are cross-bred trees that aren't found naturally.
- **clones** are trees propagated through cuttings off one parent plant.

sources

"How to Choose the Best Trees at a Tree Nursery." *Richard's Tree Service.*



look above and below:

the spot that you select for your tree must provide **enough room to expand its canopy and stretch out its roots** without affecting nearby structures, sidewalks, overhead power lines or underground utilities. in fact, many tree species need **50 feet or more of buffer space** around them.

season and weather:

- place trees upwind of your home to help **block the wind**.
- plant trees on the east or west edges to **shade your home**.
- will the tree **drop messy fruit or sap** on sidewalks or driveways?
- how much of a problem will **falling leaves or needles** be in this location?

soil conditions:

for the healthiest roots and fastest growth, most tree species require **well-draining soil conditions**. soils that remain wet after storms may require specialized species of trees. also, trees will shade the vegetation under the canopy. **keep enough spacing between trees and other plants**.

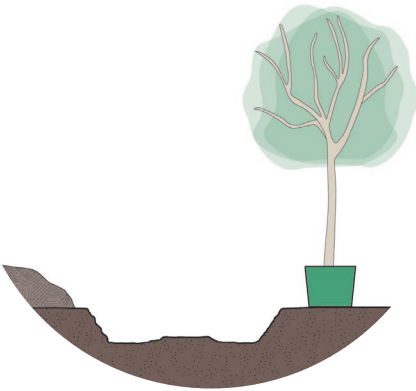
sources



how to plant a tree

step 1: choose a location

- select a site in full sun at least 15 ft away from buildings and other infrastructure
- full sun is any area that receives 6+ hours of direct sunlight
- areas with less sun may require shade tolerant species



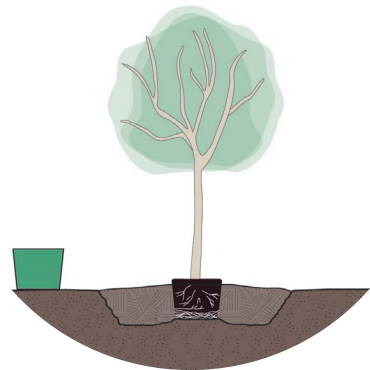
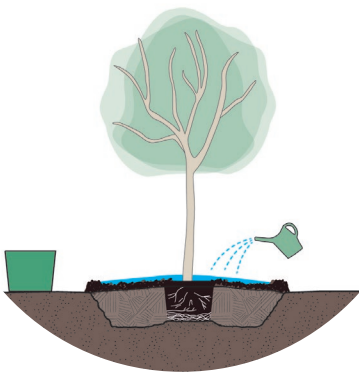
tree watering and weed control are essential for young tree care, but proper planting also makes a huge impact!

step 2: prepare the site

- dig a hole that's as deep as the tree container and 3-4x wider
- tree roots grow out before they grow down, so it's important to give them space to spread

step 3: plant the tree

- gently remove tree from container and loosen any roots that are tightly bound
- place tree in center of hole and fill with dirt so it sits a few inches above the ground- the tree will settle with time
- planting flush with the surface right away may cause the tree to sink below the ground plain and receive too much water



step 4: mulch and water

- add mulch 2-4 inches deep around the tree, leaving space around the trunk
- remove any weeds near the tree as you mulch
- it may be helpful to make a ring around the perimeter to form a basin that holds water
- water the tree thoroughly

sources

"How to Choose and Plant a Tree." *American Forests*, 2 July 2020.
How to Plant Containerized Trees.



watering trees

when to water

young trees require more water as they begin to establish roots

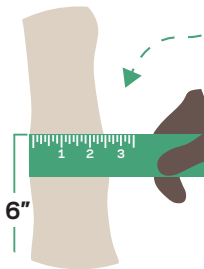
1-2 weeks after planting, water **daily**

3-12 weeks after planting, water **every 2 to 3 days**

after 12 weeks, water **weekly** until roots are established

preferably in the early morning or late afternoon

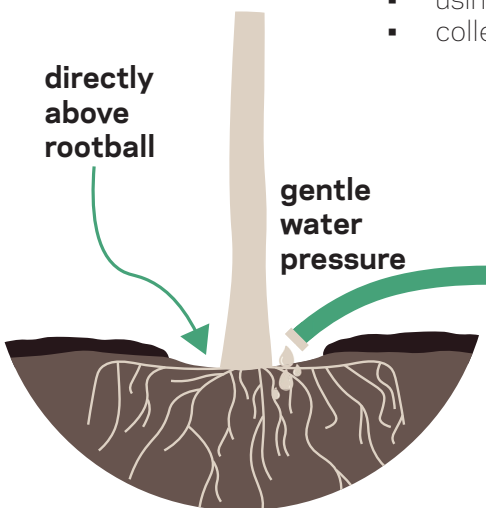
establishing roots



checking caliper size

caliper size at planting (inches)	root establishment time (years)	water requirement (gallons)
1	1.5	1 - 1.5
2	3	2 - 3
3	4.5	3 - 4.5
4	6	4 - 6
5	7.5	5 - 7.5
6	9	6 - 9

how to water



checking watering effectiveness

- using a narrow trowel, dig soil from 6" below the surface
- collect a small sample and squeeze in hand to form a ball
 - if the soil holds together, it's perfectly moist- continue with the current watering routine
 - if the soil falls apart, it's too dry- increase the amount of water and check again in a few days
 - if the soil is mushy, it's been overwatered- do not water for a few days and check again

☀ also make sure the surrounding area (backfill) is moist to encourage root growth and expansion

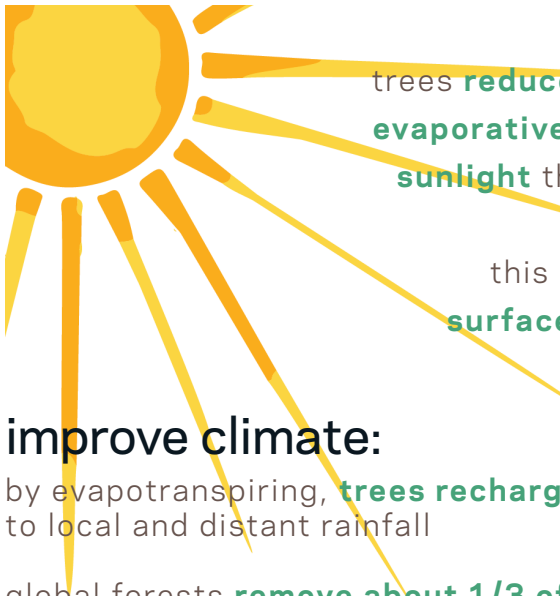
sources

Zuzek, Kathy. "Watering Newly Planted Trees and Shrubs." UMN Extension, University of Minnesota, 2018.
Tree Planting: Establishment and Care, Iowa State University Extension, 2004.

Rose, Mary Ann, and Elton Smith. Preparation and Planting of Landscape Plants, Ohio State University Extension, 2008.



ecological benefits



reduce urban heat island:

trees **reduce** the urban heat island effect through **evaporative cooling** and **reducing the amount of sunlight** that reaches parking lots and buildings

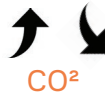
this is true in areas with **large impervious surfaces**, such as **parking lots** of stores and **industrial complexes**

improve climate:

by evapotranspiring, **trees recharge atmospheric moisture**, contributing to local and distant rainfall

global forests **remove about 1/3 of fossil fuel** emissions annually

roadside trees **reduce nearby indoor air pollution** by more than **50%**



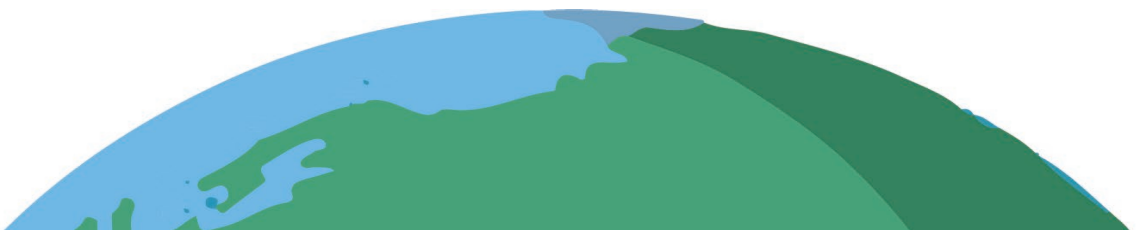
improve air quality:

100 trees remove **53 tons** of carbon dioxide and **430 pounds** of other air **pollutants** per year

a large, **healthy tree removes** almost **70 times more air pollution** each year than a small, newly planted tree

one large tree can provide a **day's supply of oxygen** for up to **4 people**

leaves **filter the air** we breathe by **removing dust** and other particulates and **releasing oxygen**



sources



water conservation:

one hundred mature trees catch about **139,000 gallons** of rainwater per year

trees **absorb** and **store rainwater** which **reduces runoff** and **sediment deposit** after storms

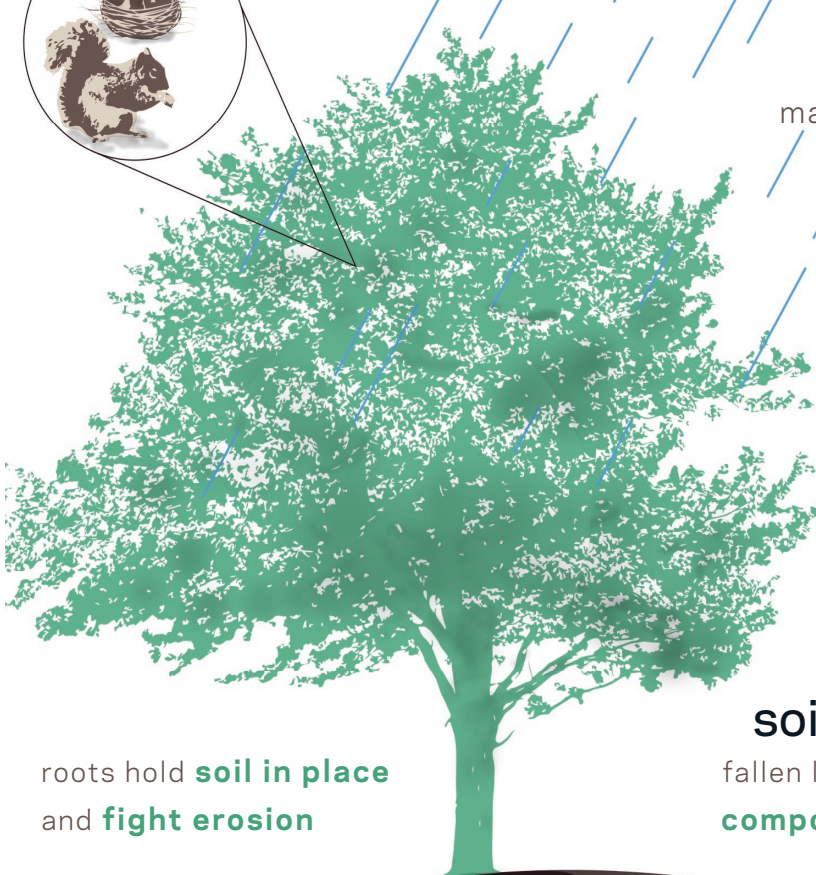
this helps the **groundwater supply recharge**, **prevents the transport of chemicals** into streams and flooding



animal habitat:

many species of wildlife **depend on trees for habitat**

trees provide **food, protection, and homes** for many birds and mammals



roots hold **soil in place** and **fight erosion**

soil improvement:

fallen leaves make **excellent compost** that **enriches soil**

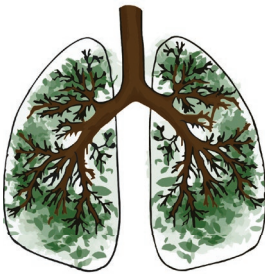
sources

"The Importance of Trees - Learn Value and Benefit of Trees." SavATree, 28 Oct. 2020
Calculating Tree Benefits for New York City, City of New York Parks and Recreation
"Trees." Trees | US Forest Service



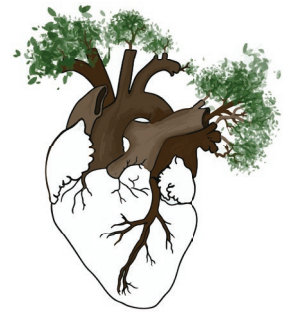
effects of urban tree canopy on physical health

respiratory health



studies have shown that an increase in urban tree canopy could lead to decreased asthma rates. further, increased tree cover would increase air quality, preventing numerous pollution related respiratory illnesses.

cardiovascular health



increased tree cover has been associated with a decrease in various heart conditions including cvd (cardiovascular disease), heart disease, and hypertension (high blood pressure)

infant health



lower urban tree presence and a smaller percentage of tree canopy cover is associated with increased risk of poor birth outcomes

diabetes



With a 1% increase in tree canopy, studies associated lower odds of diabetes, cardiovascular disease, and hypertension

studies found that diabetes, hypertension, and cardiovascular disease were lower among people who lived in areas with a tree canopy of **30% or greater**, as opposed to those who live in areas with a canopy coverage of **0-9%**.

studies also show that increasing canopy cover by **10% within 50m** of a house reduced the number of small gestational age births by 1.42 per 1000 births.

another study also found **13% lower odds** of developing insufficient sleep among people in areas where **30% or more** of landcover within 1.6km had tree canopy, compared to people in areas with **less than 10%**.

sources

Donovan, Geoffrey H., et al. "Urban Trees and the Risk of Poor Birth Outcomes."

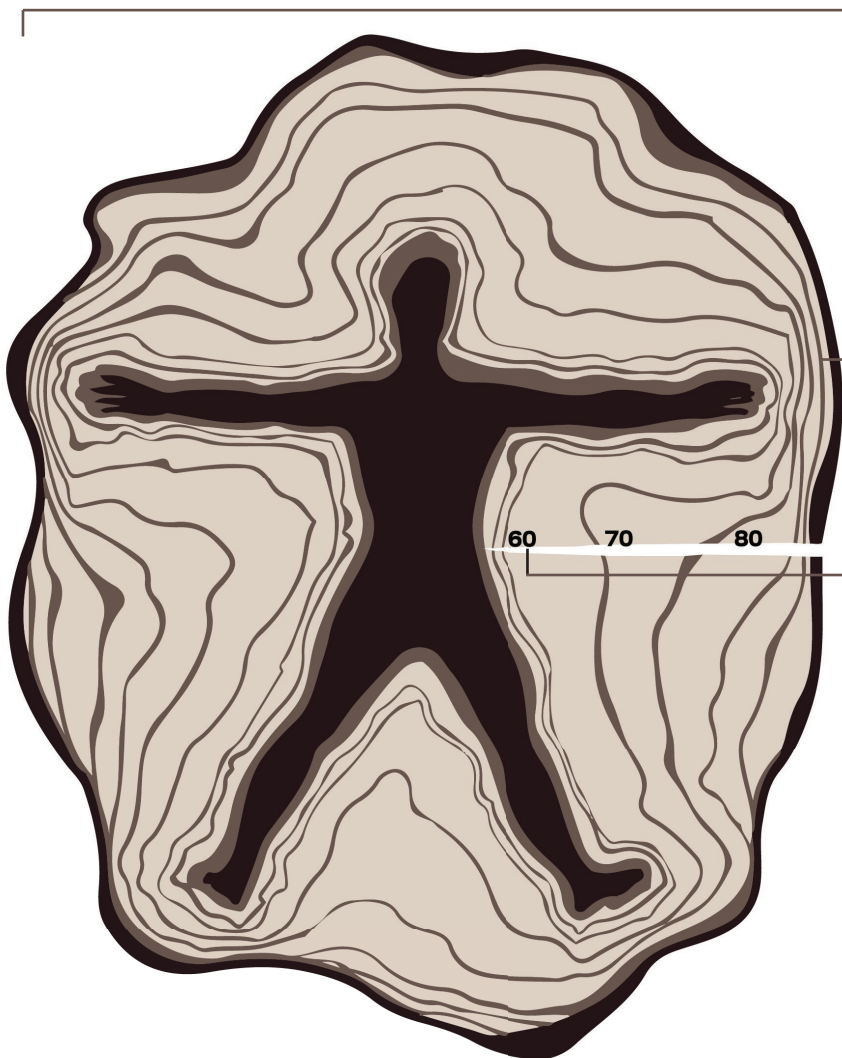
"Urban Green Space, Tree Canopy and Prevention of Cardiometabolic Diseases: a Multilevel Longitudinal Study of 46 786 Australians." (Astell-Burt and Feng)



life expectancy

a **5% point increase** in tree canopy in areas without trees could result in an annual reduction of 302 deaths in Philadelphia, PA, researchers found, and a **10% point increase** in tree canopy cover across the city was associated with an estimated reduction of 376 deaths

tree rings tell us the age of a tree. new wood is found near the outer part, whereas older rings are smaller and near the center.



each ring counts for a single year in the life of a tree. as the tree ages, more rings appear.

people living in areas of lesser tree canopy tend to experience lower life expectancy in comparison to dense canopy areas with higher life outcomes

sources

Urban green space, tree canopy, and prevention of heart disease, hypertension, and diabetes: a longitudinal study, Thomas Astell-Burt
USDA Forest Service - Northern Research Station. "Study in Philadelphia links growth in tree canopy to decrease in human mortality."




people exposed to areas with good canopy cover have been shown to experience a third **less** psychological **stress**.

green, leafy trees can provide **sensory relief** in urban areas dominated by hard surfaces.

green spaces have been shown to increase a community's **social cohesion**.

trees can also block urban noise pollution, leading to quieter, more **peaceful communities**.

proximity to forests has been linked with **improving** the brain's ability to handle stress.



exposure to trees and shrubs has been found to **increase test scores** and **graduation rates** of students.

walks through green spaces have been shown to **reduce** blood pressure, **improve** mental acuity, **boost** memory recall and **reduce** feelings of anxiety.

sources



hot temperatures are believed to lead to feelings of **anger** and **aggression**

neighborhood physical conditions, including vacant or dilapidated spaces, trash, and lack of quality infrastructure such as sidewalks and parks, are associated with **depression**

people in cities suffer from higher rates of almost every **mental health problem** compared to those living in rural areas with more trees



sources

"Impacts of Trees on Mental Health" Canopy, 6 Aug. 2020, <https://canopy.org/blog/impacts-of-trees-on-mental-health/>.



financial benefits

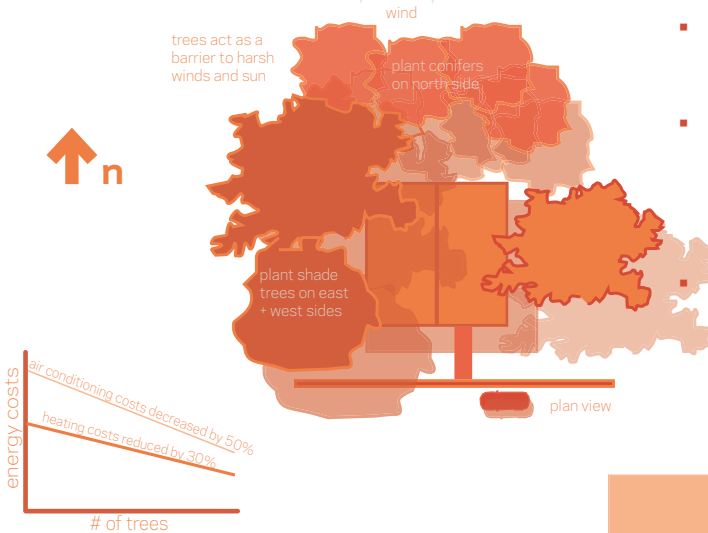
↑ property values:

- mature, healthy trees can increase home values by up to 15%
- street trees can increase property values by more than \$90 per tree
- homes with street trees sold for an average of \$7,000 more than homes without street trees in 2007
- housing enveloped by trees has correlations to decreased crime and domestic abuse
- trees create curb appeal and make properties more attractive to renters



↓ energy costs:

- trees, by producing shade, can reduce home air conditioning bills by as much as 50%
- trees planted on the north + northwest sides of a property can shield from harsh winter winds, reducing heating bills by as much as 30% per year
- during winter months, deciduous trees allow the sun to filter through empty branches, helping to warm homes



↓ repairs + maintenance:

- trees absorb stormwater and help prevent or slow flooding
- shade provided by trees helps to extend the life of pavement on driveways and streets



"trees...are the only type of infrastructure that increases in value as it ages."
-nick gilliland, registered landscape architect

sources

Powell, "Four Ways Trees Add Value to Your Property"
Kemp, "Planting Trees to Tackle Flooding."
"Big Trees Make Your Property Value Grow"

Gibbs, "The Value of Street Trees"
Lynch, "Three Things You Didn't Know Trees Did For You."
Burgess, "How to Plant Trees to Boost Property Value and Curb Appeal"
"How to Plant a Windbreak to Conserve Energy"