




Designing Sun Safety with Natural Shade

NCCEH Webinar Designing Sun Safety: Shade Lookbook

Susan Herrington, Professor, UBC School of Architecture and Landscape Architecture

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Special thanks to:

UBC MLA students

Wenyao Li

Qiushi Liu

Tara Shahbazi

Olivia Yeung

1. What is Natural Shade?

Natural shade is produced by plant materials, such as trees, shrubs, and vines.



2. Benefits of Natural Shade

Not only provides shade, but also contributes to **ecosystems** by providing habitat, food, and shelter for many species.



Becky Matsubara

2. Benefits of Natural Shade

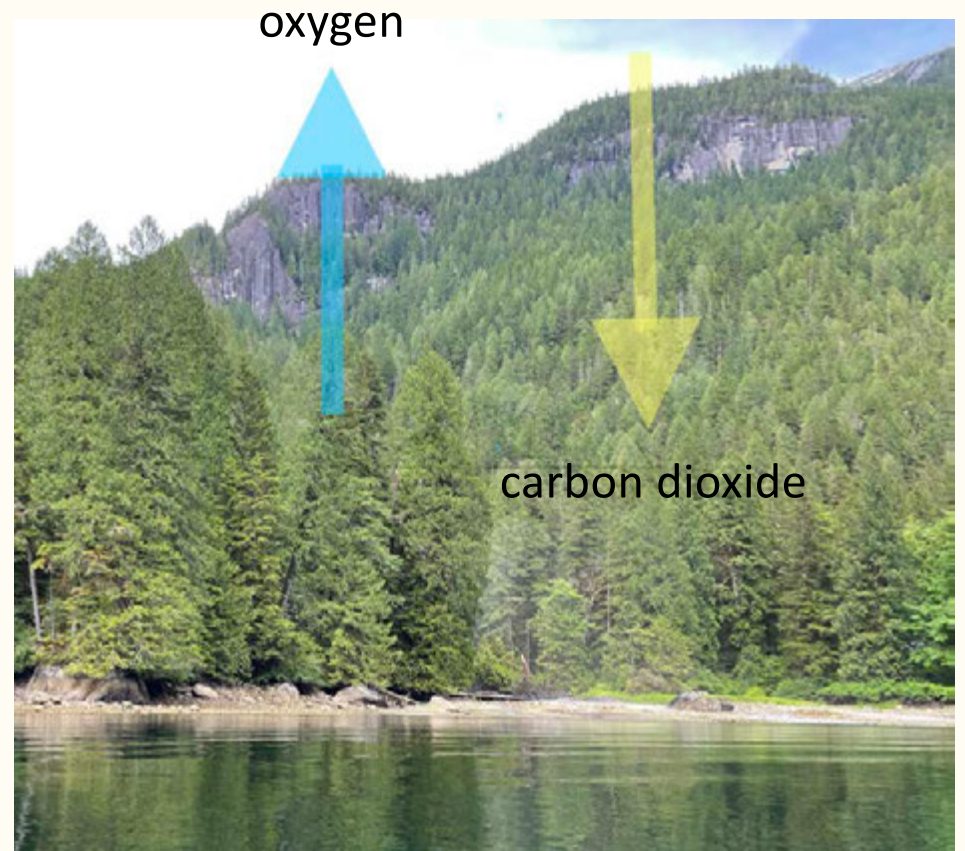
Trees and shrubs can also help stabilize slopes and shorelines by reducing soil erosion on slopes.



Trees Unlimited

2. Benefits of Natural Shade

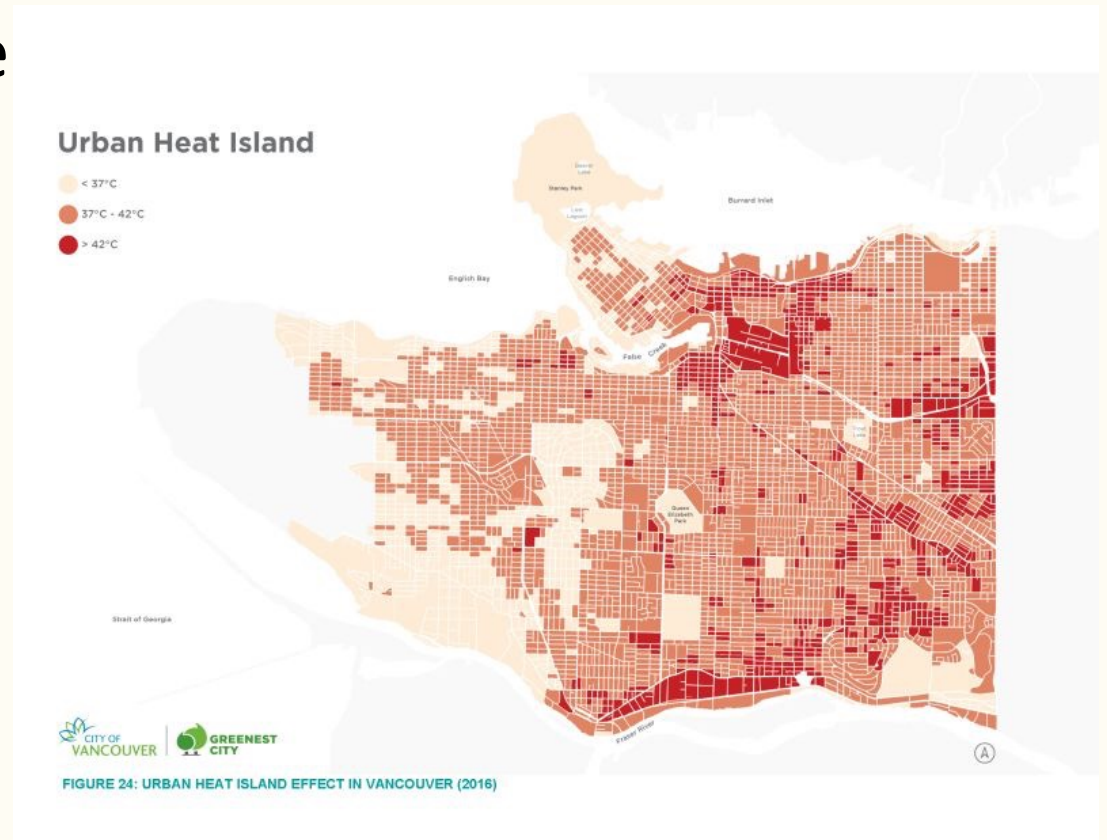
Mature trees can help to mitigate climate change by absorbing carbon dioxide from the air, storing it, and releasing oxygen into the atmosphere.



2. Benefits of Natural Shade

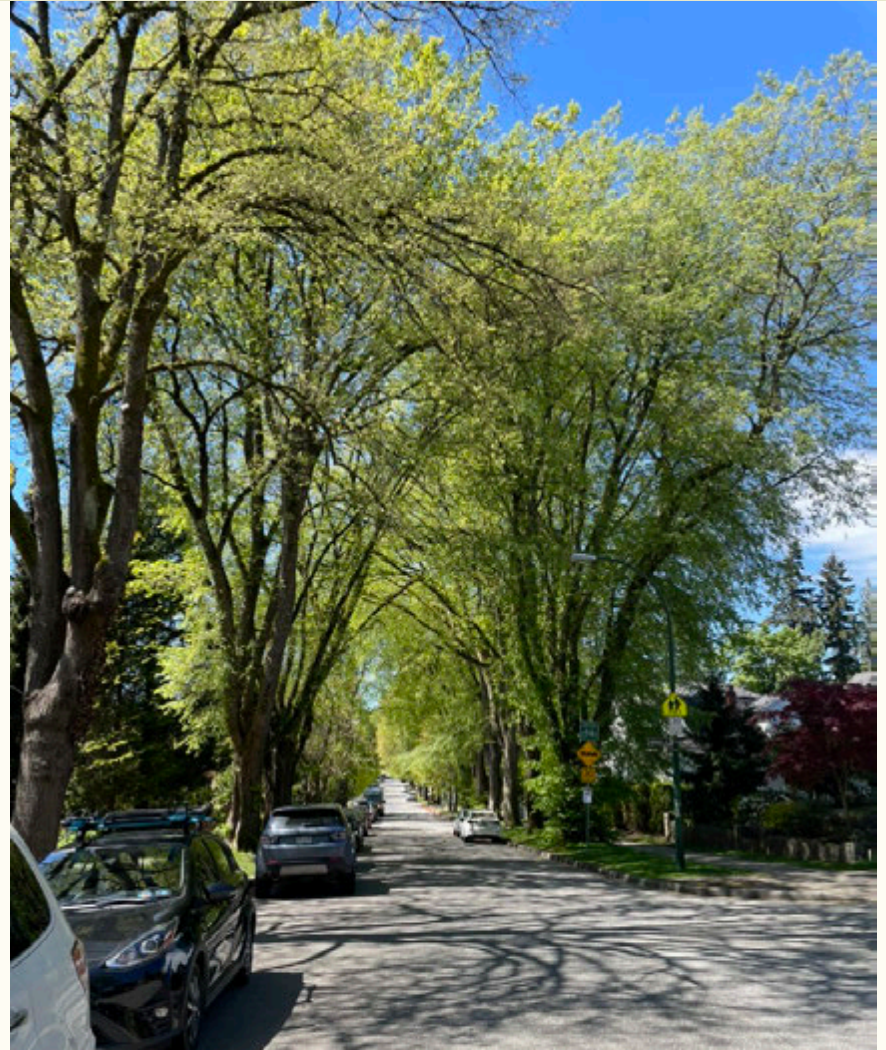
Reduces air temperature by up to **30 percent**

This can lower the heat-island effect in urban areas



2. Benefits of Natural Shade

If trees shade buildings, they can reduce the cost of mechanically cooling the interior spaces of the building.



2. Benefits of Natural Shade

Natural Shade offers
important play values:

climbing opportunities



2. Benefits of Natural Shade

Natural Shade offers important play values:

climbing opportunities

using plant parts as play props

arts and crafts projects



2. Benefits of Natural Shade

Plants change over time and many plants have unique smells and textures that can spark curiosity and help identify patterns in the environment.



2. Benefits of Natural Shade

Plants offer unique cultural values in Indigenous, historical and/or their current uses in daily life or special events.



Si Griffiths

2. Benefits of Natural Shade

The act of planting can bring people together.



Speak for the Trees

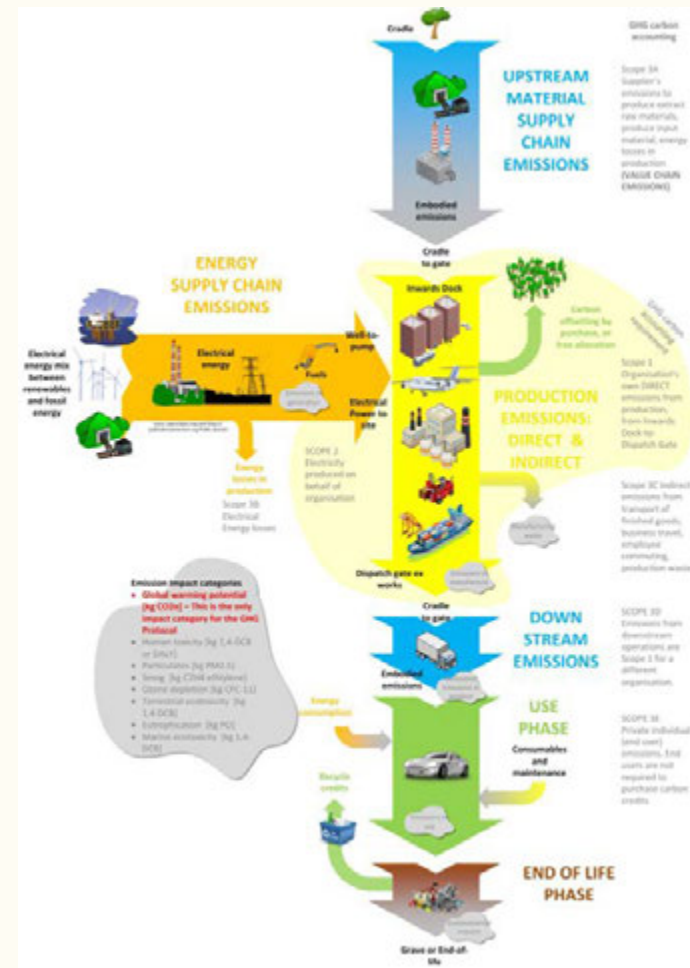
3. Natural Shade compared to Built Shade

Natural Shade has lower initial cost, although there will be more maintenance.



3. Natural Shade compared to Built Shade

Natural Shade has lower embodied energy - a calculation of all the energy that is used to produce a material or a product



3. Natural Shade compared to Built Shade

Since Natural Shade is organic there are fewer disposal issues compared to built shade which is often composed of hard to recycle material

3. Natural Shade compared to Built Shade

Most importantly Natural Shade has **dappled light**, patches of light and shadow created when sunlight passes through their leaves.



3. Natural Shade compared to Built Shade

The dappled light of Natural Shade moves with the wind, giving it a **buoyancy** that attracts people.



3. Natural Shade compared to Built Shade

The dappled light of Natural
Shade is **preferred** by people

(Chamilothori et al., 2022; Lobos, 2018; Haans, 2014;
Joye et al., 2013; Augustin, 2009).



3. Natural Shade compared to Built Shade

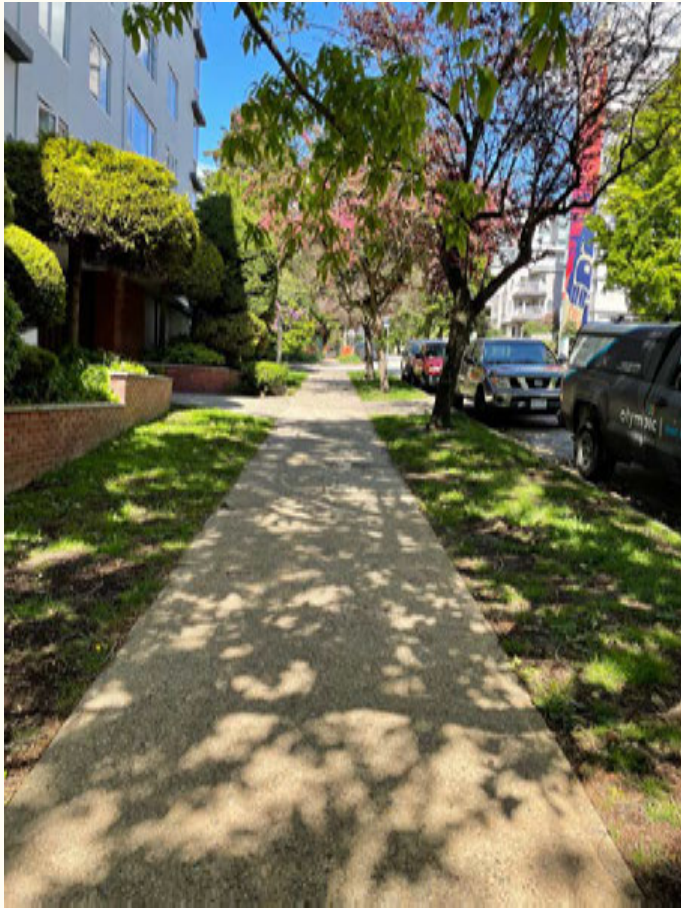
This preference
correlates with **mental
restoration**

(Basuet 2018; Tenngart ,Ivarsson,and Hagerhall,
2008; Laumann et al., 2001; Purcell et al., 2001).



3. Natural Shade compared to Built Shade

dappled light versus shade from a building



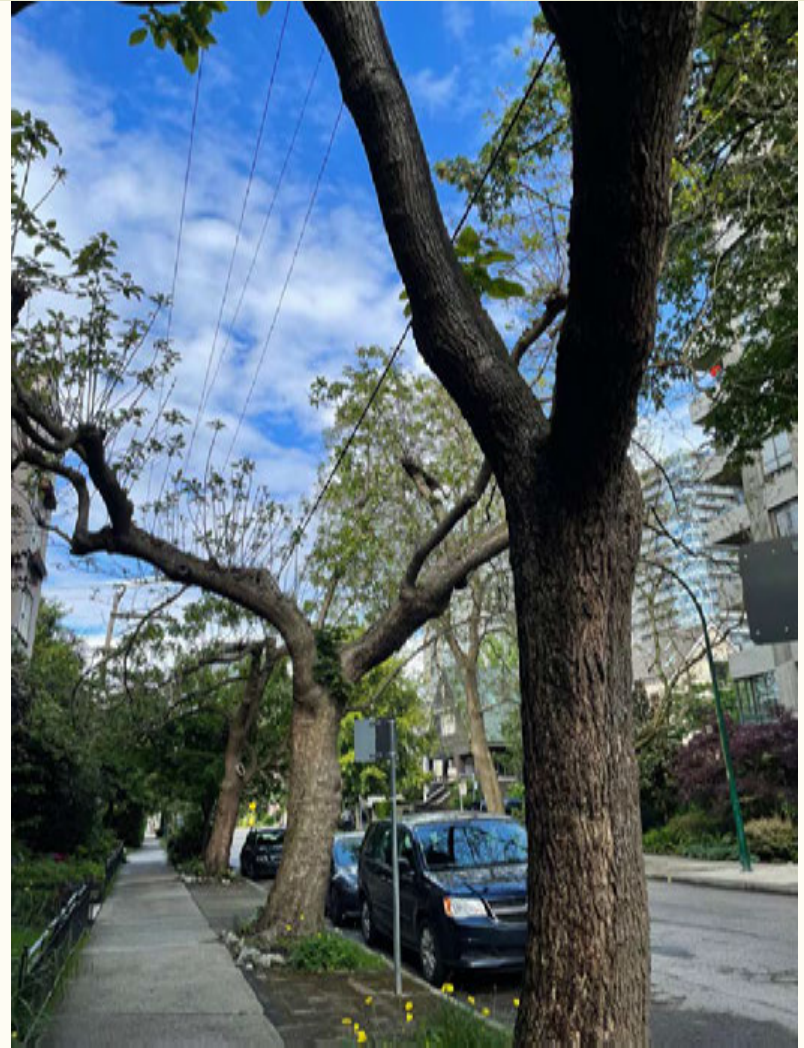
3. Natural Shade compared to Built Shade

dappled light versus shade from a building



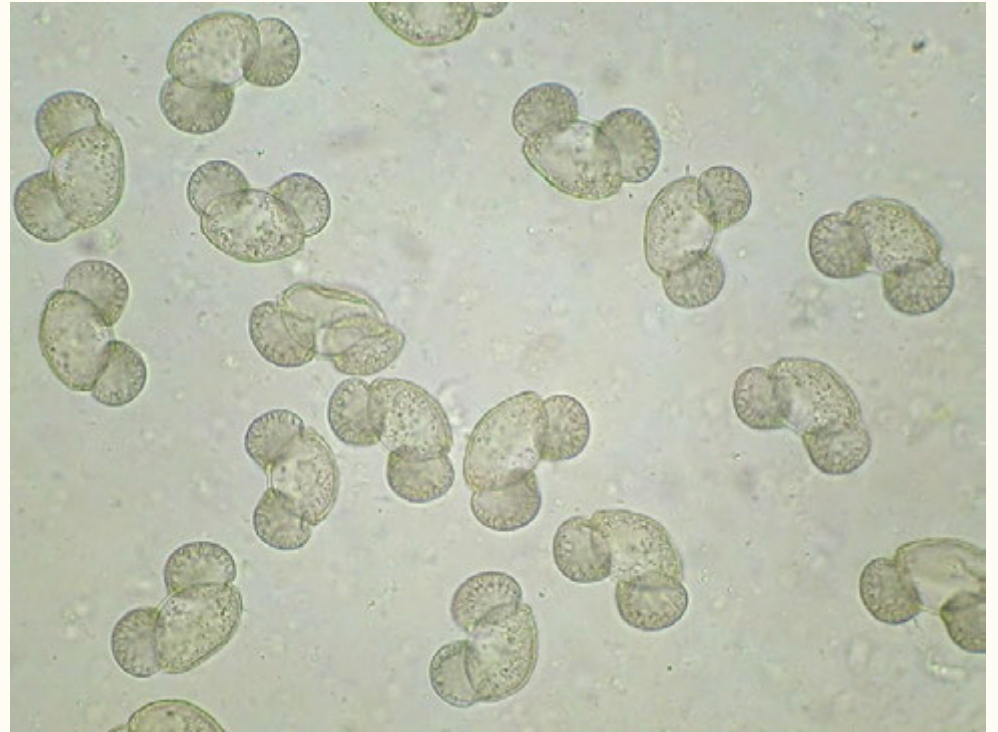
4. Downsides to Natural Shade

Trees, in particular, can interfere with infrastructure



4. Downsides to Natural Shade

Pollen can trigger allergies, and some plants are toxic and/or invasive.



Rocky Mountain National Park

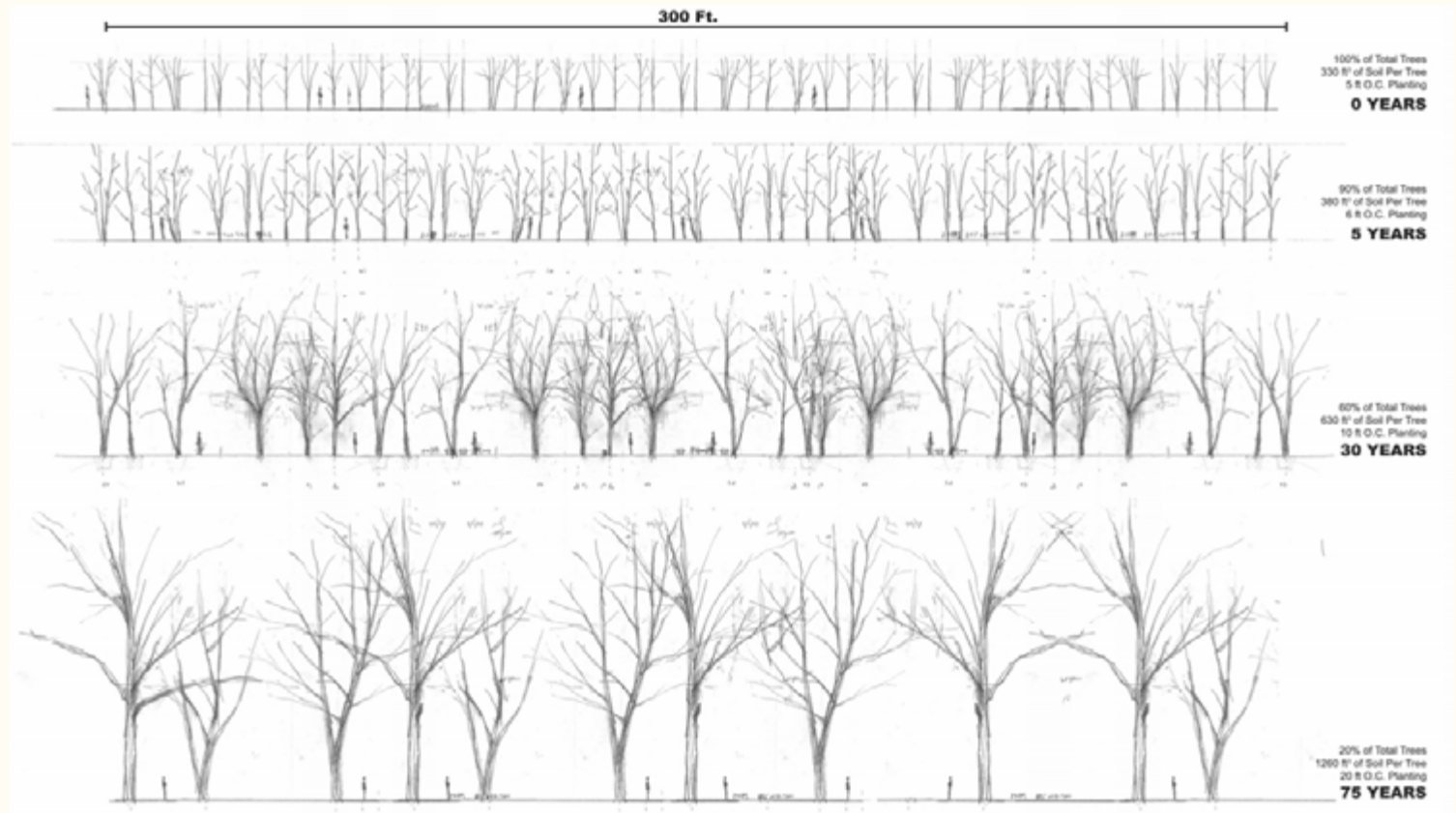
4. Downsides to Natural Shade

If the shade is too deep, it can be difficult to grow plants, like grass, underneath the tree.



4. Downsides to Natural Shade

Plants take time to grow and like all living things, they will die



Arabesque Tree Planting 75 Year Timelapse
Michael Van Valkenburgh Associates, Inc. Landscape Architects P.C.
Brooklyn Bridge Park 02 March 2007

5. Differences in Natural Shade

Leaf size



Vitya_maly

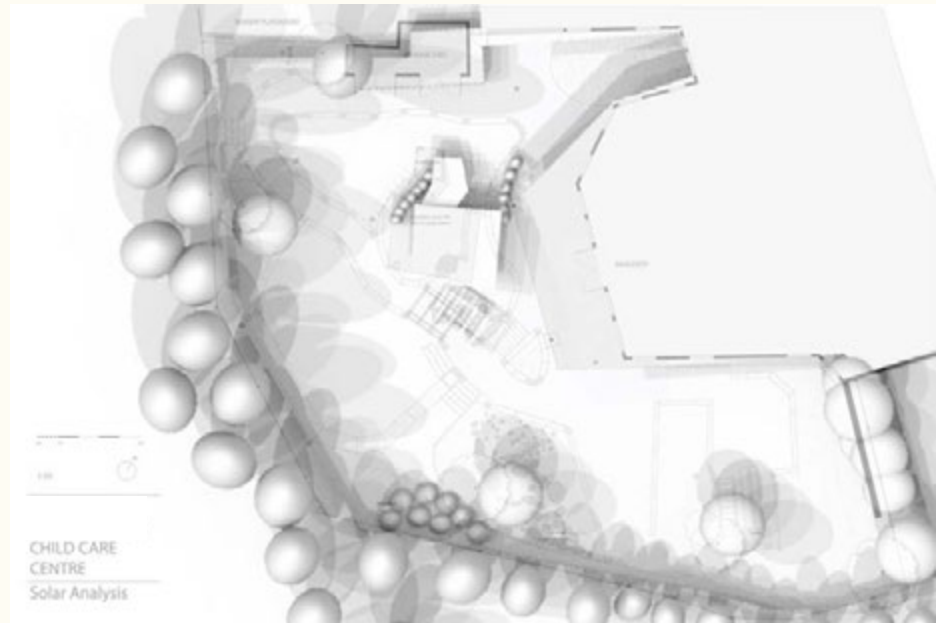
5. Differences in Natural Shade

Canopy size, leafing-out time, and branching pattern



6. Locating Natural Shade

Locating Natural Shade where sun is most prevalent in an outdoor space



Is the site south or south/west exposed? YES

-Yes, it's somewhat exposed (deciduous trees so more exposed in winter)

Is there limited/no shade on site? YES

-The centre is very exposed except for covered play structures

Are the ground surfaces made of sand, asphalt, concrete, and/or water? YES

-woodchips in play area, sand paths, concrete adjacent to the building/under the covered area

Are nearby building walls white or light coloured? YES

-Somewhat light colored, aluminum and glass facade

We recommend a shade element for this site.

6. Locating Natural Shade

Asking ECE or documenting in-situ



6. Locating Natural Shade

Vines on
over head
structures



6. Locating Natural Shade

Natural shade should cover **approximately 70%** of a play area.



6. Locating Natural Shade

Grouping of
low branching
trees



6. Locating Natural Shade

Shrubs with
multiple stems



Acabashi

7. Climatic consideration for Natural Shade

Plant Hardiness Zones in BC



Zone 2a -50°F to -45°F	Zone 2b -45°F to -40°F	Zone 3a -40°F to -35°F	Zone 3b -35°F to -30°F	Zone 4a -30°F to -25°F	Zone 4b -25°F to -20°F	Zone 5a -20°F to -15°F	Zone 5b -15°F to -10°F
Zone 6a -10°F to -5°F	Zone 6b -5°F to 0°F	Zone 7a 0°F to 5°F	Zone 7b 5°F to 10°F	Zone 8a 10°F to 15°F	Zone 8b 15°F to 20°F	Zone 9a 20°F to 25°F	Zone 9b 25°F to 30°F

7. Climatic consideration for Natural Shade

Microclimatic considerations of temperature, light, wind, salt, fog, and moisture that are shaped by orientation, slope, and nearby structures and vegetation will add variability to hardiness.

8. Criteria used for Natural Shade

broadleaf evergreen



evergreen conifer



deciduous



8. Criteria used for Natural Shade

The leaves of many varieties of oak trees remain on the tree through winter



8. Criteria used for Natural Shade

Plants identified:

provide heavy or medium shade,
are not invasive,
not toxic,
available for sale in BC

We also tried to identify plants:

native to BC,
listed as surviving Metro Vancouver's
changing climate and/or listed as a
BC Firesmart fire-resistant plant

canopy density guide

The canopy density guide will help you to assess the level of UVR protection provided by different trees.

View the tree canopy against sky and compare with illustrated leaf/canopy patterns. Estimate which pattern of sky and leaves most closely approximates the observed canopy.

heavy – over 90% UVR protection

Good protection from direct UVR. Protection from indirect UVR will depend on canopy size and where a person is positioned under the canopy. Suitable for long-stay use if personal sun protection measures are also used.



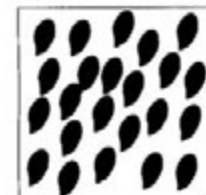
medium – around 60% UVR protection

Filtered shade provides low levels of protection from direct and indirect UVR. Suitable for short-stay use only. Personal sun protection measures should also be used.



light – less than 30% UVR protection

Poor protection from direct and indirect UVR. Suitable for transit shade only.



7. Climatic consideration for Natural Shade

BC Native Plants List

BC Tree species compendium

Canadian poisonous plants information system

E-Flora BC

FireSmart BC

Government of Canada Trees

Invasive species council of BC

Native Plants PNW

North Carolina Extension Gardener Plant Toolbox

Trees Canada

Trees for Hot Sites

Urban Tree List for Metro Vancouver in a Changing Climate

USDA Plant Database

MAPLE, VINE

Common Name	Maple, Vine
Scientific Name	<i>Acer circinatum</i>
UV Protection	Heavy
Hardiness Zone	6 – 8
Growth Rate	0.4m / year
Type	Deciduous tree
Site Conditions	Moist and well-drained soil, they will suffer in dry and hot conditions.

Landscape Use Small residential yards, play spaces, native plant gardens

Maintenance/Care Water during dry weather, species anticipated to be restricted to moist sites under future climate in Metro Vancouver region, considered fire-resistant

Cultural Value Vine maples are native to BC. Their branches were used by Indigenous people to make baskets and fish traps. They also carved the wood to make spoons, bowls, and platters.

Ecological Value Deer and elk love to eat its summer foliage. A variety of birds feed on seeds, buds, and flowers. Squirrels and chipmunks will collect the seeds. Listed as a BC Firesmart fire-resistant plant.

Play Value Vine maples have samaras that look like small dragonflies, children can peel back the seed caps and stick the samara on their noses!

Fun Fact If you try to collect seeds, you might discover that many samaras have already had their seeds removed by some small animals living around you.



Phases of maturity
Photo Credit: UBC SALA



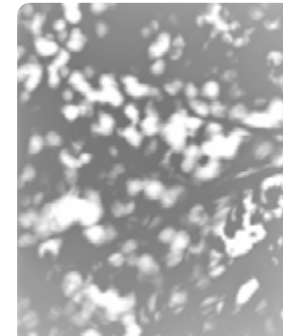
Full view of plant
Photo Credit: UBC SALA



Play value
Photo Credit: UBC SALA



Shade pattern type - UV Protection Heavy
Photo Credit: UBC SALA



Actual shade pattern
Photo Credit: UBC SALA

PINE, PONDEROSA

Common Name	Pine, Ponderosa
Scientific Name	<i>Pinus ponderosa</i>
UV Protection	Heavy
Hardiness Zone	1 – 8
Growth Rate	0.2m / year
Type	Coniferous evergreen tree
Site Conditions	Full sun or partial shade, well-drained soil preferred, could grow in a wide range of conditions

Landscape Use Large residential yards, parks, butterfly gardens, native plant gardens

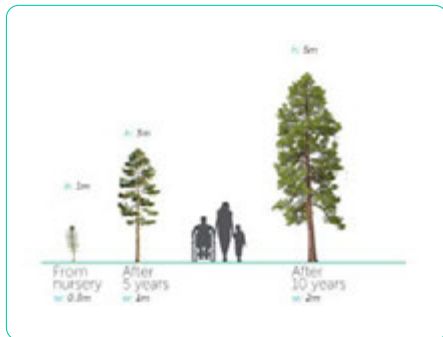
Cultural Value Ponderosa pine is native to BC. Indigenous people use the inner bark and seeds as a source of food. It serves as an important timber tree for building log cabins.

Fun Fact On a hot day, the bark smells like vanilla, and if you break a young twig, it smells like oranges!

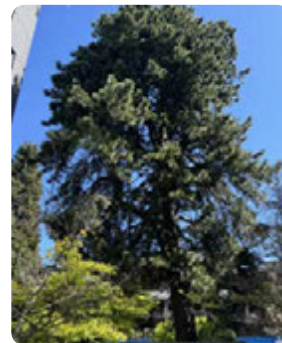
Maintenance/Care Young trees grow quickly, little maintenance is needed, tolerant to climate change, scales of the cones are tipped with a stiff prickle

Ecological Value Ponderosa Pine seeds are an extremely valuable food source for birds and squirrels. It is also a host plant for some butterflies. Pine needles are a favourite material for making nests. This tree species is on the BC Firesmart best to avoid list.

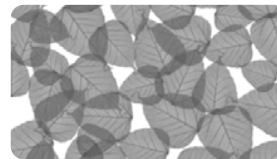
Play Value The cinnamon-coloured bark that breaks apart in large jigsaw puzzle-like pieces, can be used in arts and crafts projects.



Phases of maturity
Photo Credit: UBC SALA



Full view of plant
Photo Credit: UBC SALA



Shade pattern type - UV Protection Heavy



Actual shade pattern
Photo Credit: UBC SALA



Play value
Photo Credit: Katherine Court



Cultural value
Photo Credit: Jennifer Hanson



Ecological value
Photo Credit: gardenia.net

CURRENT, FLOWERING

Common Name Currant, Flowering

Scientific Name *Ribes sanguineum*

UV Protection Heavy

Hardiness Zone 6 – 8

Growth Rate 0.5m / year

Type Deciduous shrub

Site Conditions Full or partial sun, well-drained moist soil

Landscape Use Small residential yards, border, native plant gardens, play spaces

Maintenance/Care Prune immediately after flowering, water deeply but less frequently especially during its establishment years

Cultural Value Flowering currant is a BC Native shrub. Indigenous people use parts of the flowering currant for medicinal purposes as it has anti-bacterial and anti-viral qualities.

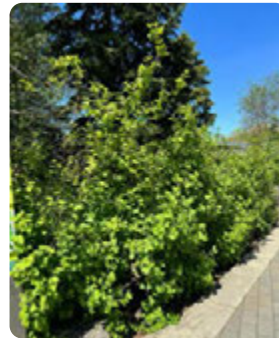
Ecological Value Flowering currant attracts hummingbirds and provides nectar for bees, butterflies, and other pollinators. The berries can also be eaten.

Play Value The fallen flowers can be used for flower crowns and the berries can be picked for a jam making activity!

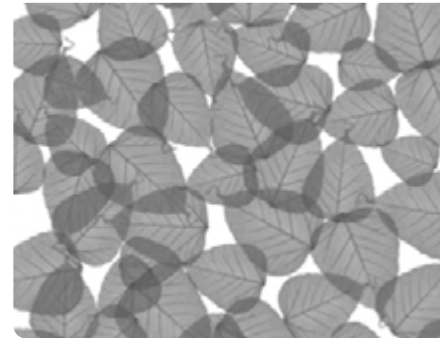
Fun Fact The foliage is fragrant when crushed!



Phases of maturity
Photo Credit: UBC SALA



Full view of plant
Photo Credit: UBC SALA



Shade pattern type - UV Protection Heavy



Actual shade pattern
Photo Credit: UBC SALA

FOX GRAPE

Common Name	Fox grape
Scientific Name	<i>Vitis labrusca</i>
UV Protection	Heavy
Hardiness Zone	5 – 8
Growth Rate	1 – 3m / year
Type	Deciduous shrub/climber
Site Conditions	Full sun, well-drained soil, drought-tolerant

Landscape Use Train on large supports of arbors, trellises, fences or other structures

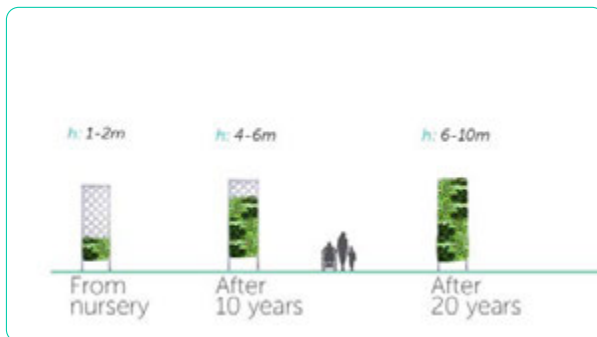
Maintenance/Care Requires sturdy support for their twining stems, pruning should be carried out in winter

Cultural Value Indigenous people and European settlers have used fruit as table grapes and juice grapes. The cultivation of grapes for winemaking has been an important cultural practice in many places where it's found.

Ecological Value Fox grape provides shelter and nesting sites for birds and small animals. Its flowers attract pollinators such as bees and butterflies. Listed as a BC Firesmart fire-resistant plant

Play Value Children can pick and eat the grapes of fox grapes vines.

Fun Fact They have the strongest aroma among wine grape varieties.



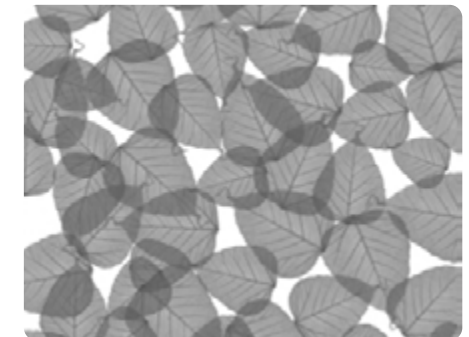
Phases of maturity
Photo Credit: UBC SALA



Fox grape leaves
Photo Credit: UBC SALA



Fox grape fruit
Photo Credit: UBC SALA



Shade pattern type - UV Protection Heavy
Photo credit: UBC SALA

Thank you.