

# The benefits of trees in the urban landscape

Hannibal Hayes

City Forester

City of Minnetonka

# Agenda

- Personal introduction
- Tree benefits

# Personal intro.

## Experience

- From SE MN
- U of M – school and work
  - Student - landscaping
  - Full time – landscaping, tree care
- Tree Care industry
  - Private
  - Municipal

# Personal intro.

## Experience

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## Credentials

- Horticultural Science, B.S. U of M - 2006
- ISA Board Certified Master Arborist - 2016
  - MN-4148B
- ISA Tree Risk Assessment Qualified - 2018
- MN DNR Licensed Tree Inspector - annual
- MNLA Certified Professional – 2006

# Full disclosure

- I love trees.... more trees.... PLANT AND PRESERVE MORE TREES!
- **However**
  - Inherent risk
  - Right tree for the site
  - Maintenance
- **ISA Certified Arborists**

# Tree benefits - brief

- **Wildlife habitat** (pollinators, birds, etc.)



John Ghent, John Ghent, Bugwood.org



# Tree benefits - brief

- **Wildlife habitat** (pollinators, raptors)
- **Noise reduction** (living sound barrier)



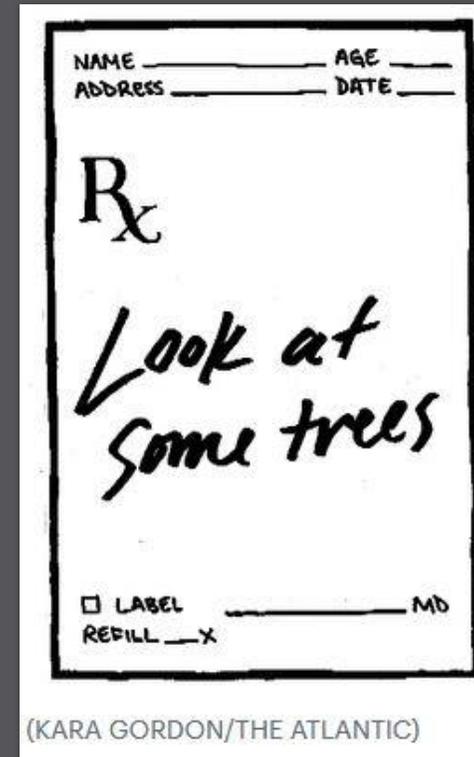
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- **Phytoremediation**
- **Wood products** (mulch, biofuels, lumber)
- **Shade** (heat island affect, UV light, energy savings, reduces temp. of stormwater)



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Richard Webb, Bugwood.org

# Tree benefits

- Stormwater
- Water quality
- Erosion control

# Stormwater

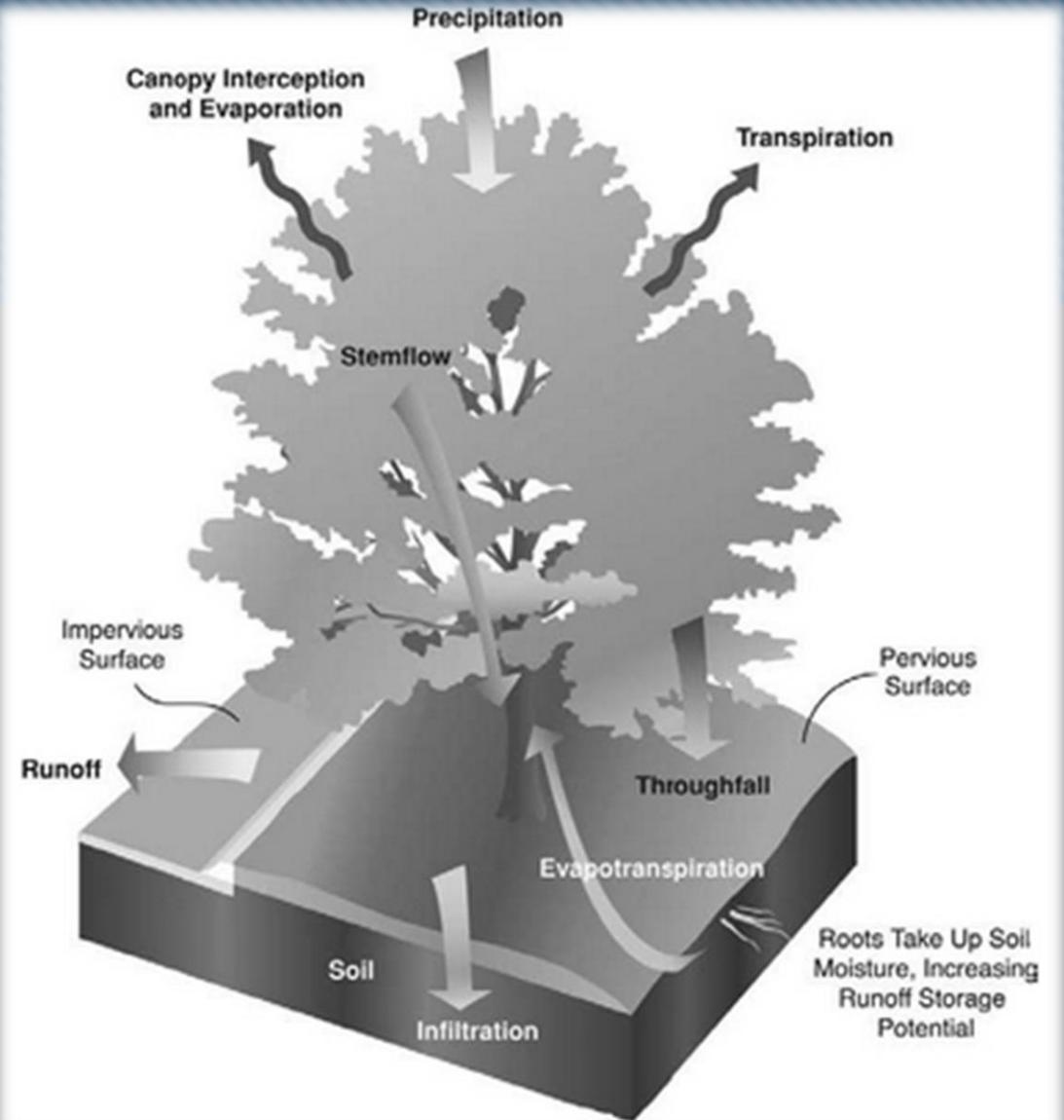
- **Reduce runoff**

- Interception - leaves and stem/slow down rainfall

- Evaporation

- Infiltration

- Transpiration

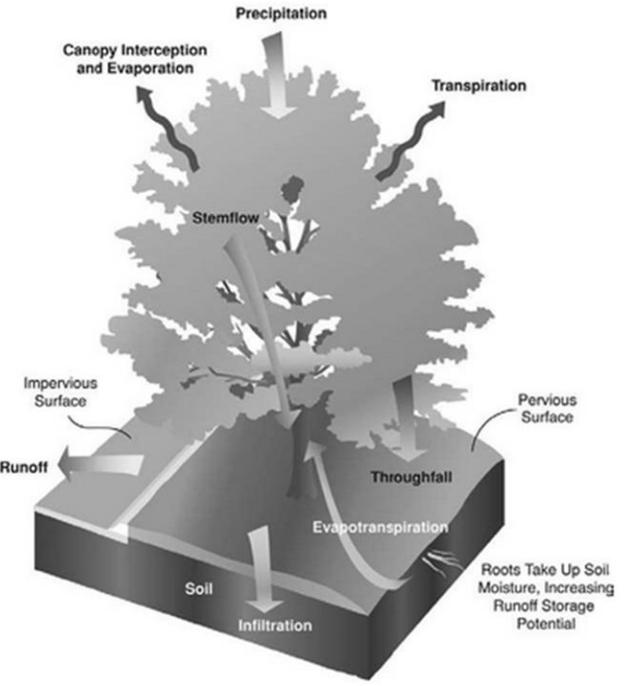


National Tree Benefit Calculator

<http://www.treebenefits.com/calculator/ReturnValues.cfm?climatezone=Midwest>

# Stormwater

Overall Benefits | **Storm Water** | Property Value | Energy | Air Quality | CO2 | About the Model



The diagram illustrates the water cycle around a tree. Precipitation falls from the sky. Some is intercepted by the canopy and evaporates. Some is transpired by the leaves. Some flows down the stem (stemflow). The remaining water (throughfall) falls to the ground. On an impervious surface, it causes runoff. On a pervious surface, it infiltrates the soil. Evapotranspiration occurs from the soil. Roots take up soil moisture, increasing runoff storage potential.

**Your 20 inch Cottonwood will intercept 2,403 gallons of stormwater runoff this year.**

Urban stormwater runoff (or "non-point source pollution") washes chemicals (oil, gasoline, salts, etc.) and litter from surfaces such as roadways and parking lots into streams, wetlands, rivers and oceans. The more impervious the surface (e.g., concrete, asphalt, rooftops), the more quickly pollutants are washed into our community waterways. Drinking water, aquatic life and the health of our entire ecosystem can be adversely effected by this process.

Trees act as mini-reservoirs, controlling runoff at the source. Trees reduce runoff by:

- Intercepting and holding rain on leaves, branches and bark
- Increasing infiltration and storage of rainwater through the tree's root system
- Reducing soil erosion by slowing rainfall before it strikes the soil

For more information visit: [The Center for Urban Forest Research](#)



The National Tree Benefit Calculator was conceived and developed by Casey Trees and Davey Tree Expert Co.



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# Stormwater

- Interception rates vary
  - Size – crown
- Therefore,
  - 20" dia. cottonwood = 2,403 gal
  - 30" dia. cottonwood = 4,717 gal

Overall Benefits **Storm Water** Property Value Energy Air Quality CO2 About the Model

Precipitation

Canopy Interception and Evaporation

Transpiration

Stemflow

Impervious Surface

Pervious Surface

Runoff

Throughfall

Evapotranspiration

Soil

Infiltration

Roots Take Up Soil Moisture, Increasing Runoff Storage Potential

Your 30 inch Eastern cottonwood will intercept 4,717 gallons of stormwater runoff this year.

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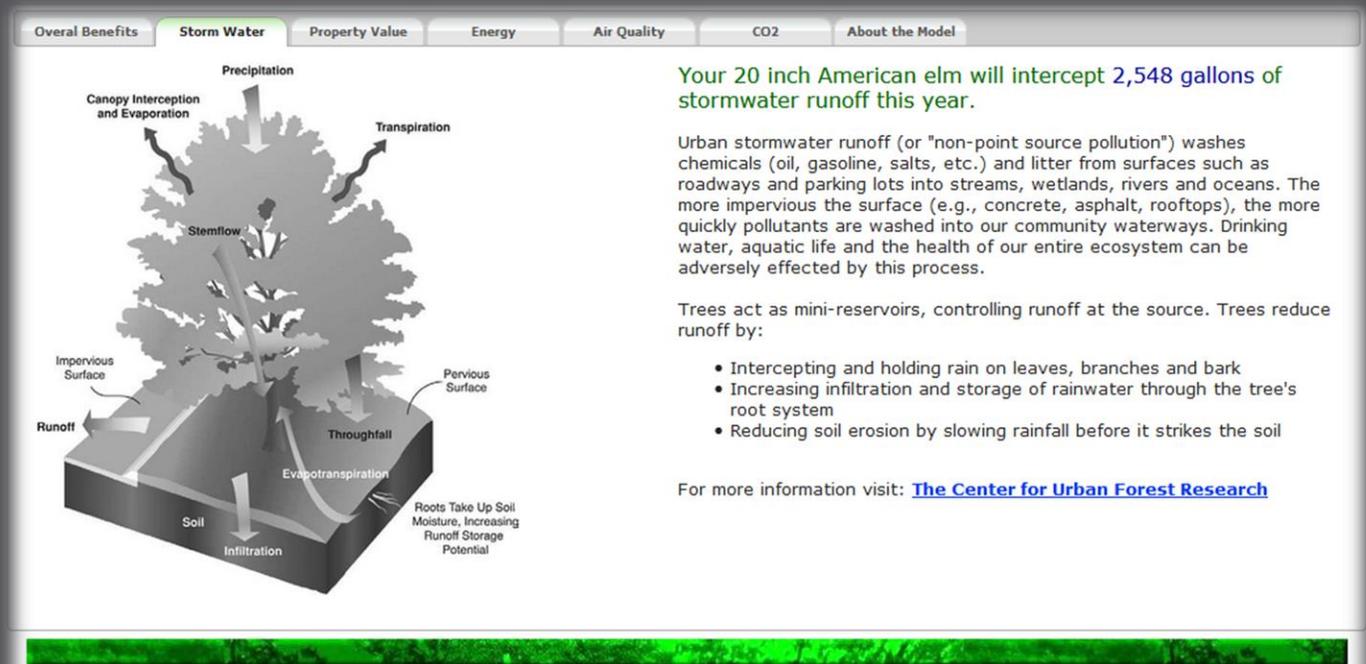


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# Stormwater

- Interception rates vary
  - Size
  - **Species** - density of crown
    - Leaves and structure
- Therefore,
  - 20" dia. cottonwood = 2,403 gal
  - 20" dia. American elm = 2,548 gal



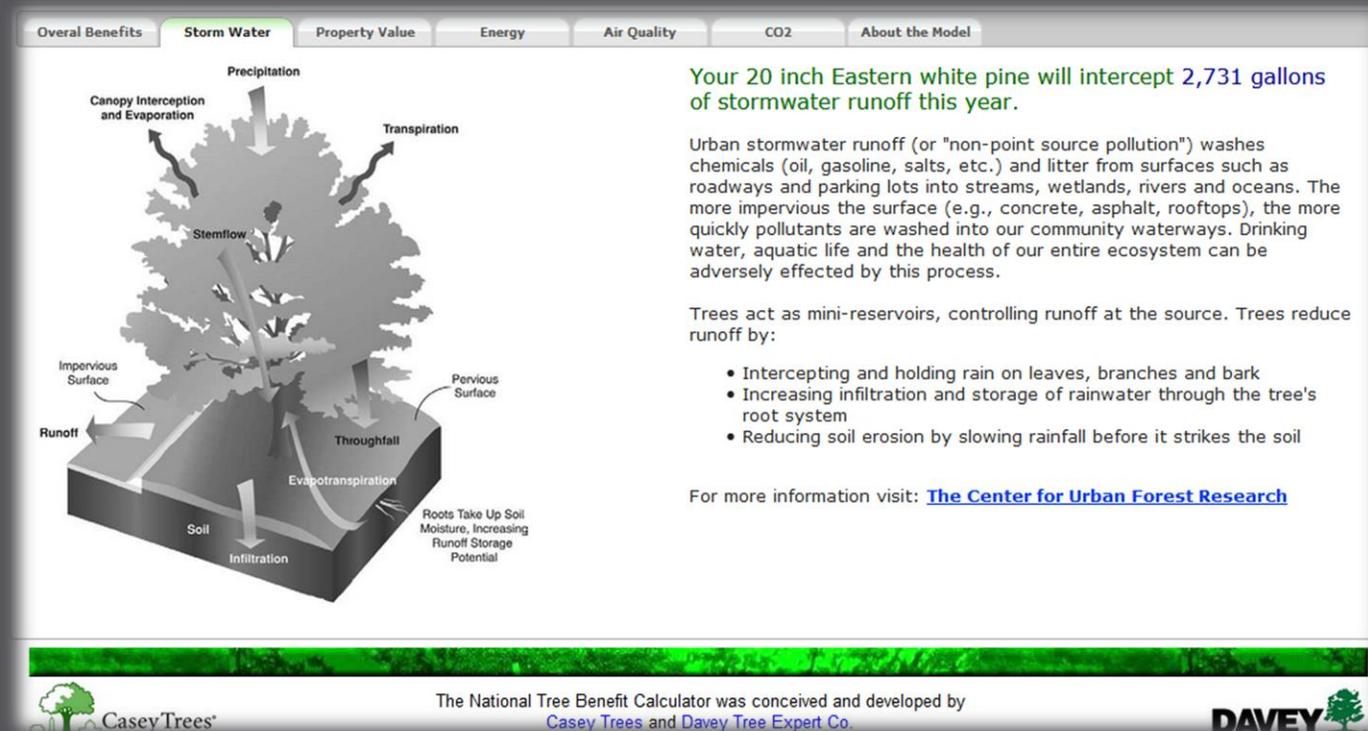
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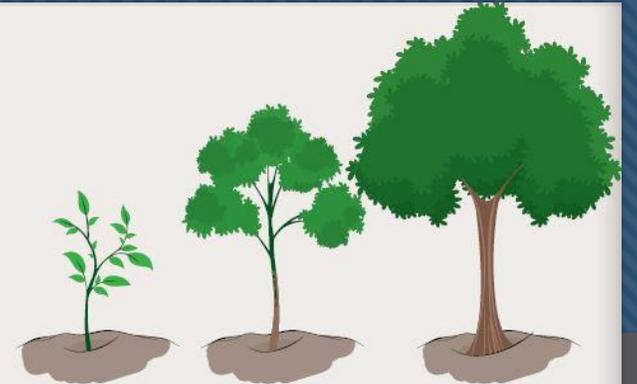
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  - 20" dia. Eastern white pine = 2,731 gal



# Stormwater

- Preservation vs. new tree planting
- 2" dia. oak tree = 44 gal
- 20" dia. oak tree = 1,898 gal
- 20" dia. oak tree = (53) 2" dia. oak trees!

## Annual Benefits



Tree diameter	2"	10"	20"
<b>Stormwater Intercepted</b>	44 gal	639 gal	1,898 gal
<b>Energy Saved</b>			
Electricity	12 kWh	112 kWh	212 kWh
Natural gas	2 therms	16 therms	29 therms
<b>Carbon Dioxide Absorbed</b>	33 lbs	349 lbs	680 lbs
<b>Improvements To Air Quality (value)</b>	.38¢	\$3.85	\$5.10

### Number of 2" Trees Needed to Equal Benefits of One 20" Oak Tree

Stormwater Interception:	53
Energy Savings:	14–17
Carbon Monoxide Absorption:	20
Air Quality Improvements:	22

# Water quality

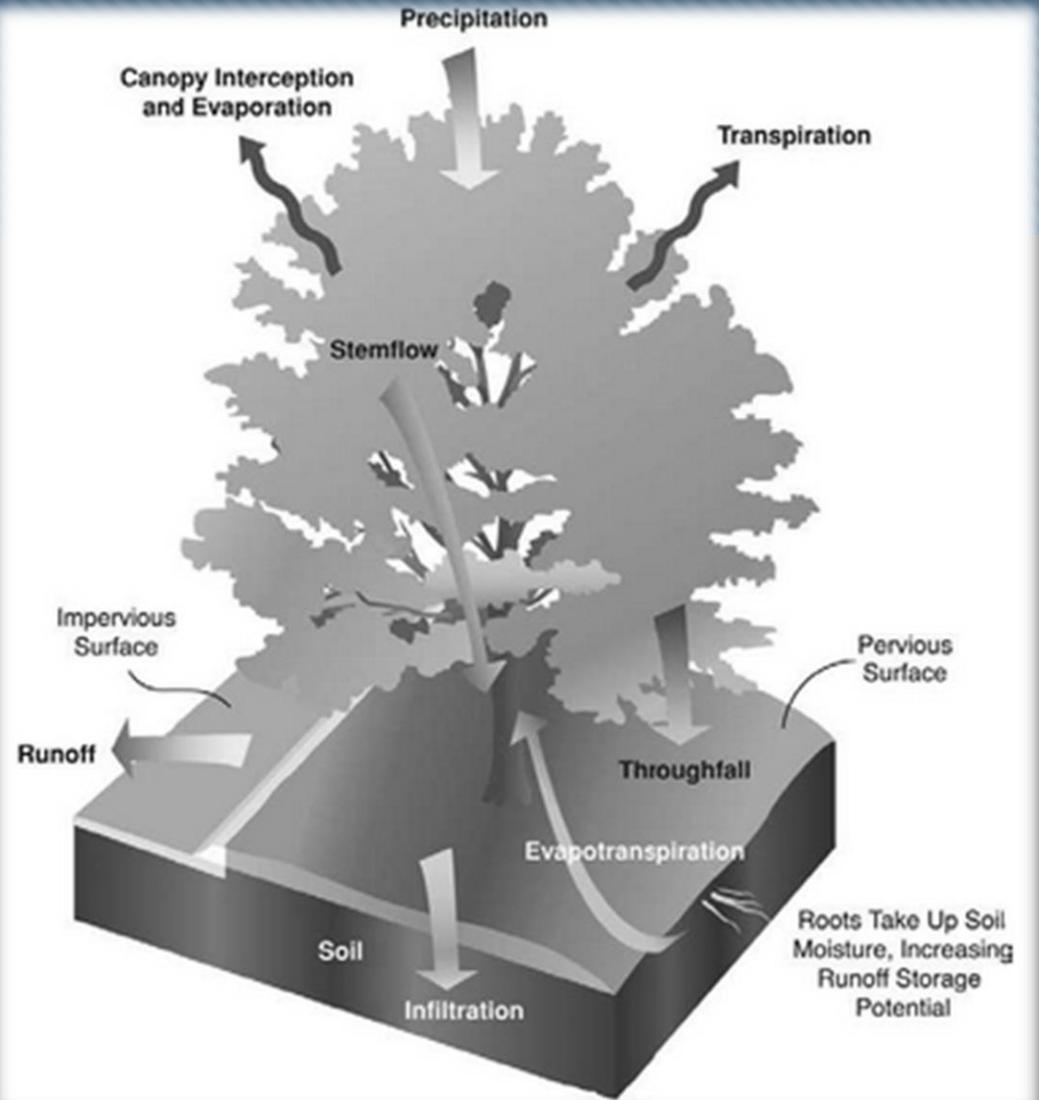
- **Slow runoff**
  - Sediment and contaminants filtering
    - Deposition – build soil
    - Infiltration – microbial break down contaminants



# Soil Erosion

- Slow runoff

- Decrease energy of water



# Soil Erosion

- **Slow runoff**
  - Decrease energy of water
- **Roots**
  - Hold soil
  - Enhance infiltration



# Benefits of Trees

- Wildlife habitat
- Noise reduction
- Privacy
- Reduce stress/ increase health
- Air quality/Carbon sequestration
- Phytoremediation
- Wood products
- Shade
- Stormwater
- Water quality
- Erosion control

Thank you!

