

Where Are All The COOL Parking Lots?

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Center for Urban Forest Research

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Our Mission

To demonstrate new ways
in which trees add value
to communities.

Convert research results
into financial terms to
stimulate community
investment in trees.



Areas of Research

Investment Value- Benefits and Costs

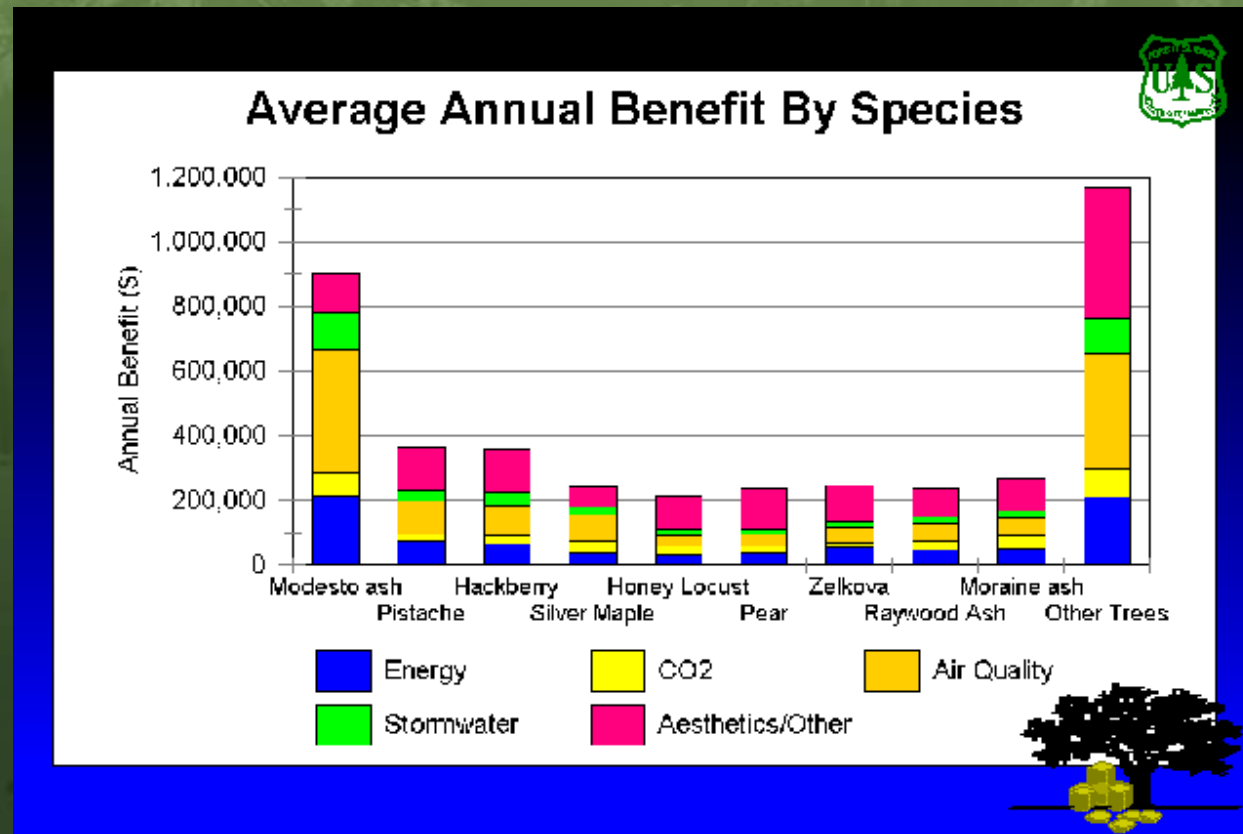
- Energy Conservation
- Air Quality
- Conserving Runoff
- FireWise Landscapes



Investment Value

Benefits - Costs

For every \$1 invested for care and maintenance, the urban forest returns \$2 - \$4 in benefits



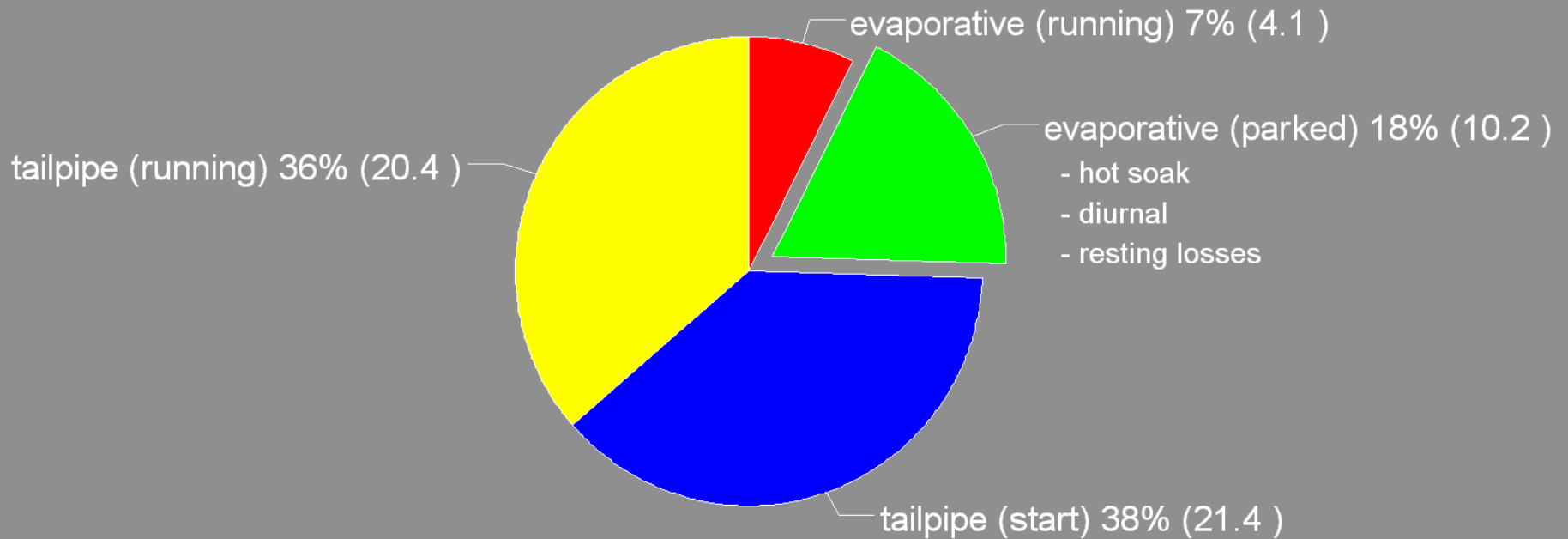
Air Quality and Urban trees

- BVOC emissions (Biogenic Volatile Organic Compounds)
 - Function of tree size- per tree and not per unit mass basis
 - Emissions due to tree care
- Net ozone effects
 - Temperature reduction and other climatic effects (pollution deflection/trapping)
 - Deposition- removal of ozone and NO_x
 - Avoided NO_x emissions from energy savings
 - Emission reduction from cooling of parked automobiles; startup emissions
- Net environmental effects
 - Deposition and avoided PM₁₀, SO₂, etc.
 - Energy savings due to reduced building cooling and heating
 - CO₂ sequestered and avoided
 - Storm water runoff reduction
 - Reduced repaving interval for shaded streets (reduced emissions?)
 - Improved health

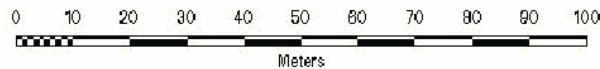
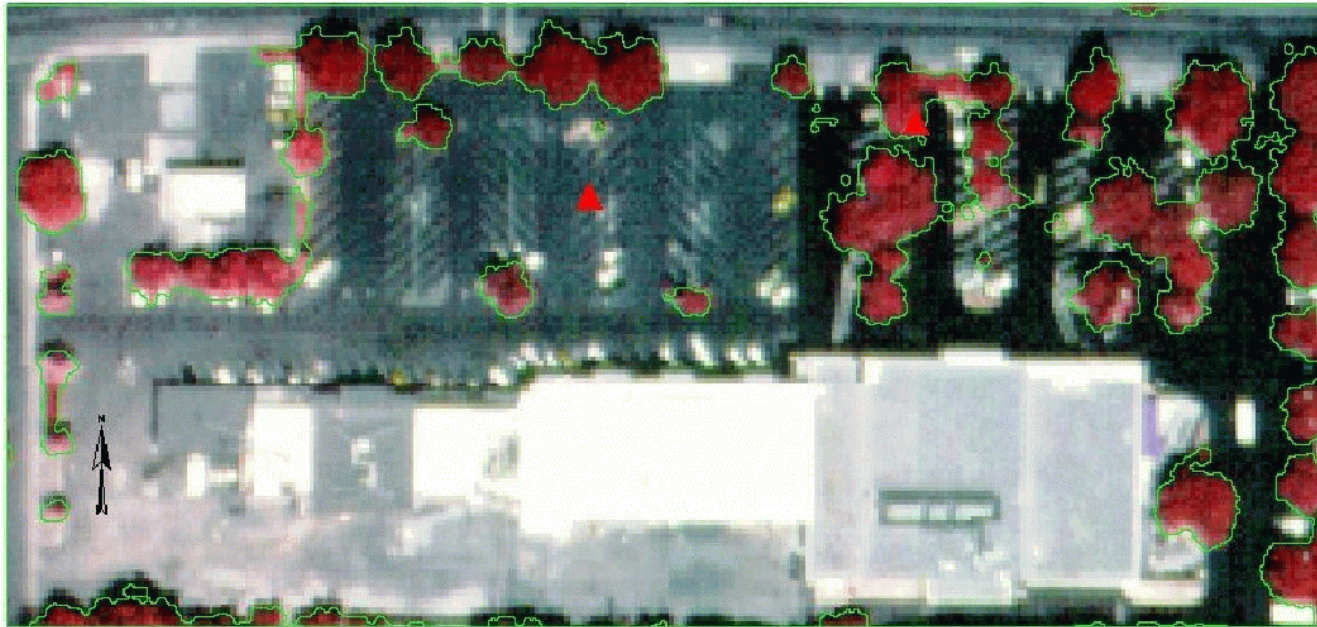
Background

- Parking lots - 10% of urban land
- Sacramento County emissions (all sources)
 - ROG 114 tpd (1995); 70 tpd 2004
 - NO_x 125 tpd (1995); 87 tpd 2004
- ROG evaporative emissions
 - 8% of inventory (9.7 tpd)
 - 18% of vehicular (vehicular 49% of total)
 - Temperature sensitive
- Trees shade pavement and provide transpirational cooling

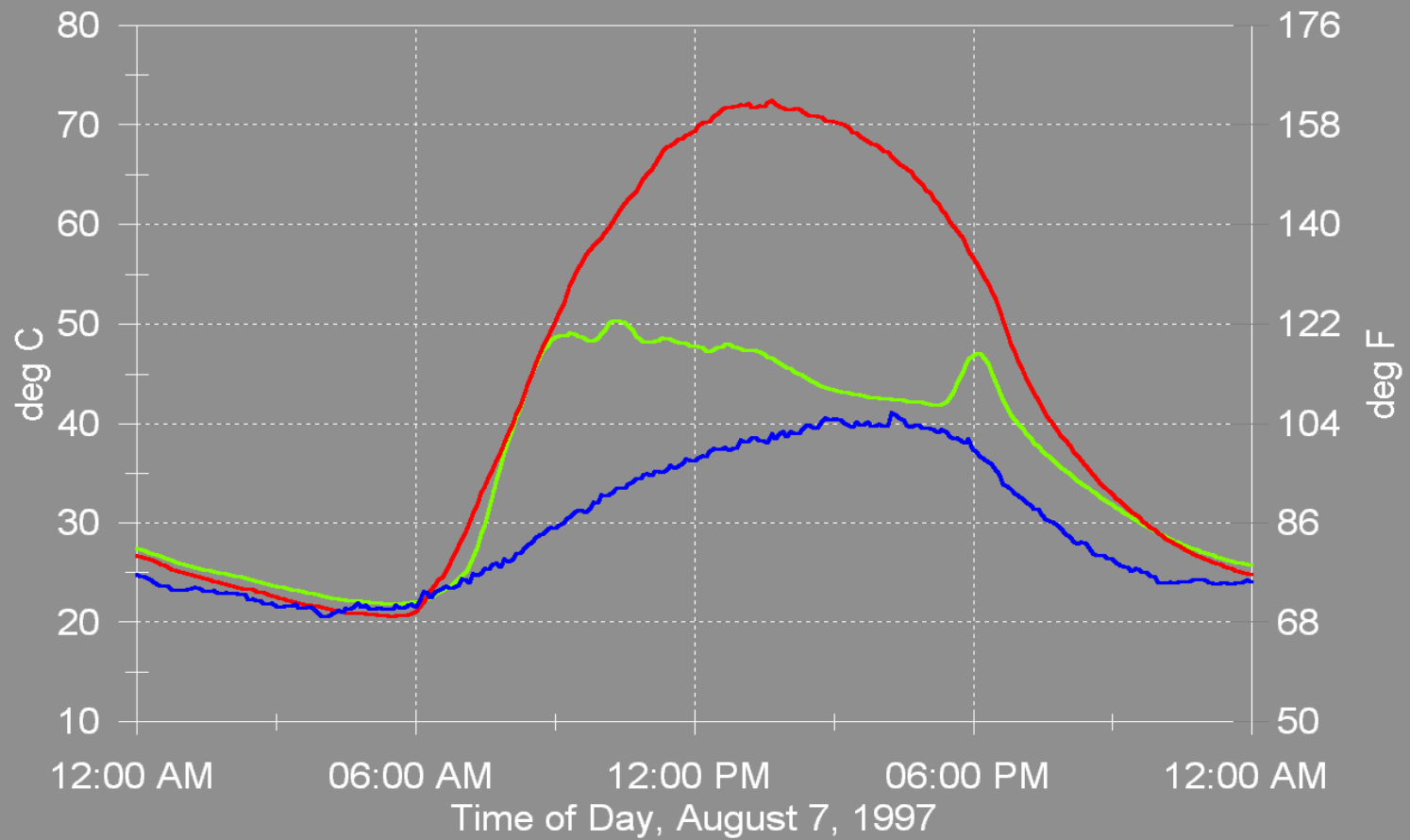
Sacramento Co. vehicle HC emissions 1996 (tons/day)



Parking Lot Study



 Car & Weather station



— shaded vehicle cabin — unshaded vehicle cabin — shaded air temp at 0.5 m

Emissions Modeling

- ROG reductions = 0.85 ton/day (2%)
 - Greatest savings for starts (50%)
 - Diurnal and hot soak each 25%
- NOx reductions = 0.1 ton/day (0.2%)
- Reductions equivalent to other SMAQMD programs:
 - ROG: graphic arts + waste burning, etc. (0.9 tpd)
 - NOx: light-duty vehicle scrappage (0.1 tpd)

Summary

Parking lots and air quality

- Lots up to 2 °C cooler
- Cabin up to 25 °C cooler
- Gas temp 2-4 °C cooler
- 1 ton/day ROG reduction with 50% shade



Conclusions

- Emissions reductions comparable to other strategies
- What are the costs?
- Don't forget the other benefits
- Start up emissions (38% of total) reductions?
- These emissions reductions should accrue to any urban forest strategy that reduces ambient temperatures

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ourmission

Our research demonstrates new ways that trees add value to communities, converting results into financial terms to stimulate more investment in trees.

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welcome...

Since 1992 we have provided our customers with reliable scientific evidence that the benefits of urban forests add real value to communities.

Our research confirms that trees in our community forests are assets that pay us back.

Trees:

- Conserve energy by shading buildings and paved surfaces
- Filter airborne pollutants
- Remove atmospheric carbon dioxide
- Reduce stormwater runoff
- Increase the value of our homes

what'sshot?

New research

STRATUM - an easy to use, computer-based program that helps communities assess the benefits of their street trees. - [Learn more](#)

See what happened at:

what'snew?

New Newsletter. Top story: "Fire Prevention in the Wildland-Urban Interface. What we've learned." See what lessons two case studies have taught us. Also in this issue: "Regional Urban Forest Canopy Cover Analyses." Our preliminary results already reveal some interesting facts about expanding developments. [Click here to sign up](#) to receive future issues electronically. - [View PDF document](#) [0.67MB]

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energy air water fire benefits & costs