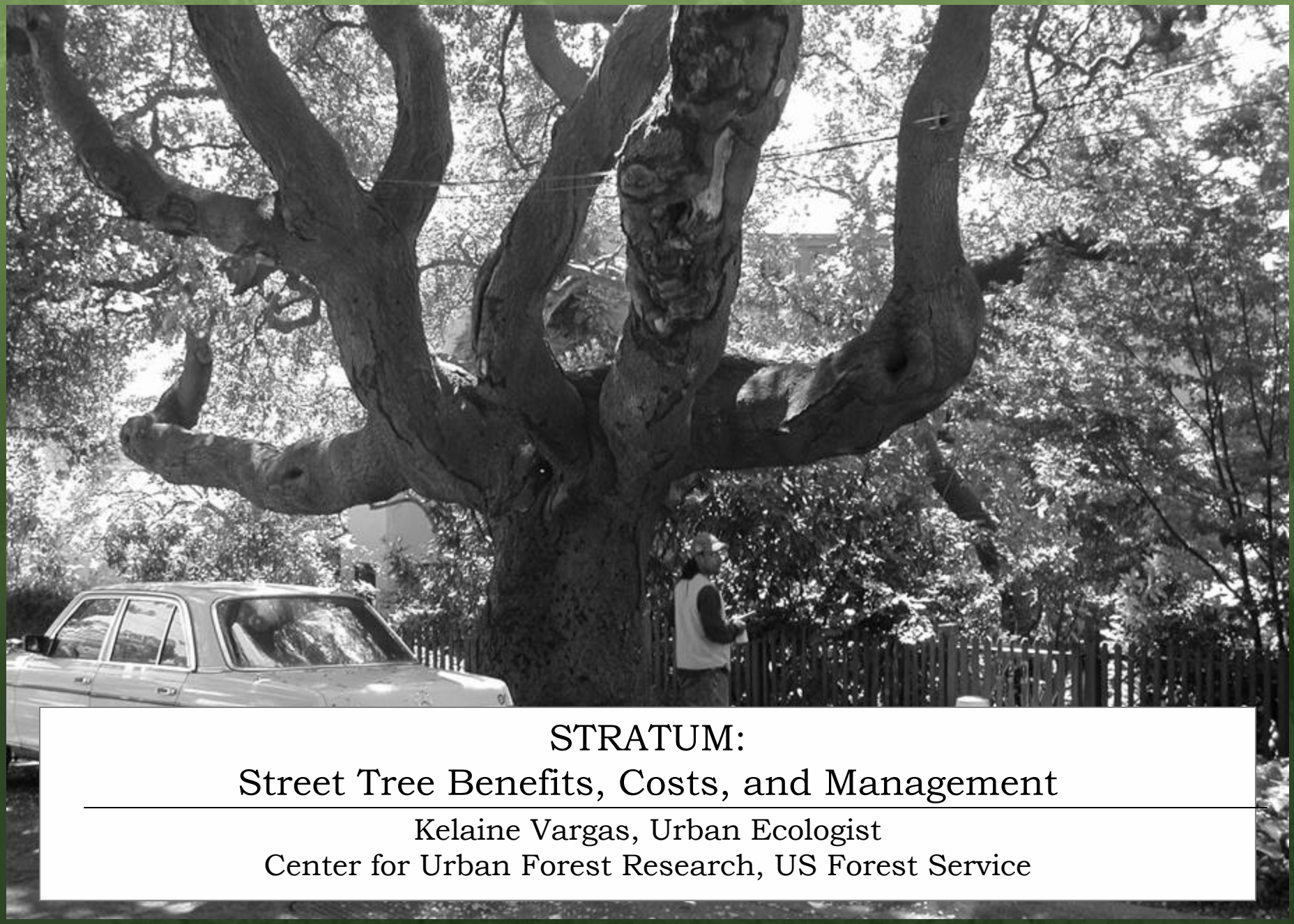


STRATUM:
Street Tree Benefits, Costs, and Management

Kelaine Vargas, Urban Ecologist
Center for Urban Forest Research, US Forest Service

Center for Urban Forest Research

USDA Forest Service

PSW Research Station

Davis, CA

STRATUM v 3.2

Street Tree Resource Analysis Tool for Urban Forest Managers

Center for Urban Forest Research
Pacific Southwest Research Station, USDA Forest Service

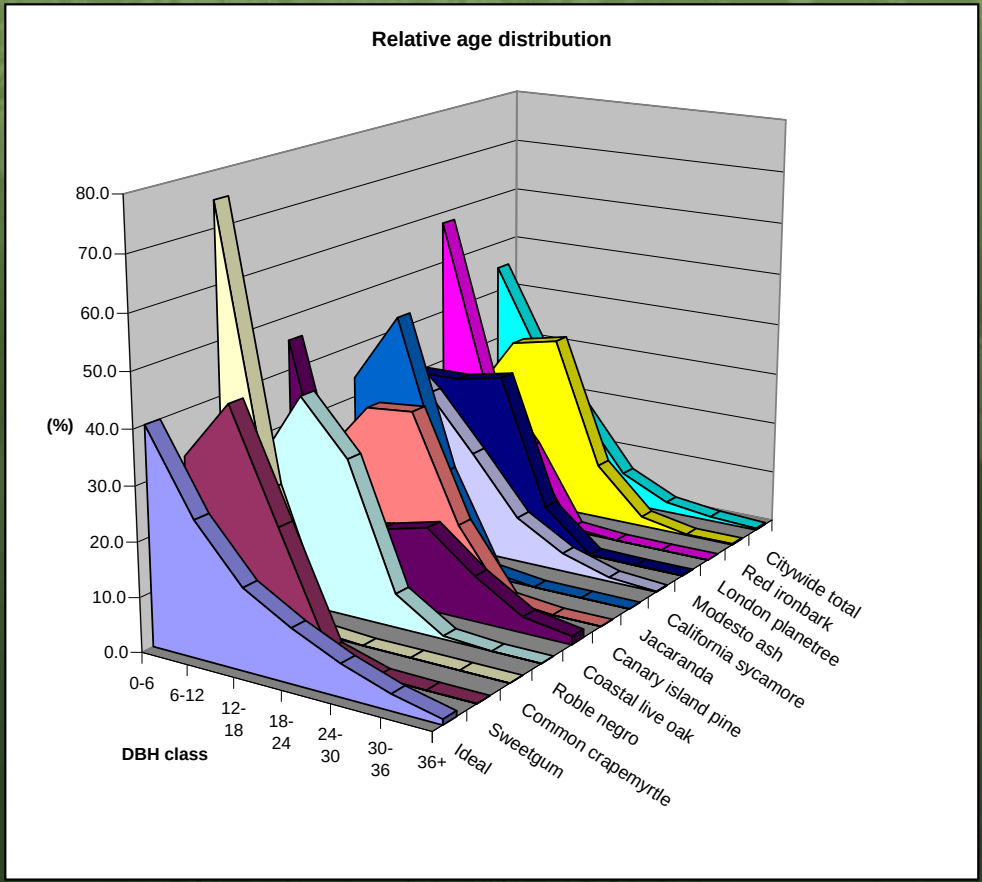
Benefit-Based Approach

Benefits of trees: Claremont

- 23,500 municipal trees

Claremont
Species Distribution of All Trees (%)

Species	Percent
Sweetgum	9.23
Common crapemyrtle	8.74
Roble negro	4.27
Coastal live oak	4.19
Canary island pine	3.98
Jacaranda	3.97
California sycamore	3.91
Modesto ash	2.84
London planetree	2.61
Red ironbark	2.49
Other species	53.78
Total	100.00



Conserving Energy

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How California's Power Crisis Works

by Kevin Bonsor

California's power woes are worsening as power demands in the
supplies. Even with the help from out-of-state sources, millions a
outages. In the first few months of 2001, residents of California h
of stage 3 alerts, which almost always precede rolling blackouts

The scene on the streets and in buildings in California is becomi
news. The lack of power paralyzes normal activity, with dead traf
schools and businesses grinding to a halt. This crisis has been g
been building for years.

With the hottest months of the year ahead, the power crisis in C
expects rolling blackouts to continue until utilities can increase th
outside sources. In this edition of HowStuffWorks, we will take a l
American history, what caused it and how it might spill over into
country.

The Roots of the Crisis

As you can imagine, there is a lot of finger-pointing going on in
this most recent energy shortage. This crisis isn't something tha
that has been building for years. Here are a few of the factors th
situation:

CNN.com

IN-DEPTH SPECIAL | In-depth Archive | CNN.com Sections

Power Crisis

California's struggle to solve its energy crisis in the wake of the 1996 deregulation of its utilities market has nationwide implications, with 25 other states also moving toward deregulation

California power crisis sends shock waves nationwide

As rolling blackouts swept through parts of California, Energy Secretary Spencer Abraham warned the country that it faces its "most serious shortage" since the 1970s. In California, the crisis may have already begun. Wholesale electricity prices have risen dramatically in the past year.

FULL STORY
RECENT NEWS

FEATURES

- California power crisis sends shock waves nationwide
- y: The California power quagmire
- FAQ: What California's crisis means to the rest of the U.S.
- Deregulating California's electric utilities

STATISTICS

- U.S. home heating sources
- U.S. power generation
- U.S. residential gas prices
- World energy consumption
- Global electricity consumption

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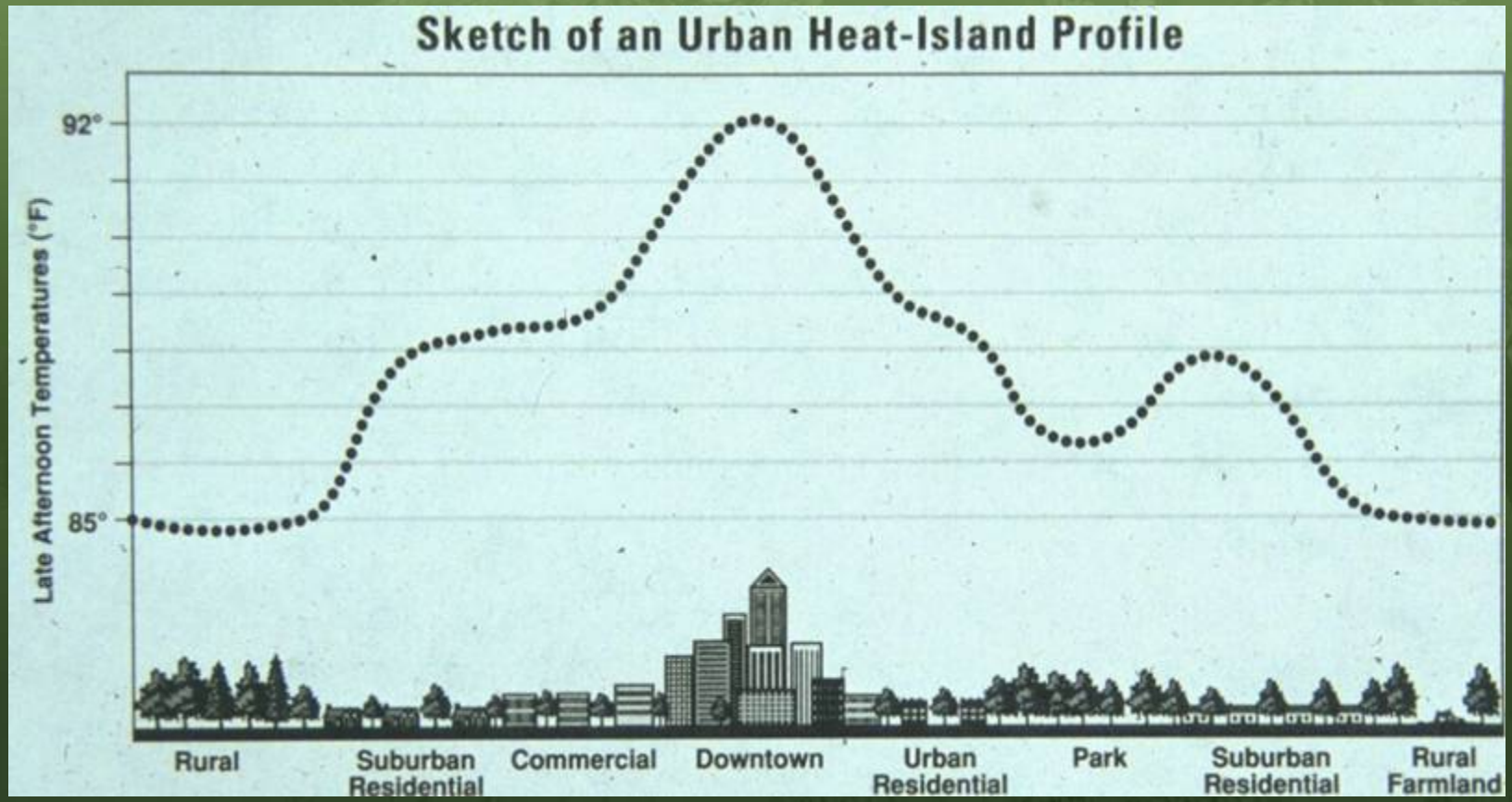
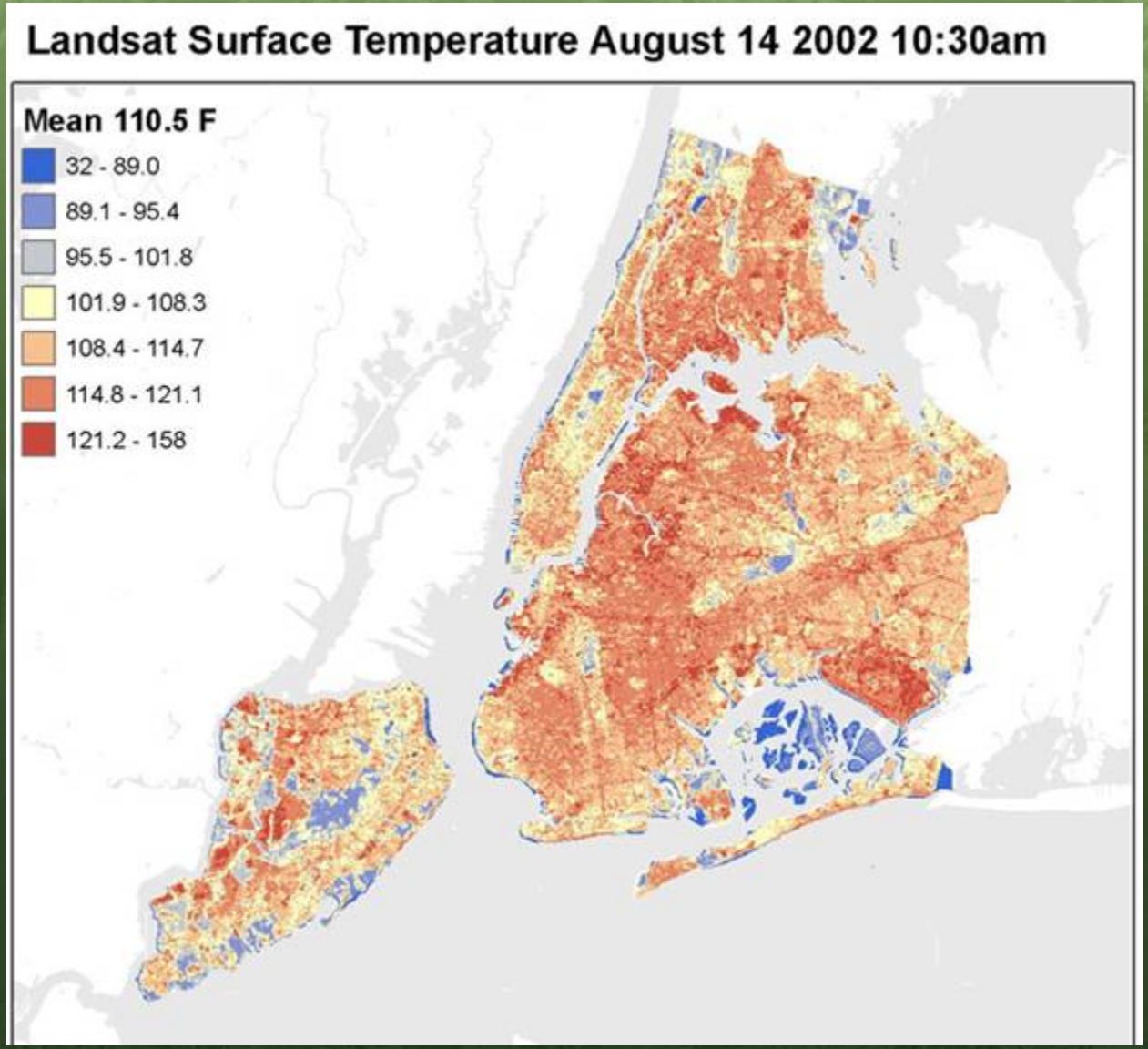
Conserving Energy

Trees lower air temperature



Mitigating NYC's Heat Island



"Street trees…have the largest cooling potential per unit area…"

Claremont
Annual Energy Benefits of Trees by Species

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Sweetgum	85.28	17,181.44	- 226.97	- 151.78	17,029.66	9.23	6.49	7.86
Common crapemyrtle	75.99	15,310.10	- 299.80	- 200.48	15,109.63	8.74	5.76	7.36
Roble negro	83.81	16,886.79	- 284.78	- 190.44	16,696.35	4.27	6.36	16.63
Coastal live oak; California l	108.40	21,841.38	- 376.49	- 251.77	21,589.61	4.19	8.22	21.94
Canary island pine	47.36	9,542.68	- 159.44	- 106.62	9,436.06	3.98	3.59	10.09
Jacaranda	47.61	9,592.53	- 89.32	- 59.73	9,532.80	3.97	3.63	10.23
California sycamore	85.23	17,172.11	- 241.21	- 161.30	17,010.81	3.91	6.48	18.49
Modesto ash	58.25	11,736.04	- 213.61	- 142.84	11,593.20	2.84	4.42	17.38
London planetree	37.96	7,647.22	- 105.11	- 70.29	7,576.94	2.61	2.89	12.34
Red ironbark	40.25	8,109.18	- 132.59	- 88.67	8,020.51	2.49	3.06	13.73
Chinese pistache	9.21	1,855.90	- 27.01	- 18.06	1,837.84	2.16	0.70	3.62
Tulip tree	28.37	5,716.74	- 70.26	- 46.98	5,669.76	2.13	2.16	11.32
Southern magnolia	31.23	6,291.36	- 114.30	- 76.43	6,214.93	1.94	2.37	13.66
Turkish pine; east mediterra	24.66	4,968.70	- 89.23	- 59.67	4,909.03	1.76	1.87	11.86
Ginkgo	12.53	2,523.76	- 52.40	- 35.04	2,488.72	1.59	0.95	6.65
Evergreen ash	42.40	8,543.58	- 81.89	- 54.76	8,488.82	1.47	3.23	24.61
California white oak	2.02	407.20	- 5.85	- 3.91	403.29	1.26	0.15	1.37
Camphor tree	18.30	3,687.80	- 57.99	- 38.78	3,649.02	1.25	1.39	12.45
Kurrajong	7.00	1,409.75	- 27.23	- 18.21	1,391.55	1.23	0.53	4.83
Mexican fan palm	4.31	869.23	0.03	0.02	869.25	1.13	0.33	3.28
Chinese sweet gum	14.29	2,878.16	- 34.77	- 23.25	2,854.90	1.10	1.09	11.02
Other street trees	452.00	91,068.95	- 1,406.26	- 940.38	90,128.56	36.78	34.33	10.43
Citywide total	1,316.46	265,240.50	- 4,096.48	- 2,739.36	262,501.19	100.00	100.00	11.17

Trees Conserve Energy

Modesto's Municipal Trees

- Electricity saved: 12,700 MWh
  - Total savings: $1 million
- Natural gas increase: 152 Mbtu
  - Cost: $−1,233
- Total energy benefit: $1,000,560

GREEN PLANTS OR POWER PLANTS ?

What is the best solution for California?

Build more power plants or plant more trees?

Researchers at the Center for Urban Forest Research in Davis, California found that planting shade trees can reduce the need for power plants. The study shows that 50 million shade trees planted in strategic, energy-saving locations could eliminate the need for seven 100-megawatt (MW) power plants.

Are Trees Really the Answer?

According to the Center Director, Dr. Greg McPherson, "A tree must grow at least 5 to 15 years before it can fully contribute to the energy conservation process. However, if we don't invest in energy-conserving trees now, they will not be available in 15 years when the demand for energy will be even greater."

Center for Urban Forest Research
Pacific Southwest Research Station
USDA Forest Service
Davis, CA 95616-8587

Telephone: 530-752-5936
http://cufr.ucdavis.edu/

Planting trees can reduce the need for power plants

Improving Air Quality

50 Worst Cities

Rank	Metro Statistical Area	Rank	Metro Statistical Area
1	Los Angeles, CA	26	Hartford, CT
2	Riverside-San Bernardino, CA	27	Middlesex-Hunterdon, NJ
3	New York City, NY	28	Columbus, OH
4	Philadelphia, PA	29	Raleigh, NC
5	Houston, TX	30	Grand Rapids, MI
6	Washington, DC	31	Buffalo-Niagara Falls, NY
7	Chicago, IL	32	Richmond, VA
8	Baltimore, MD	33	Greensboro-High Point, NC
9	Atlanta, GA	34	Providence, RI
10	Detroit, MI	35	Denver, CO
11	Fresno, CA	36	New Haven, CT
12	Sacramento, CA	37	Salt Lake City, UT
13	Bakersfield, CA	38	Louisville, KY
14	Dallas, TX	39	Wilmington, DE
15	Boston, MA	40	Ventura, CA
16	St. Louis, MO-IL	41	Dayton-Springfield, OH
17	Cleveland, OH	42	Akron, OH
18	Pittsburgh, PA	43	Kansas City, KS/MO
19	Fort Worth-Arlington, TX	44	Allentown, PA
20	Charlotte, NC	45	San Antonio, TX
21	Newark, NJ	46	Birmingham, AL
22	Memphis, TN	47	Knoxville, TN
23	Monmouth-Ocean, NJ	48	Bridgeport, CT
24	Indianapolis, IN	49	Harrisburg, PA
25	Cincinnati, OH	50	San Diego, CA

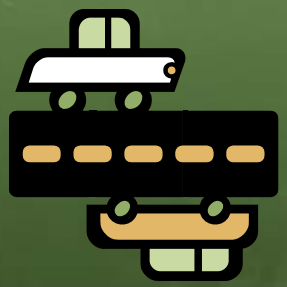
Environmental Defense Fund:
where the worst air affects the most children

American Lung Association:
worst ozone pollution

25 Most Ozone-Polluted Cities

2005 Rank1	Metropolitan Area
1	Los Angeles-Long Beach-Riverside,CA
2	Bakersfield,CA
3	Fresno-Madera,CA
4	Visalia-Porterville,CA
5	Merced,CA
6	Houston-Baytown-Huntsville,TX
7	Sacramento-Arden-Arcade-Truckee,CA-NV
8	Dallas-Fort Worth,TX
9	New York-Newark-Bridgeport,NY-NJ-CT-PA
10	Philadelphia-Camden-Vineland,PA-NJ-DE-MD
11	Washington-Baltimore-Northern Virginia,DC-MD-VA-WV
12	Charlotte-Gastonia-Salisbury,NC-SC
13	Hanford-Corcoran,CA
13	Cleveland-Akron-Elyria,OH
15	Knoxville-Sevierville-La Follette,TN
15	Modesto,CA
17	Pittsburgh-New Castle,PA
18	Youngstown-Warren-East Liverpool,OH-PA
19	Columbus-Marion-Chillicothe,OH
20	Detroit-Warren-Flint,MI
20	Buffalo-Niagara-Cattaraugus,NY
22	Sheboygan,WI 113,376
23	Chicago-Naperville-Michigan City,IL-IN-WI
24	El Centro,CA
25	Lancaster,PA

Pollution



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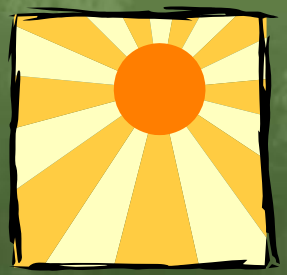

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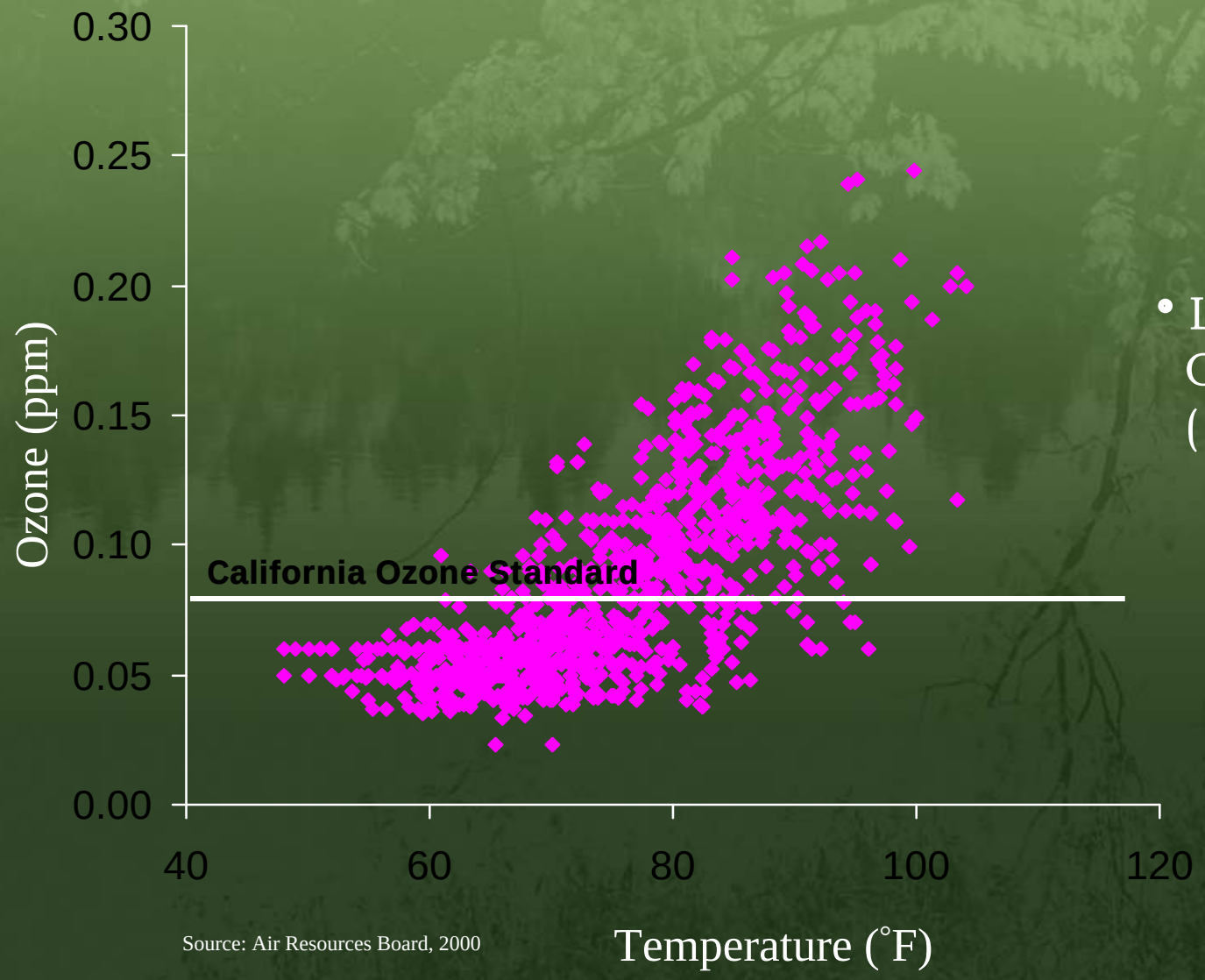
VOCs
115 tons per day

NOx
86 tons per day

Lots of sun

The worst smog in the country

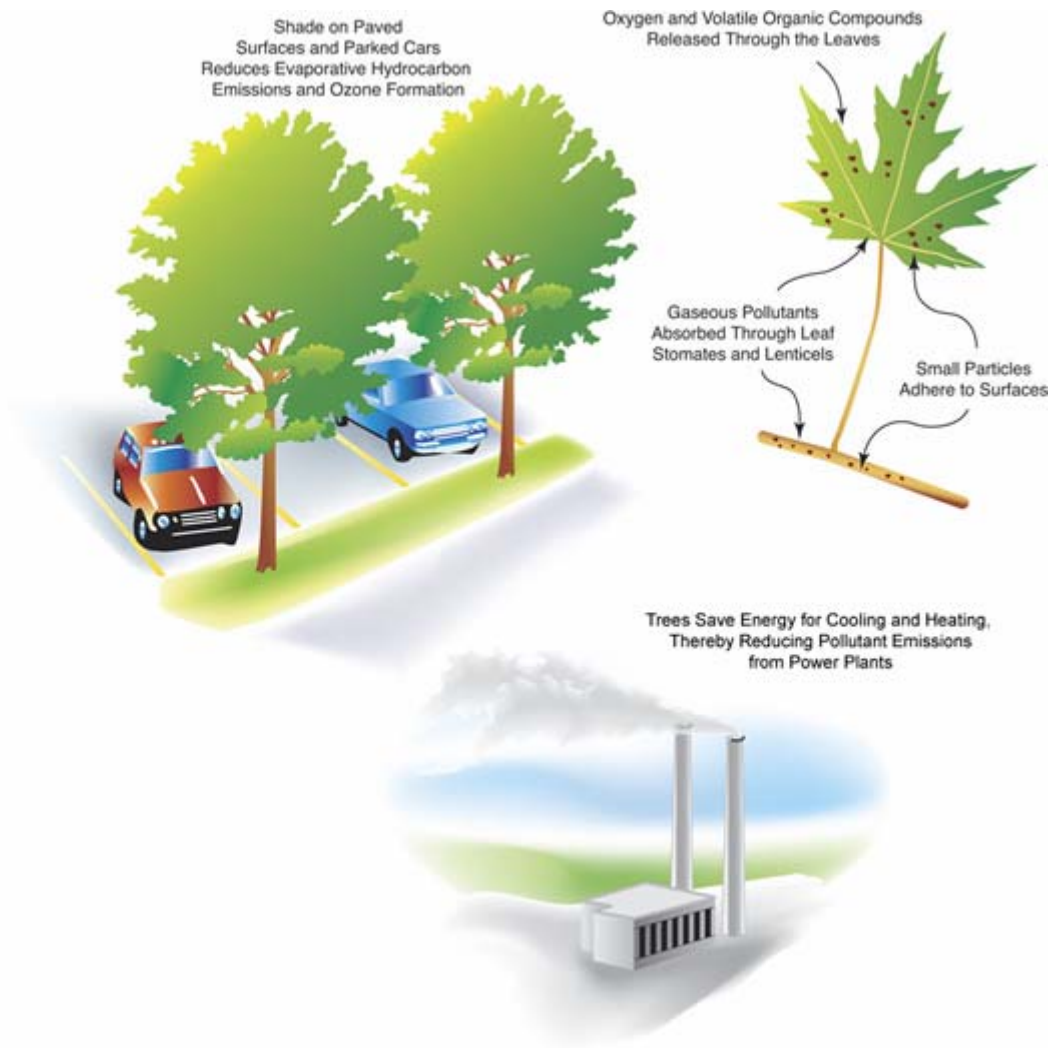
Hotter Days Lead to Higher Emissions and More Smog



- Los Angeles Ozone Levels (1995-1998)

Source: Air Resources Board, 2000

Improving Air Quality



Annual Air Quality Benefits of Trees by Species

	Deposition (lb)					Avoided (lb)					BVOCs		Total			
Species	O3	NO2	PM10	SO2	Total Deposition ($)	NO2	PM10	VOC	SO2	Total Avoided ($)	(lb)	($)	(lb)	($)	% of Total Tree Numbers	Avg. $/tree
Sweetgum	319.61	104.88	167.43	13.80	2,438.80	110.98	27.25	27.24	216.98	1,131.87	- 4,050.81	- 7,777.55	- 3,062.64	- 4,206.88	9.23	- 1.94
Common crapemyrtle	294.18	100.03	155.26	13.52	2,265.49	97.90	24.21	24.22	193.34	1,004.32	0.00	0.00	902.66	3,269.81	8.74	1.59
Roble negro	520.48	201.68	290.39	19.21	4,164.26	108.45	26.73	26.74	213.25	1,109.76	- 2,142.15	- 4,112.92	- 735.22	1,161.10	4.27	1.16
Coastal live oak	736.79	285.50	411.08	27.20	5,894.98	140.18	34.57	34.58	275.82	1,435.01	- 5,973.13	- 11,468.41	- 4,027.41	- 4,138.42	4.19	- 4.21
Canary island pine	225.64	87.43	125.89	8.33	1,805.34	61.30	15.11	15.11	120.51	627.19	- 563.06	- 1,081.07	96.27	1,351.46	3.98	1.45
Jacaranda	253.70	113.32	139.45	13.16	2,086.97	62.34	15.24	15.23	121.14	633.57	0.00	0.00	733.58	2,720.54	3.97	2.92
California sycamore	392.24	128.71	205.48	16.93	2,992.98	110.77	27.22	27.22	216.86	1,130.63	- 708.22	- 1,359.78	417.22	2,763.83	3.91	3.00
Modesto ash	252.14	82.74	132.09	10.88	1,923.98	75.21	18.57	18.58	148.21	770.58	0.00	0.00	738.42	2,694.56	2.84	4.04
London planetree	173.28	56.86	90.78	7.48	1,322.22	49.35	12.12	12.12	96.57	503.60	- 392.99	- 754.54	105.58	1,071.28	2.61	1.74
Red ironbark	219.18	84.93	122.29	8.09	1,753.62	52.12	12.84	12.84	102.41	533.10	- 1,368.96	- 2,628.41	- 754.27	- 341.69	2.49	- 0.59
Chinese pistache	37.00	12.14	19.38	1.60	282.31	11.96	2.94	2.94	23.44	122.15	- 93.39	- 179.32	18.01	225.15	2.16	0.44
Tulip tree	130.55	42.84	68.39	5.63	996.15	36.98	9.07	9.07	72.19	376.84	- 1,953.82	- 3,751.33	- 1,579.09	- 2,378.35	2.13	- 4.75
Southern magnolia	193.93	75.14	108.20	7.16	1,551.59	40.32	9.95	9.96	79.45	413.09	- 495.01	- 950.41	29.10	1,014.27	1.94	2.23
Turkish pine	133.30	51.65	74.38	4.92	1,066.55	31.85	7.86	7.87	62.75	326.29	- 34.25	- 65.77	340.33	1,327.08	1.76	3.21
Ginkgo	37.89	12.08	19.79	1.56	287.32	16.11	3.99	3.99	31.87	165.42	- 47.71	- 91.61	79.57	361.14	1.59	0.97
Evergreen ash	224.89	73.80	117.81	9.71	1,716.03	55.50	13.57	13.56	107.89	564.19	0.00	0.00	616.74	2,280.22	1.47	6.61
California white oak	6.03	2.34	3.37	0.22	48.26	2.63	0.65	0.65	5.14	26.80	- 151.74	- 291.34	- 130.73	- 216.28	1.26	- 0.73
Camphor tree	121.49	47.08	67.78	4.48	972.02	23.73	5.84	5.84	46.57	242.54	0.00	0.00	322.81	1,214.56	1.25	4.15
Kurrajong	36.65	14.20	20.45	1.35	293.24	9.02	2.23	2.23	17.80	92.49	- 22.39	- 42.99	81.54	342.74	1.23	1.19
Mexican fan palm	28.03	10.86	15.64	1.03	224.24	5.73	1.39	1.38	10.98	57.77	- 30.74	- 59.02	44.30	222.98	1.13	0.84
Chinese sweet gum	57.06	18.72	29.89	2.46	435.40	18.62	4.57	4.57	36.35	189.75	- 731.31	- 1,404.11	- 559.06	- 778.96	1.10	- 3.01
Other street trees	2,519.09	937.83	1,383.09	97.59	19,915.42	586.17	144.27	144.29	1,150.05	5,990.51	- 8,869.50	- 17,029.43	- 1,907.12	8,876.50	36.78	1.03
Citywide total	6,913.16	2,544.76	3,768.31	276.32	54,437.18	1,707.23	420.18	420.24	3,349.56	17,447.47	- 27,629.17	- 53,048.00	- 8,229.42	18,836.61	100.00	0.80

Trees Improve Air Quality

Sacramento's urban canopy

- Ozone, 665 tons = $16 million
- NO2, 163 tons = $4 million
- PM10, 750 tons = $8 million
- SO2, 30 tons = $541,000
- Total, 1600 tons = $29 million

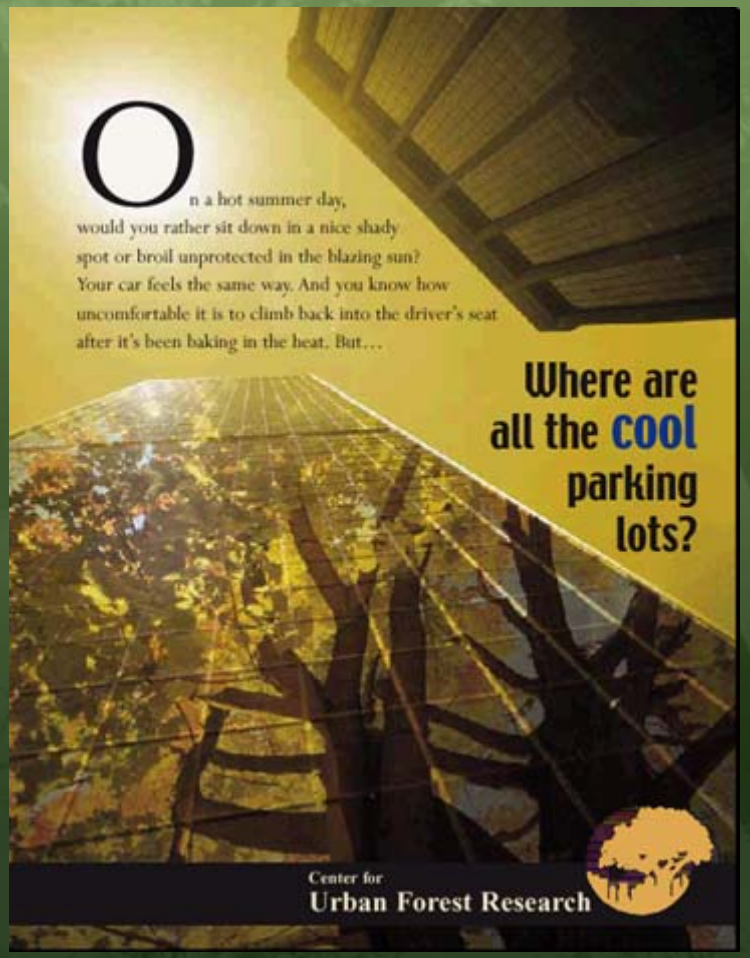
Modesto's Municipal Trees

- Gingko = $2.79
- Pear = $2.98
- Chinese pistache = $10.27
- Modesto ash = $52.61

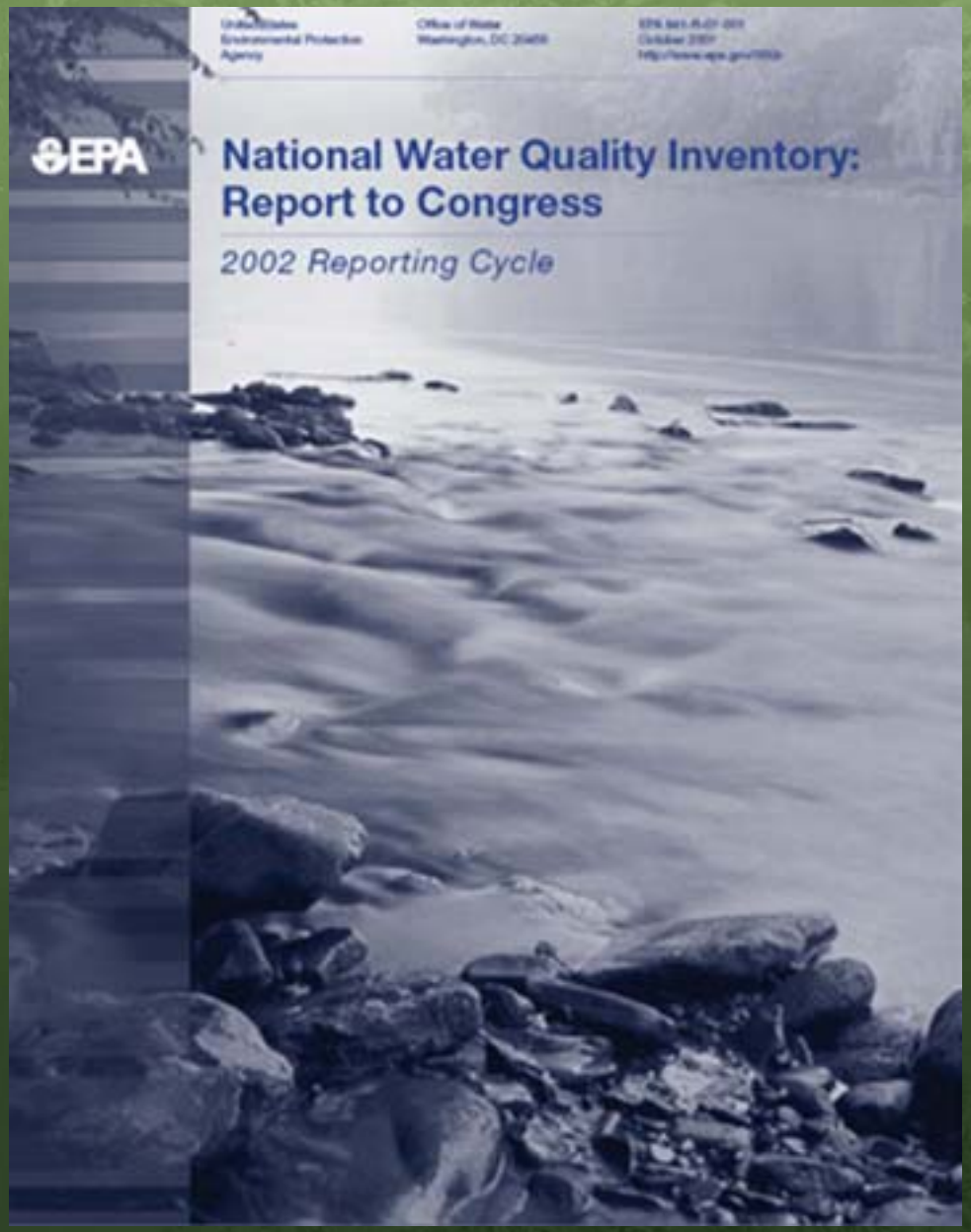
Improving Air Quality

Parking Lots

- Lots 3°F cooler
- Cabin 40-50°F cooler
- Gas temp 4-8°F cooler
- Reduce VOC 1ton/day

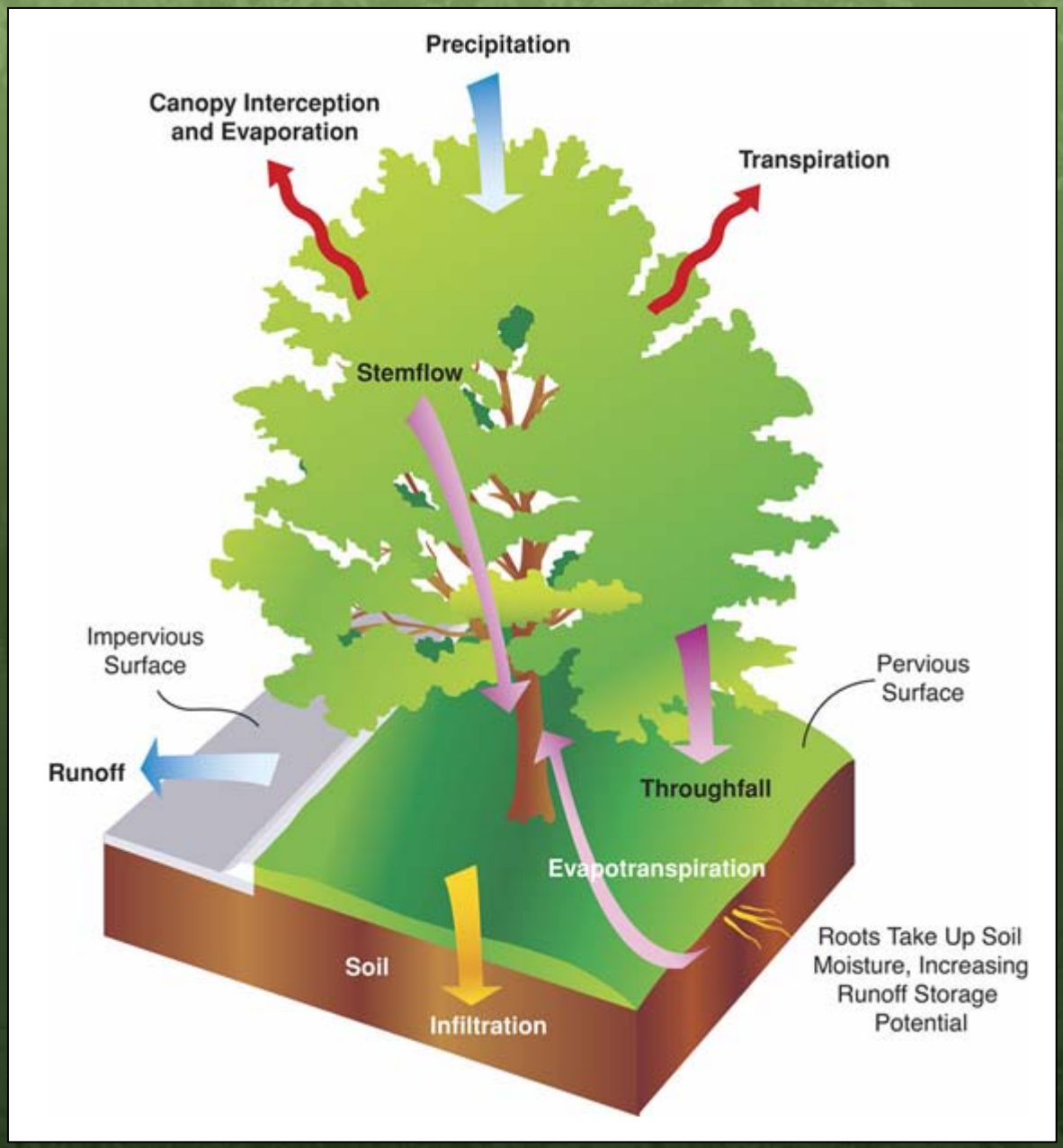


Reducing stormwater runoff



"Nonpoint-source pollution (polluted runoff from diffuse sources) is one of the most significant causes of pollution in our waterways and much of the damage comes from runoff from our streets and chemically treated lawns and gardens."

Reducing Stormwater Runoff



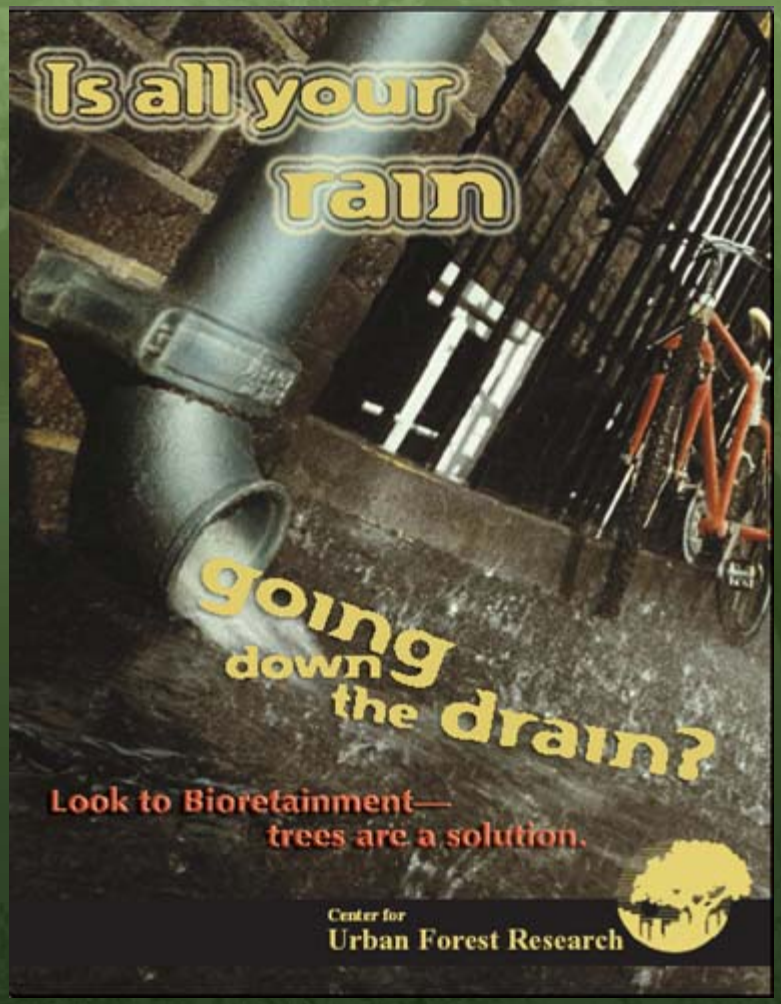
Claremont

Annual Stormwater Benefits of Trees by Species

Species	Total Rainfall Interception (Gal)	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Sweetgum	291,746.59	1,604.72	9.23	1.83	0.74
Common crapemyrtle	318,250.25	1,750.50	8.74	1.99	0.85
Roble negro	1,545,002.63	8,498.10	4.27	9.68	8.46
Coastal live oak	2,008,666.00	11,048.43	4.19	12.58	11.23
Canary island pine	842,515.81	4,634.16	3.98	5.28	4.96
Jacaranda	1,085,972.25	5,973.26	3.97	6.80	6.41
California sycamore	599,611.94	3,298.10	3.91	3.76	3.58
Modesto ash	244,406.09	1,344.33	2.84	1.53	2.02
London planetree	216,717.19	1,192.03	2.61	1.36	1.94
Red ironbark	689,997.88	3,795.25	2.49	4.32	6.50
Chinese pistache	40,613.59	223.39	2.16	0.25	0.44
Tulip tree	98,562.32	542.13	2.13	0.62	1.08
Southern magnolia	541,405.38	2,977.94	1.94	3.39	6.54
Turkish pine	414,168.75	2,278.09	1.76	2.59	5.50
Ginkgo	45,015.82	247.60	1.59	0.28	0.66
Evergreen ash	264,454.75	1,454.60	1.47	1.66	4.22
California white oak	20,501.07	112.76	1.26	0.13	0.38
Camphor tree	338,205.88	1,860.26	1.25	2.12	6.35
Kurrajong	104,397.29	574.23	1.23	0.65	1.99
Mexican fan palm	65,307.81	359.22	1.13	0.41	1.36
Chinese sweet gum	52,099.35	286.57	1.10	0.33	1.11
Other street trees	6,136,796.50	33,754.75	36.78	38.44	3.91
Citywide total	15,964,414.00	87,810.39	100.00	100.00	3.74

Reducing Runoff

Charlotte, NC: 211 million gallons
Modesto, CA: 77 million gallons



Reducing Carbon Dioxide

LIVE EARTH
THE CONCERTS FOR A CLIMATE IN CRISIS

an inconvenient truth
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INCLUDING
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DOCUMENTARY

FROM THE DIRECTOR OF INDEPENDENCE DAY
THE DAY AFTER TOMORROW
MAY 28 WHERE WILL YOU BE?

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Climbing temperatures.
Melting glaciers. Rising seas.
All over the earth we're feeling the heat.
Why isn't Washington?

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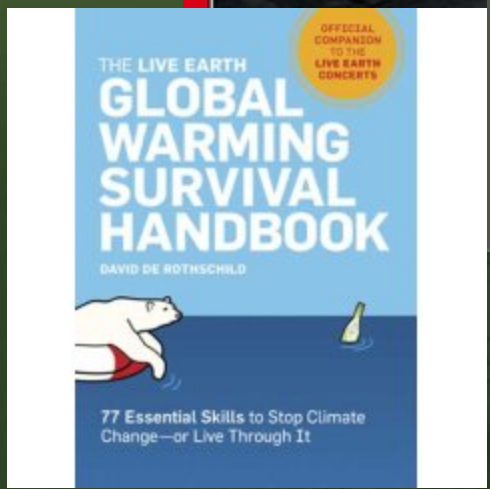
by far the most terrify

SPECIAL REPORT GLOBAL WARMING
TIME
BE WORRIED. BE VERY WORRIED.
Climate change isn't some vague future problem—it's already damaging the planet at an alarming pace. Here's how it affects you, your kids and their kids as well
EARTH AT THE TIPPING POINT
HOW IT THREATENS YOUR HEALTH
HOW CHINA & INDIA CAN HELP SAVE THE WORLD—OR DESTROY IT
THE CLIMATE CRUSADERS


OFFICIAL COMPANION TO THE LIVE EARTH CONCERTS
THE LIVE EARTH
GLOBAL WARMING SURVIVAL HANDBOOK
DAVID DE ROTHSCHILD
77 Essential Skills to Stop Climate Change—or Live Through It

ON THIN ICE
For more than an hour,

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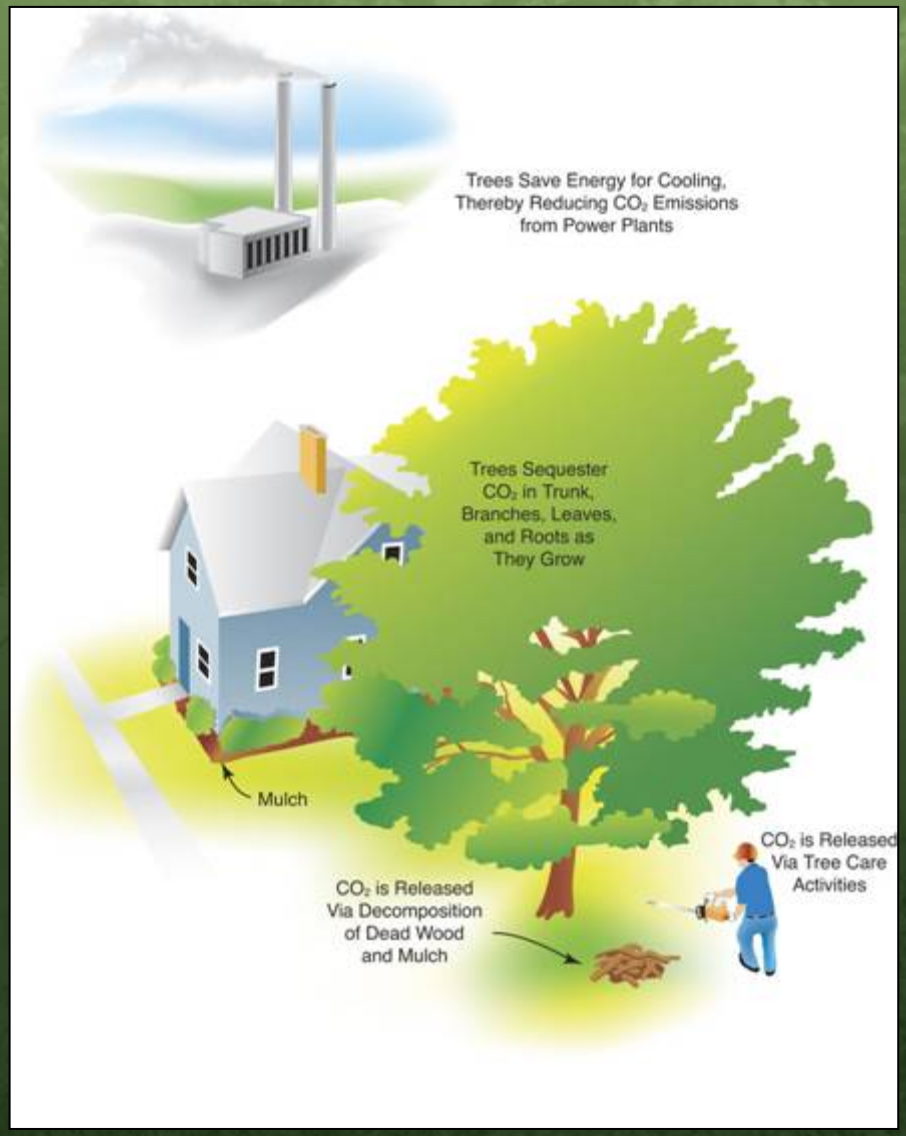
60 MINUTES

Reducing Atmospheric Carbon Dioxide



Annual CO2 Benefits of Trees by Species

Species	Seq (lb)	Seq ($)	Decomp Release(lb)	Maint Release (lb)	Total Release ($)	Avoided (lb)	Avoided ($)	Net Total (lb)	Total ($)	% of Total Tree Nos.	% of Total $	Avg. $/tree
Sweetgum	120,271.04	401.71	- 1,520.57	- 9,399.17	- 36.47	55,350.45	184.87	164,701.75	550.10	9.23	6.42	0.25
Common crapemyrtle	16,767.63	56.00	- 248.84	- 4,538.62	- 15.99	49,321.91	164.74	61,302.08	204.75	8.74	2.39	0.10
Roble negro	208,630.11	696.82	- 2,029.54	- 5,003.87	- 23.49	54,401.25	181.70	255,997.95	855.03	4.27	9.98	0.85
Coastal live oak\	159,258.53	531.92	- 4,020.50	- 5,610.98	- 32.17	70,362.58	235.01	219,989.63	734.77	4.19	8.57	0.75
Canary island pine	130,175.98	434.79	- 385.30	- 5,211.88	- 18.69	30,742.01	102.68	155,320.81	518.77	3.98	6.05	0.55
Jacaranda	36,741.45	122.72	- 396.88	- 3,639.72	- 13.48	30,902.57	103.21	63,607.43	212.45	3.97	2.48	0.23
California sycamore	121,191.96	404.78	- 1,383.56	- 4,371.77	- 19.22	55,320.42	184.77	170,757.05	570.33	3.91	6.65	0.62
Modesto ash	29,926.43	99.95	- 454.00	- 3,253.11	- 12.38	37,807.95	126.28	64,027.27	213.85	2.84	2.50	0.32
London planetree	35,995.04	120.22	- 371.56	- 1,932.31	- 7.69	24,635.73	82.28	58,326.89	194.81	2.61	2.27	0.32
Red ironbark	95,434.23	318.75	- 317.96	- 3,303.09	- 12.09	26,123.94	87.25	117,937.13	393.91	2.49	4.60	0.67
Chinese pistache	5,743.40	19.18	- 40.74	- 372.64	- 1.38	5,978.83	19.97	11,308.85	37.77	2.16	0.44	0.07
Tulip tree	30,706.40	102.56	- 389.11	- 2,080.05	- 8.25	18,416.64	61.51	46,653.89	155.82	2.13	1.82	0.31
Southern magnolia	21,857.14	73.00	- 286.09	- 2,011.69	- 7.67	20,267.79	67.69	39,827.14	133.02	1.94	1.55	0.29
Turkish pine	40,584.57	135.55	- 282.52	- 304.29	- 1.96	16,006.79	53.46	56,004.55	187.06	1.76	2.18	0.45
Ginkgo	12,493.25	41.73	- 177.41	- 1,109.11	- 4.30	8,130.36	27.16	19,337.09	64.59	1.59	0.75	0.17
Evergreen ash	110,932.36	370.51	- 1,597.22	- 3,023.05	- 15.43	27,523.38	91.93	133,835.47	447.01	1.47	5.22	1.30
California white oak	3,691.27	12.33	- 42.41	- 221.23	- 0.88	1,311.82	4.38	4,739.44	15.83	1.26	0.18	0.05
Camphor tree	19,927.73	66.56	- 375.73	- 992.25	- 4.57	11,880.35	39.68	30,440.11	101.67	1.25	1.19	0.35
Kurrajong	6,307.47	21.07	- 84.51	- 954.03	- 3.47	4,541.56	15.17	9,810.49	32.77	1.23	0.38	0.11
Mexican fan palm	7,664.24	25.60	- 222.70	- 1,700.79	- 6.42	2,800.24	9.35	8,540.99	28.53	1.13	0.33	0.11
Chinese sweet gum	20,723.38	69.22	- 301.46	- 1,533.21	- 6.13	9,272.05	30.97	28,160.76	94.06	1.10	1.10	0.36
Other street trees	590,648.00	1,972.76	- 6,644.79	- 31,792.37	- 128.38	293,380.84	979.89	845,591.69	2,824.28	36.78	32.95	0.33
Citywide total	1,825,671.63	6,097.74	- 21,573.39	- 92,359.23	- 380.54	854,479.50	2,853.96	2,566,218.50	8,571.17	100.00	100.00	0.36

Trees Reduce CO2

Sacramento's Urban Canopy

- Store 8.8 million tons of CO2
- Sequester 263,000 tons annually
- Reduced energy use = 83,300 tons
- Maintenance 10,000 tons
- Net annual sequestration 335,000 tons
- Estimated value $6.7 million

Modesto's Municipal Trees

- Pear = $0.43
- Southern magnolia = $0.62
- Gingko = $1.21
- Modesto ash = $1.70

Aesthetic and other benefits

Annual Aesthetic/Other Benefit of All Trees by Species

Species	Total ($)	% of Total Tree Numbers	% of Total $	Avg. $/tree
Sweetgum	207,328.41	9.23	8.41	95.63
Common crapemyrtle	71,003.25	8.74	2.88	34.57
Roble negro	174,149.80	4.27	7.06	173.46
Coastal live oak; California l	100,085.20	4.19	4.06	101.71
Canary island pine	157,168.30	3.98	6.37	168.09
Jacaranda	127,909.40	3.97	5.19	137.24
California sycamore	246,026.30	3.91	9.97	267.42
Modesto ash	54,839.83	2.84	2.22	82.22
London planetree	120,931.70	2.61	4.90	196.96
Red ironbark	66,893.94	2.49	2.71	114.54
Chinese pistache	41,101.76	2.16	1.67	81.07
Tulip tree	62,549.27	2.13	2.54	124.85
Southern magnolia	48,473.31	1.94	1.97	106.53
Turkish pine; east mediterra	66,502.24	1.76	2.70	160.63
Ginkgo	27,518.60	1.59	1.12	73.58
Evergreen ash	86,183.73	1.47	3.49	249.81
California white oak	22,602.46	1.26	0.92	76.62
Camphor tree	31,428.33	1.25	1.27	107.26
Kurrajong	9,493.05	1.23	0.38	32.96
Mexican fan palm	6,440.00	1.13	0.26	24.30
Chinese sweet gum	30,070.26	1.10	1.22	116.10
Other street trees	707,739.88	36.78	28.69	81.89
Citywide total	2,466,439.00	100.00	100.00	104.95

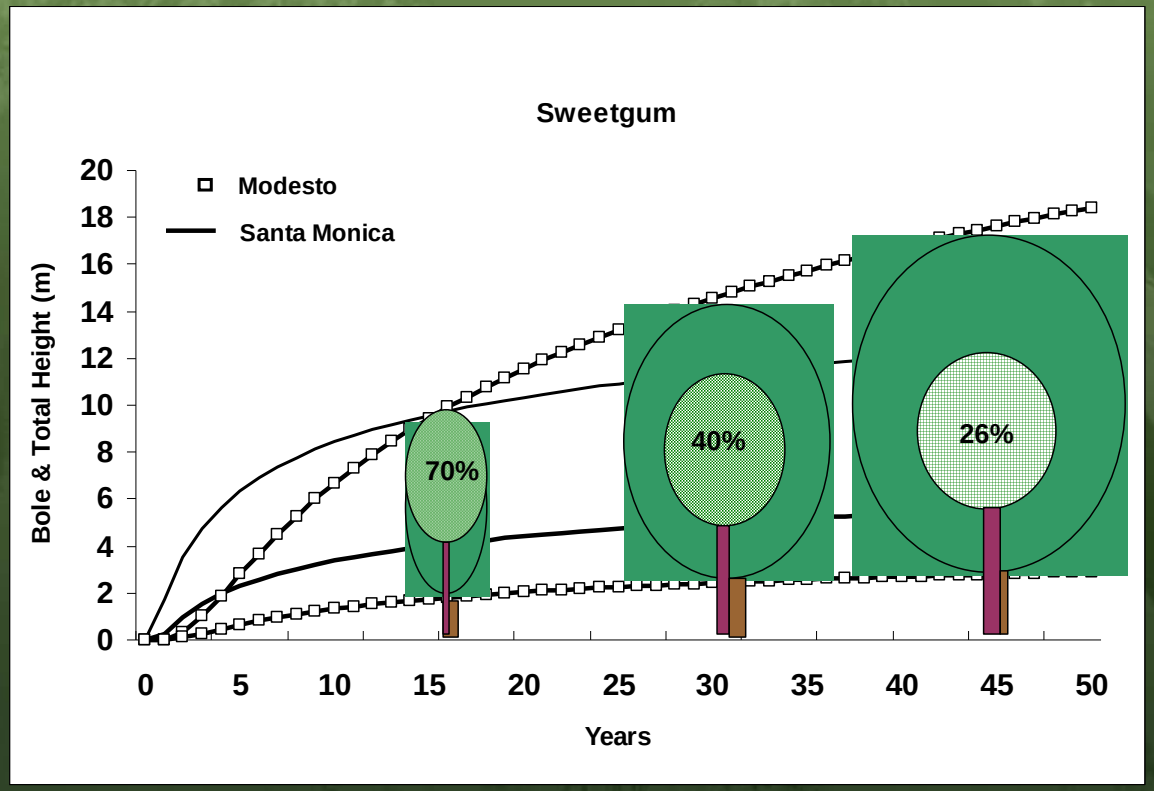
Maximizing benefits

Plant lots of trees

Choose species wisely:
Bigger is better

Shade paved surfaces

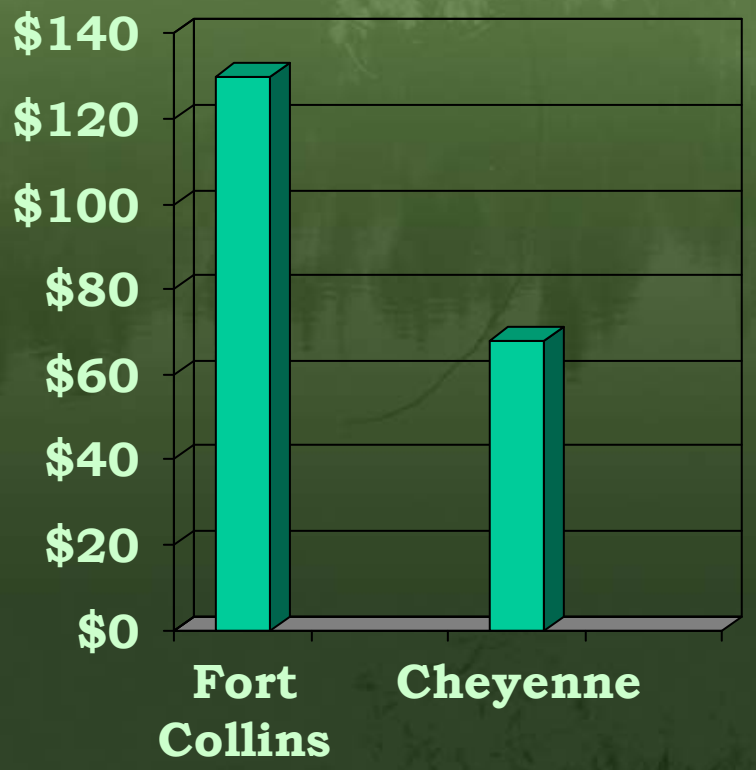
Maximize leaf area and tree health through proper care

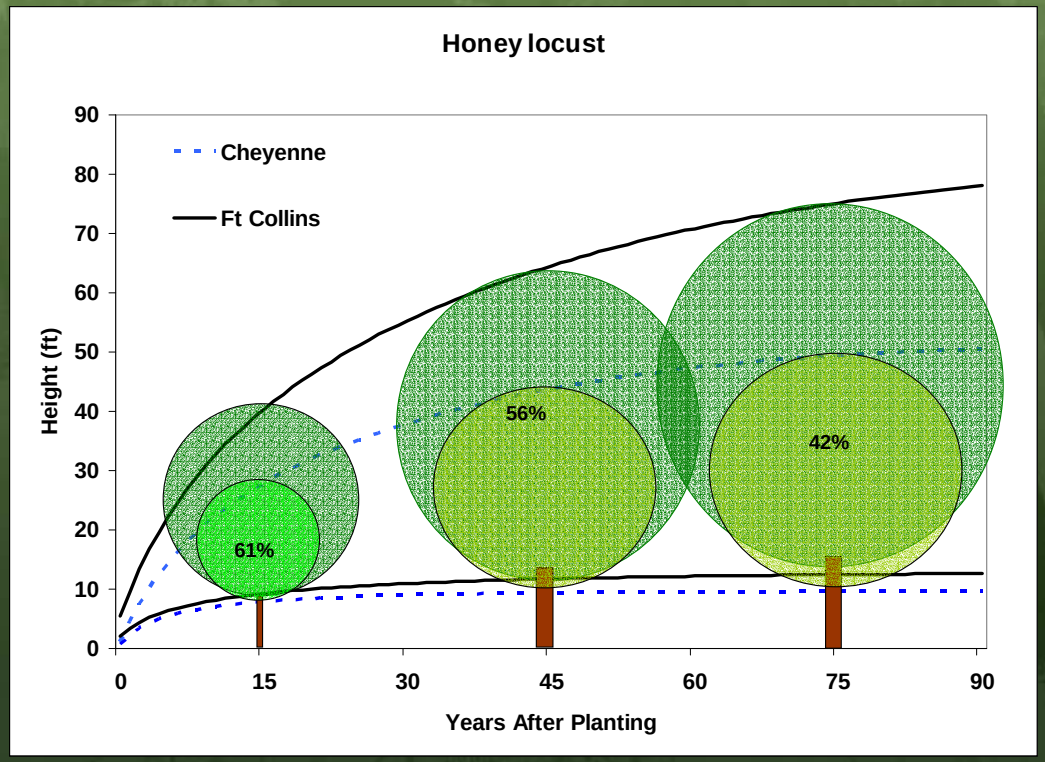


Are your pruning cycles

pruning dollars off of trees?

Tree Size and Benefits





Reducing costs

Berkeley

Total Annual Benefits, Net Benefits, and Costs for Public Trees

1/24/2006

Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	517,842	(N/A)	14.19	(N/A)	4.98	(N/A)
CO2	49,047	(N/A)	1.34	(N/A)	0.47	(N/A)
Air Quality	-81,593	(N/A)	-2.24	(N/A)	-0.78	(N/A)
Stormwater	142,502	(N/A)	3.91	(N/A)	1.37	(N/A)
Aesthetic/Other	2,815,250	(N/A)	77.16	(N/A)	27.07	(N/A)
Total Benefits	3,443,048	(±0)	94.37	(±0)	33.11	(±0)
Costs						
Contract Pruning	770,000		21.10		7.40	
Tree & Stump	70,000		1.92		0.67	
Pest Management	0		0.00		0.00	
Irrigation	0		0.00		0.00	
Inspection/Servic	80,000		2.19		0.77	
Planting	95,000		2.60		0.91	
Administration	100,000		2.74		0.96	
Litter Clean-up	195,000		5.34		1.88	
Infrastructure	1,030,000		28.23		9.90	
Liability/Claims	32,000		0.88		0.31	
Other Costs	0		0.00		0.00	
Total Costs	2,372,000		65.01		22.81	
Net Benefits	1,071,048	(±0)	29.36	(±0)	10.30	(±0)
Benefit-cost ratio	1.45	(±0)				

Pruning

- Prune early to encourage proper structure
- Prune properly to maximize benefits

Infrastructure Damage

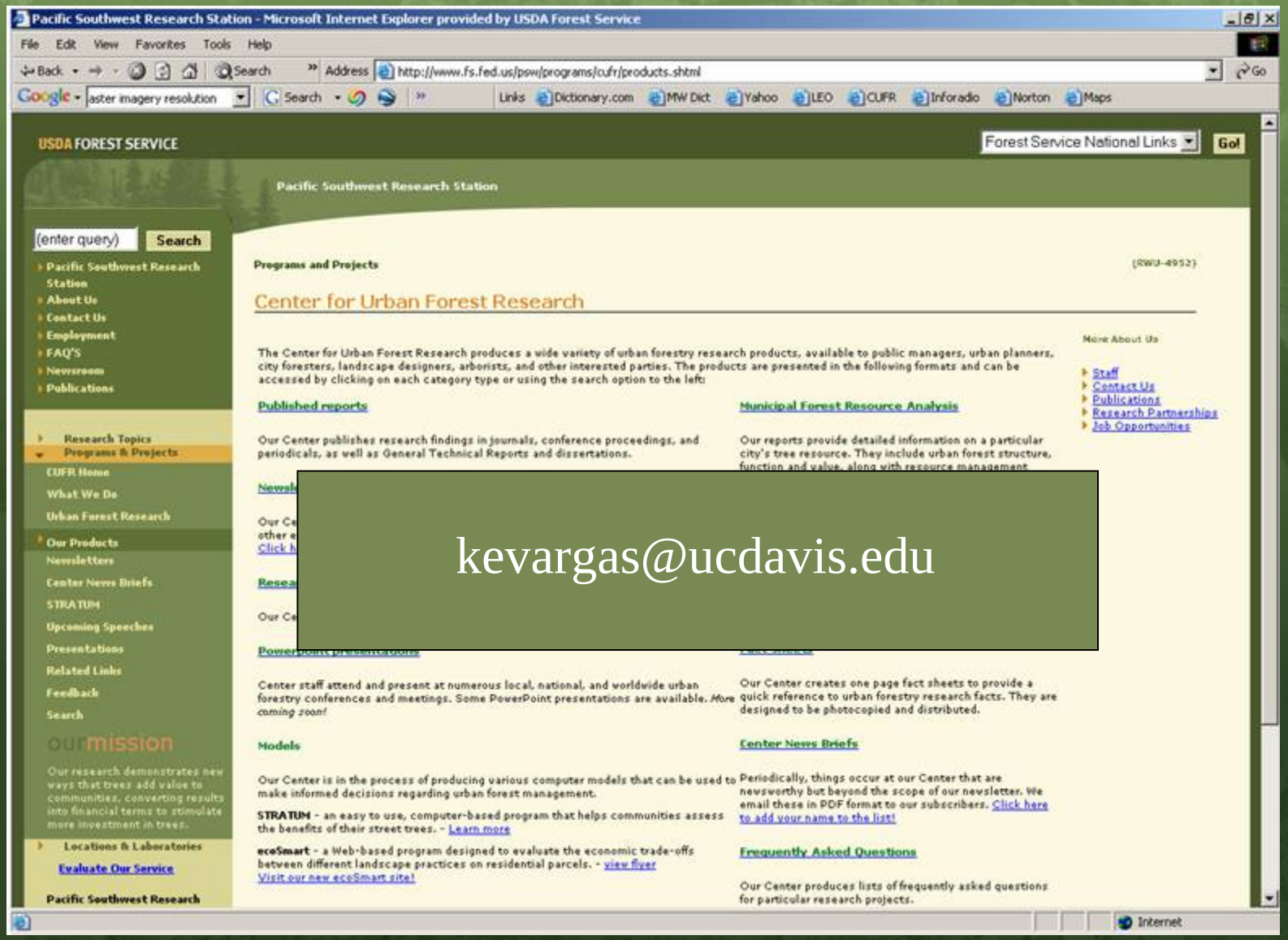
Compendium of Strategies to Reduce Infrastructure Damage

Urban
Advantage

Urban
Advantage

Our Publications

http://www.fs.fed.us/psw/programs/cufr/products.shtml



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