PLANTING THE SEEDS OF SUCCESS.

Overview of Urban Forestry Programs

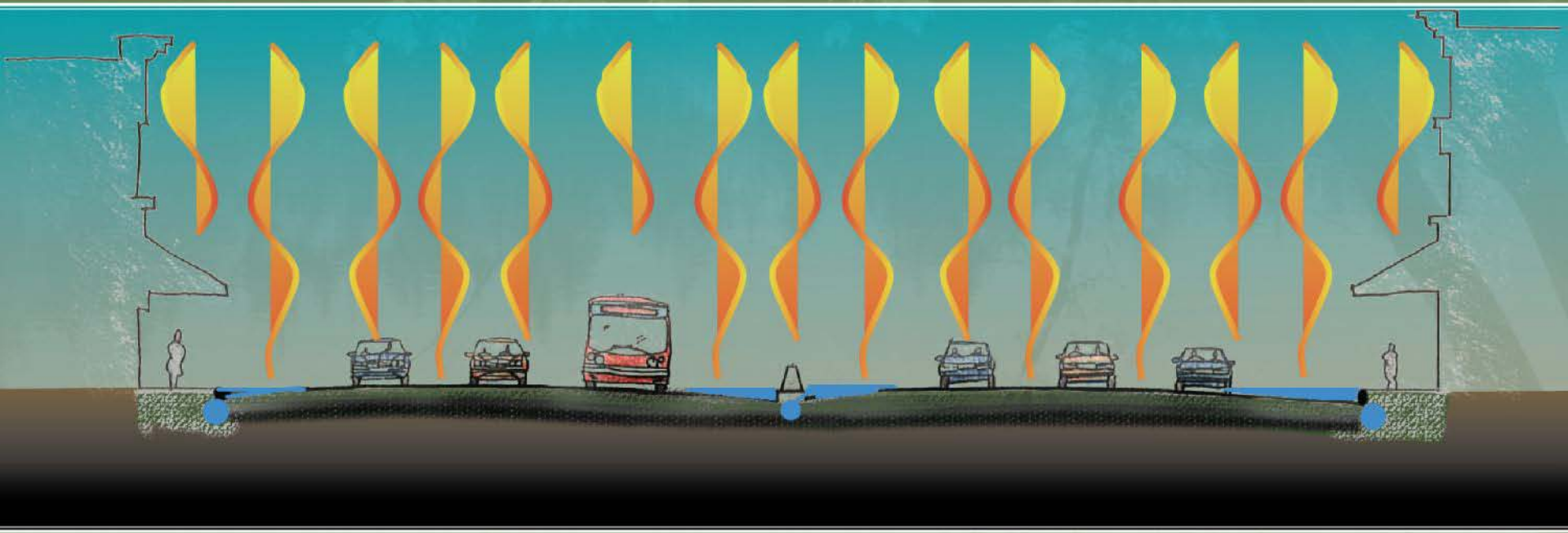
Greg McPherson, Research Forester
Center for Urban Forest Research
Pacific Southwest Research Station, USDA Forest Service

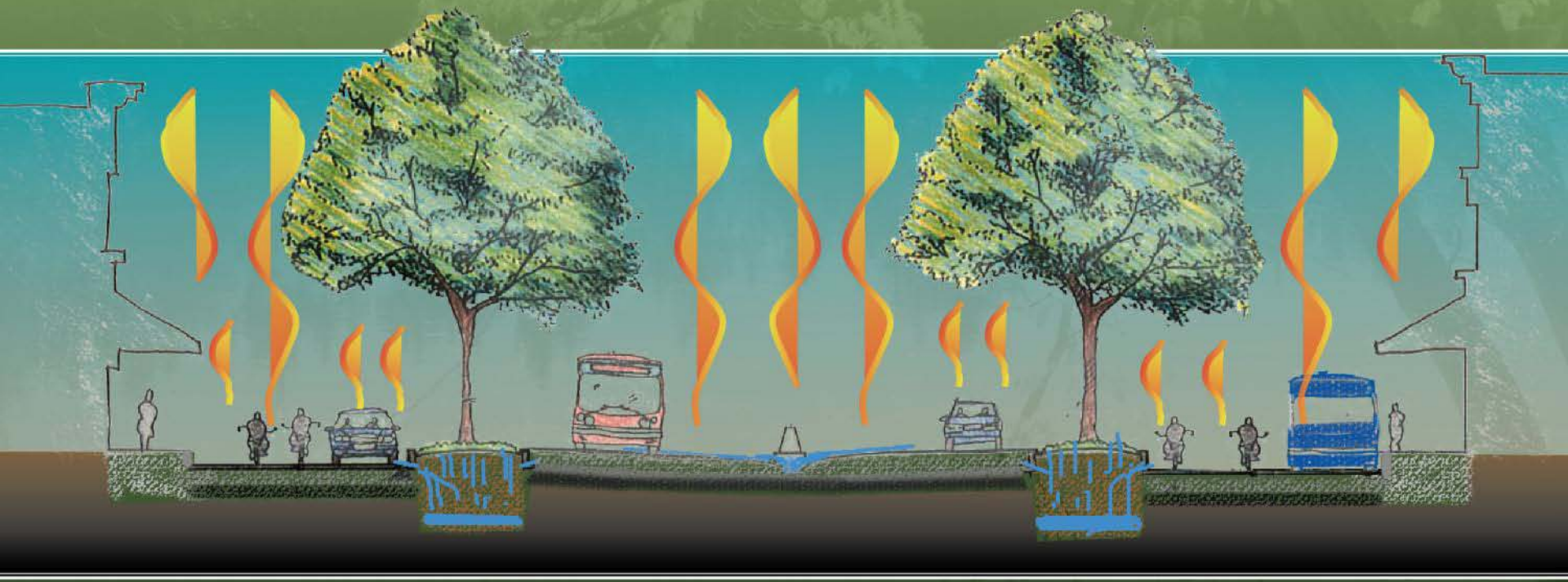
Today

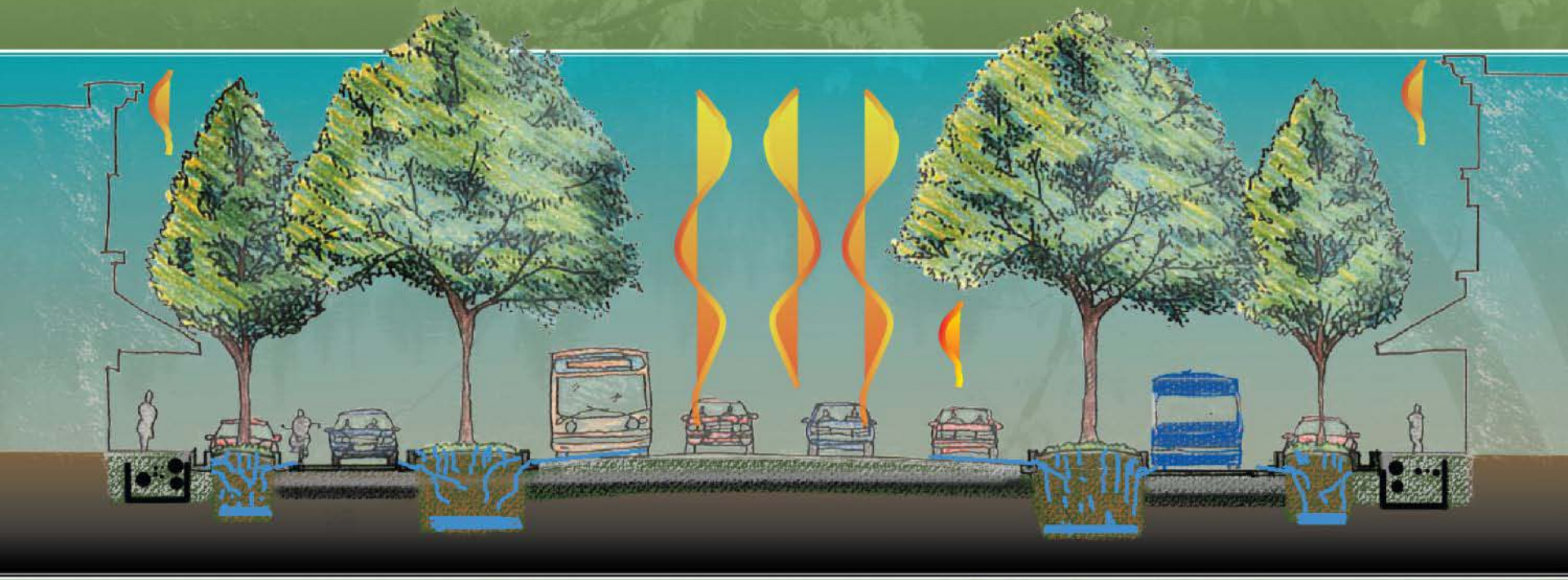
- Vegetation & Roadway Design
- Successes & Challenges
- Sacramento
- Policy/Research
- New Approaches
- Communication

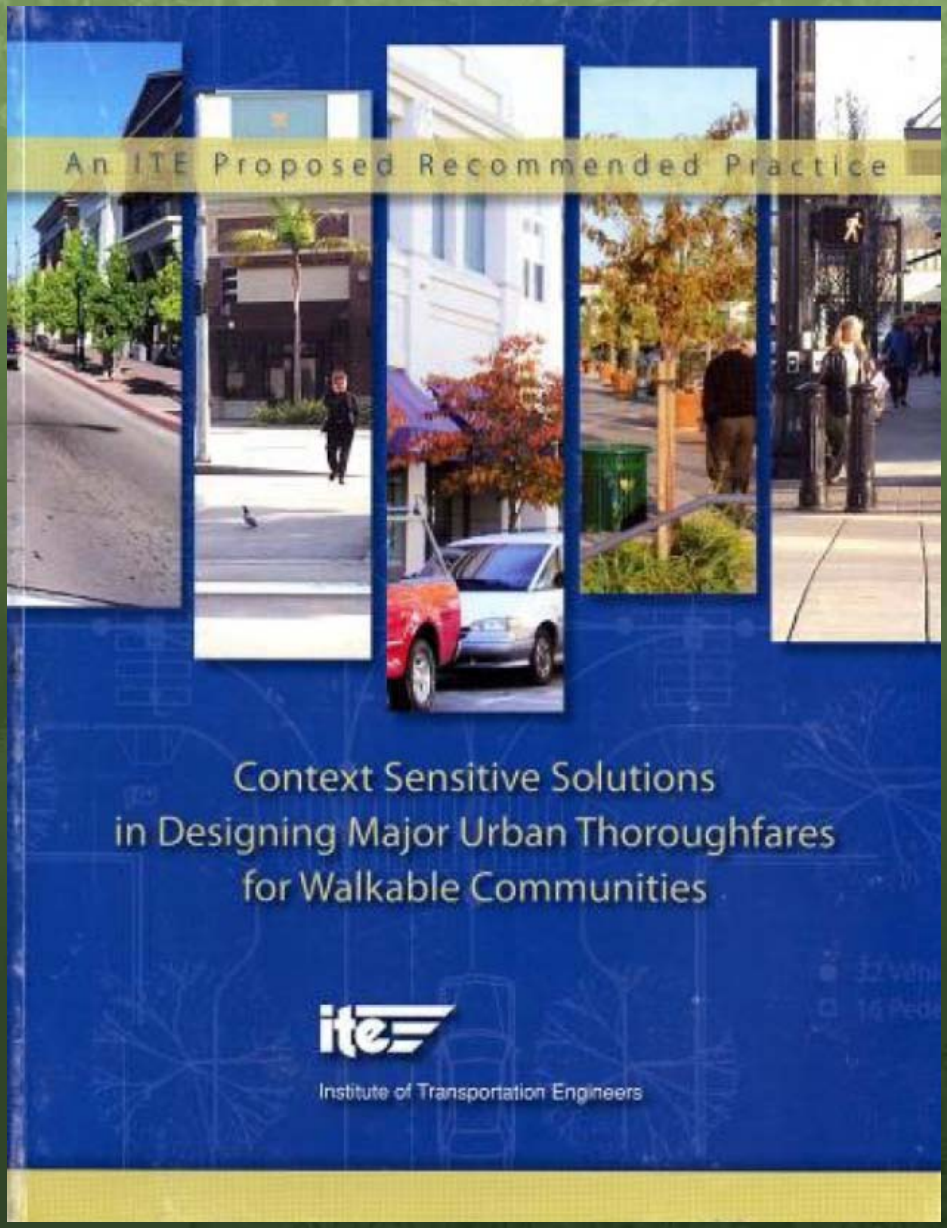
Then

Now








An ITE Proposed Recommended Practice
Context Sensitive Solutions
in Designing Major Urban Thoroughfares
for Walkable Communities
ite
Institute of Transportation Engineers


"This conference will long be remembered as the one that reshaped our ideas of how we design our facilities..."
–Gloria Jeff, Deputy Administrator, Federal Highway Administration
"I challenge you to help define a process which will lead to excellence, which produces a project that is carefully, imaginatively designed, serves traffic demand, provides safety for our customers, respects the natural and man-made environments, is viewed as an asset to those who use it, and whose design has the input of professionals and customers alike."
–Parker F. Williams, Administrator, Maryland State Highway Administration
"Have the confidence to use flexible design – push yourself beyond what you think is great – there is something better out there. You have a role in daily history – you're making a big impact wherever you go."
–Susanna Massie Thomas, The Shakertown Coalition/Bluegrass Tomorrow, Harrodsburg, KY
"Aesthetic, community-sensitive design is where our nation wants to go and we should go with them."
–Francis B. Francois, Executive Director, American Association of State Highway and Transportation Officials
THINKING BEYOND THE PAVEMENT
A National Workshop on Integrating Highway Development with Communities and the Environment while Maintaining Safety and Performance.

Complete the Streets!

Photo: Marcy McInelly, SERA/Urbsworks

Pillars of Sustainable Street Design

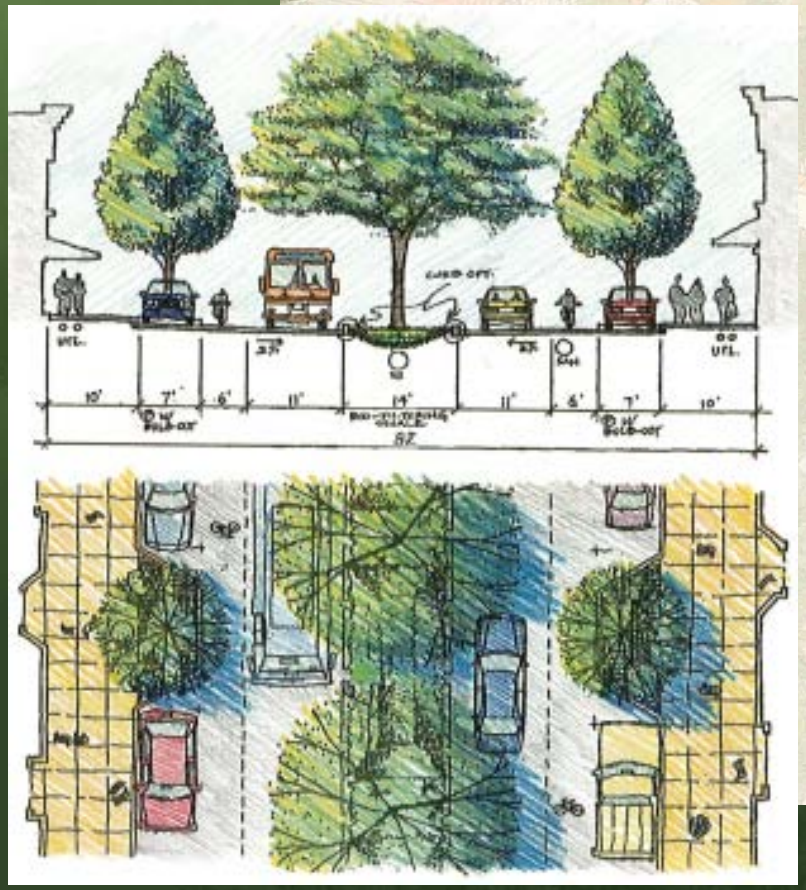
Mobility

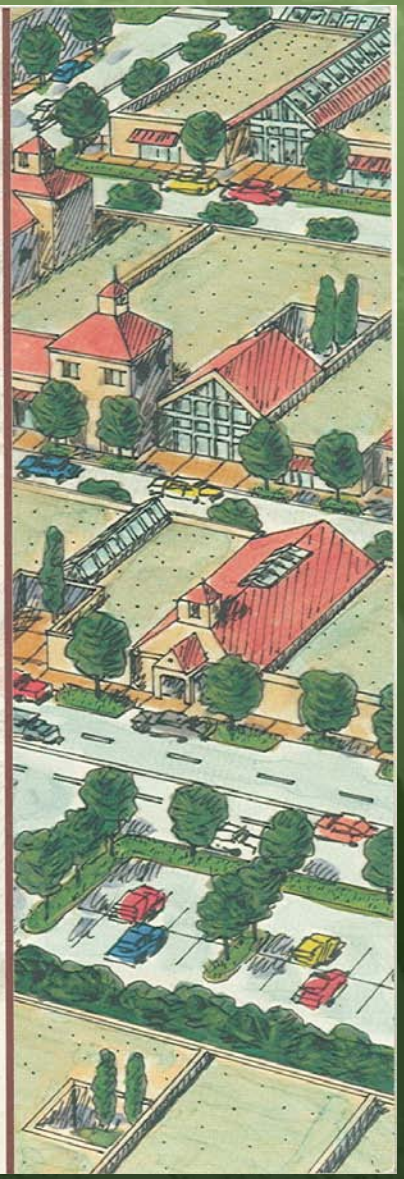
Ecology

Community

Green Streets

Innovative Solutions
for Stormwater and
Stream Crossings



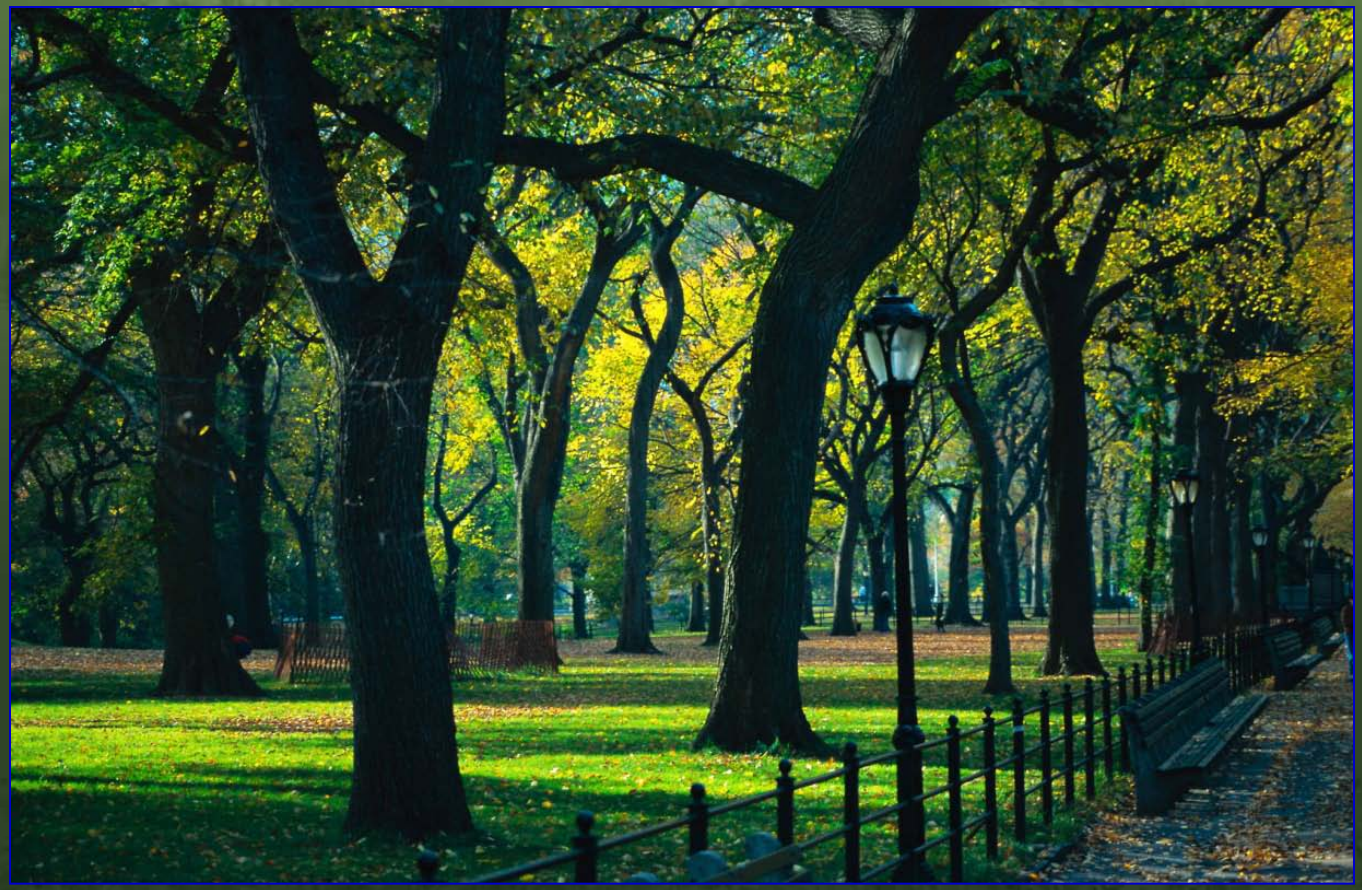


METRO

PEOPLE PLACES
OPEN SPACES

Common Goal

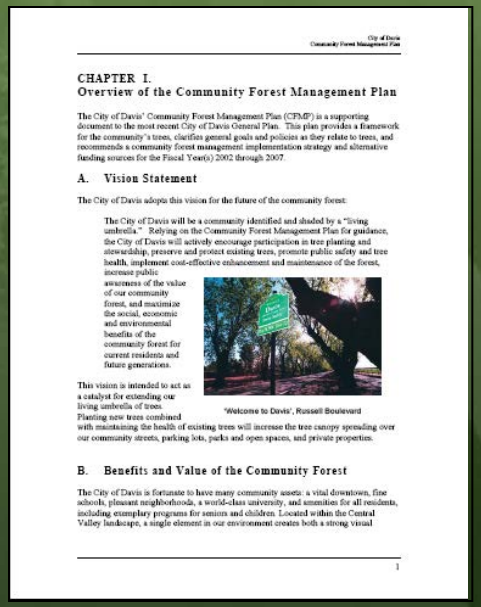
"To build the best urban forest"



Key Ingredients

Citizen Engagement

Political Support



CHAPTER I.
Overview of the Community Forest Management Plan

The City of Davis' Community Forest Management Plan (CFMP) is a supporting document to the most recent City of Davis General Plan. This plan provides a framework for the community's trees, clarifies general goals and policies as they relate to trees, and recommends a community forest management implementation strategy and alternative funding sources for the Fiscal Year(s) 2002 through 2007.

A. Vision Statement

The City of Davis adopts this vision for the future of the community forest:

The City of Davis will be a community identified and shaded by a "living umbrella." Relying on the Community Forest Management Plan for guidance, the City of Davis will actively encourage participation in tree planting and stewardship, preserve and protect existing trees, promote public safety and tree health, implement cost-effective enhancement and maintenance of the forest, increase public awareness of the value of our community forest, and maximize the social, economic and environmental benefits of the community forest for current residents and future generations.

"Welcome to Davis", Russell Boulevard

This vision is intended to act as a catalyst for extending our living umbrella of trees. Planting new trees combined with maintaining the health of existing trees will increase the tree canopy spreading over our community streets, parking lots, parks and open spaces, and private properties.

B. Benefits and Value of the Community Forest

The City of Davis is fortunate to have many community assets: a vital downtown, fine schools, pleasant neighborhoods, a world-class university, and amenities for all residents, including exemplary programs for seniors and children. Located within the Central Valley landscape, a single element in our environment creates both a strong visual

Management

Management

- Successes
  - Inventories and Plans
  - Ordinances
  - Training
  - Communication
- Challenges
  - Funding for tree care
  - Increasing diversity
  - Matching tree to function & site
  - Space for trees

Citizen Engagement

- Successes
  - Value of trees
  - NGOs
  - Volunteers
- Challenges
  - Engaging youth
  - Social equity
  - Attitudes about trees & nature

The Oregonian

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Portland-area communities look to strengthen 'green infrastructure'

Street trees gain stature as awareness of their air-cleaning, water-absorbing and aesthetic benefits grows

Tuesday, August 19, 2008

ROBIN FRANZEN

The Oregonian Staff

FACTBOX
▪ Facts about trees
Related Documents (PDF)
1

GRESHAM -- In a world of people and plants, trees stand out as solid citizens. They clean and cool the air. They slow water runoff. They make neighborhoods feel like neighborhoods.

During the past century, however, humans felled many of the trees that once greened the Portland region and soaked up its abundant rainfall. The gray result: concrete mega-projects such as Portland's $1.4 billion Big Pipe, tunneling alongside the Willamette River to control millions of gallons of storm water that run off the unforested urban landscape each year.

Yet, like a leaf starting to unfurl, tree-thinking is changing. Recognizing that they can help combat climate change, and ultimately save society billions of dollars in combination with more conventional "gray" infrastructure, jurisdictions are stepping up to save existing stands and replant trees in urban areas.

Political Support

- Successes
  - Mayoral Climate Protection Plans
  - Stormwater Credits
  - Healthy Community Design
  - ARRA funds
- Challenges
  - Sustaining TPIs
  - Integrating policy
  - Trees as solar biotechnology

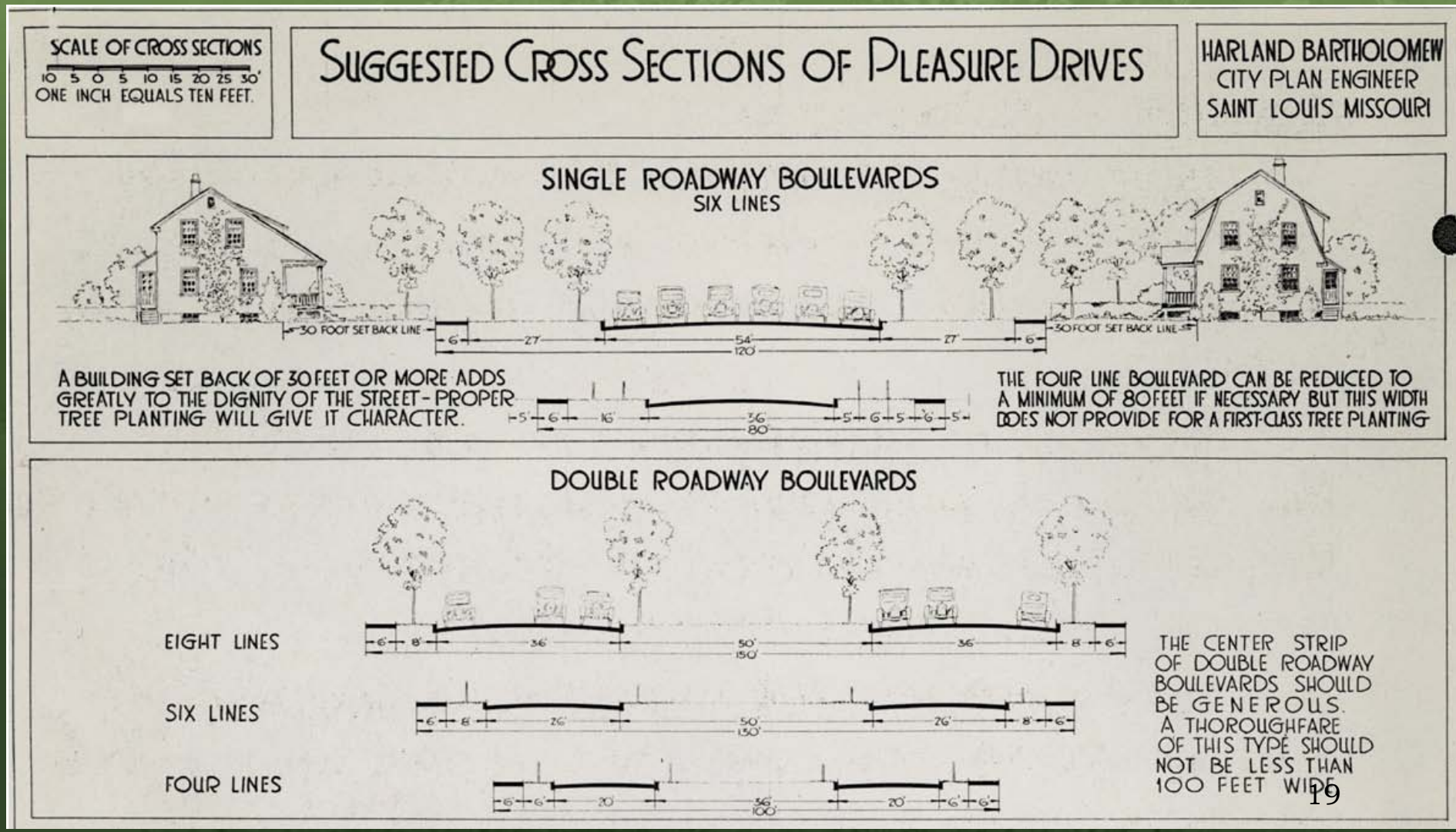

Sacramento City of Trees


Water
Plains usually overflowed in Winter fine Grazing
Water
VERNON
FREMONT
Road over the Plains
Gordon's Rancho
Tule
Road
Vernon
River
Road
Oak
Dry Creek
overflowed in Winter
Oak
Boston
Childs
AMERICAN
RIVER
Fort
SACRAMENTO CITY
River Road
Mormon Isld
Green Spring
Road
Coloma
Rainy Season
during
Ranch
impassable
Benecia Road
TULE
SUTTER
Sycamore & Oak
Road to Shadow's Rancho
Good Grazing on these Plains
Road to Daylors Rancho
To Lower Mines
121½
121

Research


STOP

Designing Tree-lined Roadways



95/24/1695

"Leaners" on 17th street. Day after the storm. Feb. 10th, 1938.

Causes

- Improper planting
- Improper pruning
- Roots cut with street and sidewalk development
- Elms “too big”
- Began removals of trees: 35-50 ft spacing
  - (until $$ ran out)

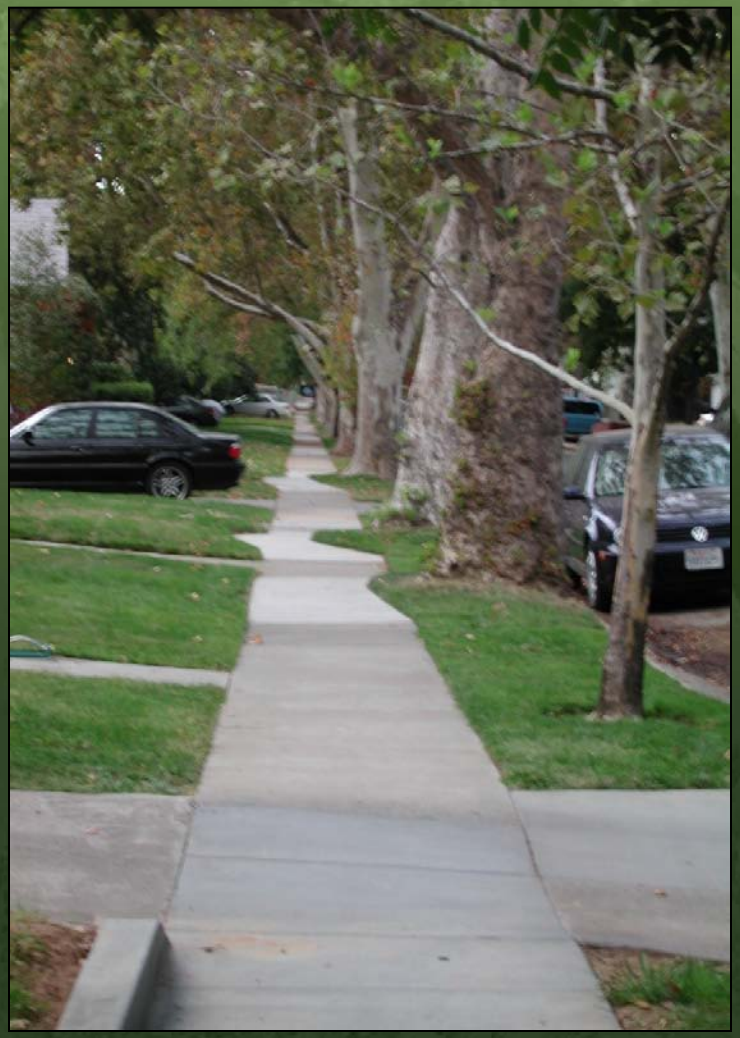
2007 Research: Larger Space = larger tree + longer life

Larger tree = greater benefits for longer period

Trees in Planting Strips

(<15 feet)

- Smaller the space, more trees
- Smaller the space, higher mortality
- Smaller space, poorer condition (94% lawn trees in fair or better; only 79% strip)
- More replacement

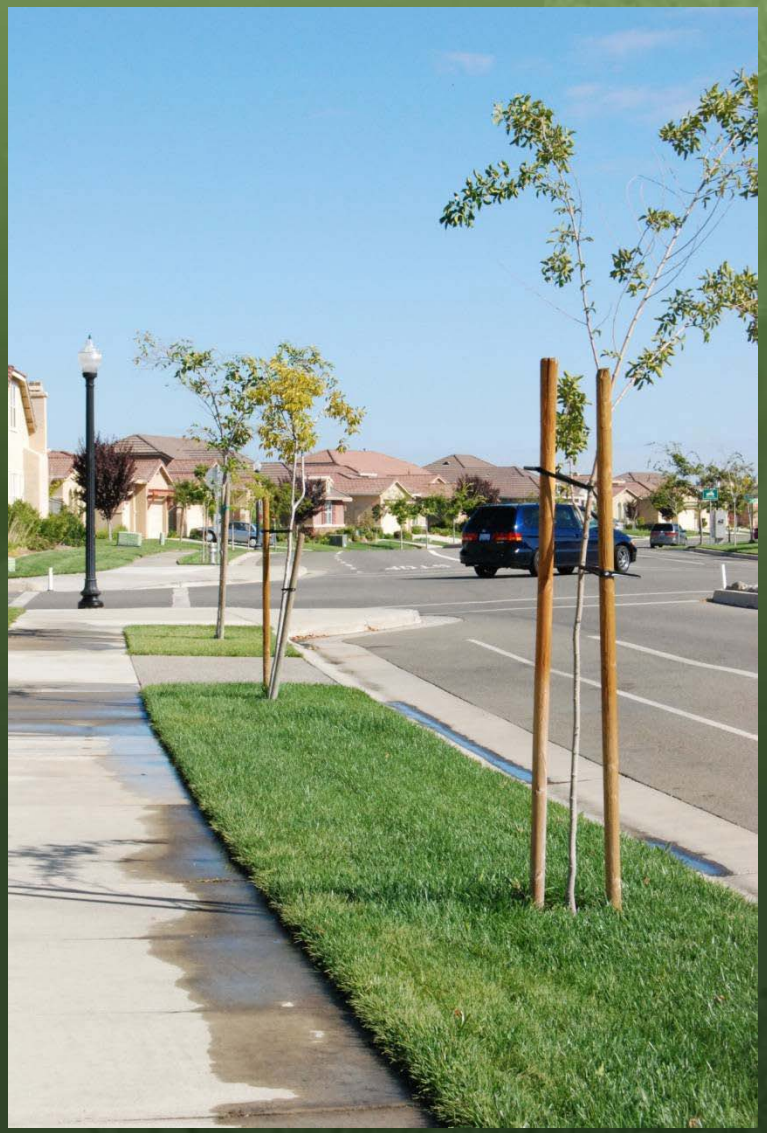


Space to Grow

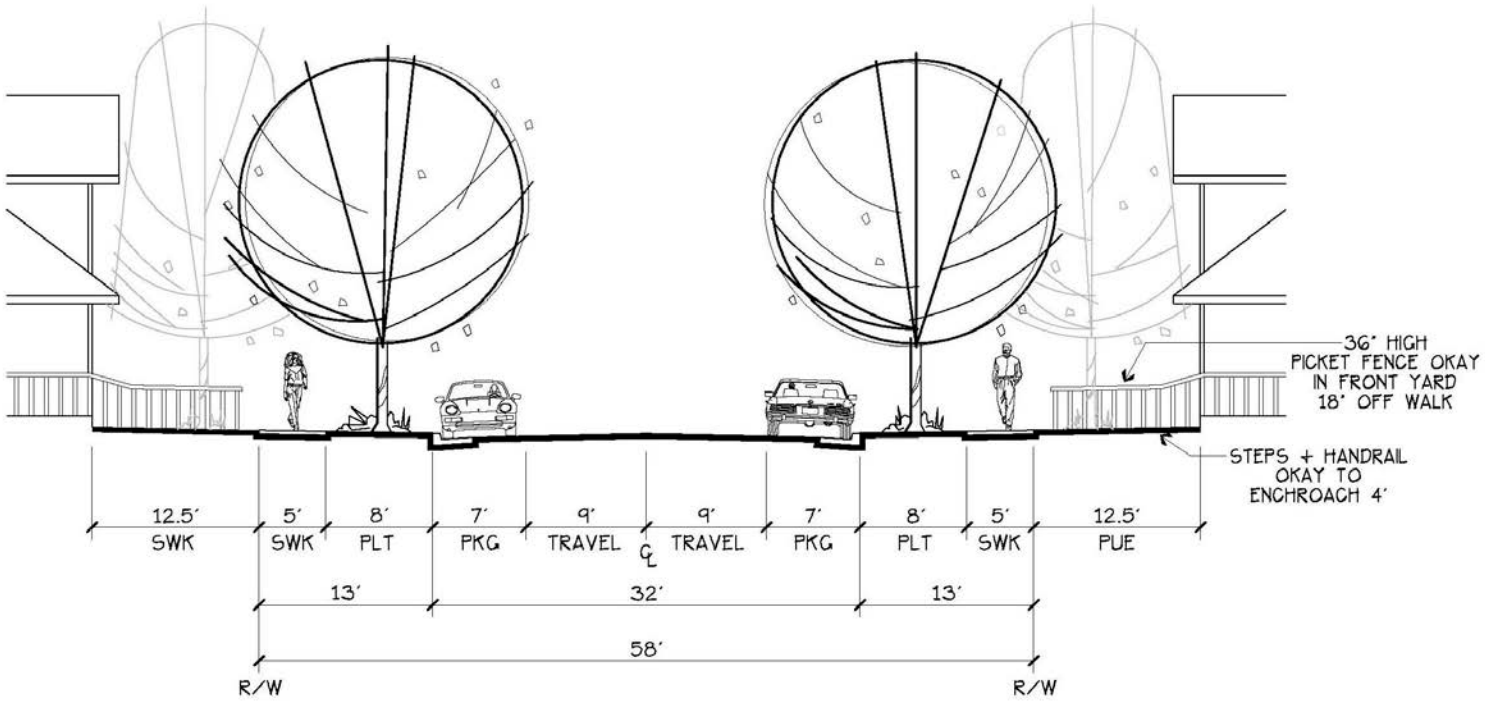
What's wrong with this picture?


NO
PARKING
ANY
TIME

Drainage



Development and Retrofit

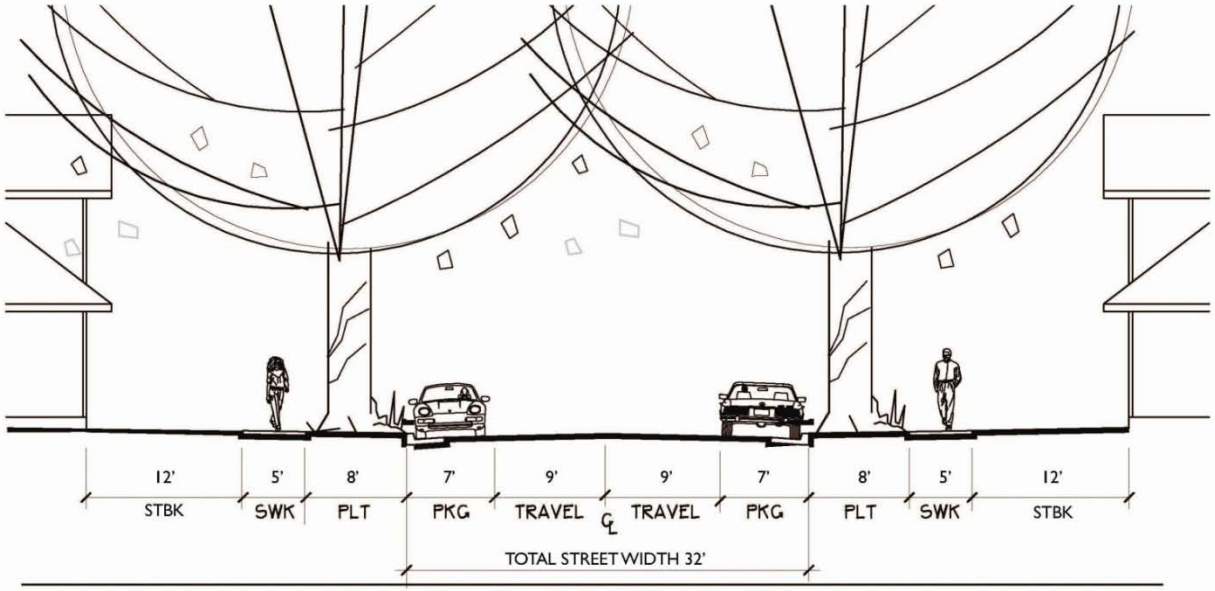


B

TYPICAL 2 WAY RESIDENTIAL STREET

58' STREET SECTION (CITY OF SACRAMENTO IS 53'- 6' PLT, 6.5' PKG)
NOT TO SCALE

Actual Two-Way Streets



Neighborhood	Street	Between	Planting strip Section PUE	SWK	PLT	Total street width	PLT	SWK	PUE	Tree DBH	Height	Crown diameter
Curtis Park	Donner, N side		15.5	4.5	5	33	5	4.5	15.5	24	53	41
Curtis Park	Portola		12.5	5	5	41	5	5	12.5	22	50	43
Land Park	5th	17th and 19th	24.5	4	9	30	9	4	24.5	25	69	49
McKinley	D	33rd and Alhambra	19	6	15	33	15	6	19	30	85	57.5
McKinley	37th	H and F	21	4	5	31	5	4	21	26	67	54
Oak Park	1st Ave	34th and 35th	12.5	6	9.5	49	9.5	6	12.5	14	33	28
East Sacramento	38th	Folsom and R	36.5	4	7.5	37/58	7.5	4	36.5	34	54	68

Fig. 1—"Typical" treescape conditions for the studied streets with planting strips. Drawing, including tree height, crown, and diameter, is to scale and represents a potential future scenario that can be compared with dimensions on existing streets

Research


Institutional Memory Short
No link between ecology and design..not unique to Sacramento

Presidio Ecology and Design Charette, 2008
EDAW | AECOM Project Director: Alexander Felson

Project Approach in Their Respective Fields

time

typical

scope	evaluation	design	construction	post-occupancy
team formation — rfp response	research — analysis	co — sd — dd — cd	site preparation — implementation	1yr — 2yr — 5yr — 10+yr
Ecologists and designers typically craft their own scopes, neglecting to use each other's expertise.	Ecologists are typically involved in rigorous front-end analyses and evaluation.	Ecologists currently struggle to add effective input during the design process. While designers can incorporate ecology into design, ecologists cannot perform design tasks as easily.	The role of ecologists and designers is typically reduced during construction.	Designers typically have limited post-occupancy maintenance plans.

ecology
design
mean

time →

ideal

scope	evaluation	design	construction	post-occupancy
team formation — rfp response	research — analysis	co — sd — dd — cd	site preparation — implementation	1yr — 2yr — 5yr — 10+yr

ecology
design
mean

value added to project through collaboration

Collaboration on scope definition is essential to define means of interaction throughout project life cycle. This will maximize knowledge transfer through collaboratively defined tasks, leading to a stronger overall product.

Designers can increase their understanding of sites through an integrated approach, ultimately improving on ecological analyses with strong information representation skills.

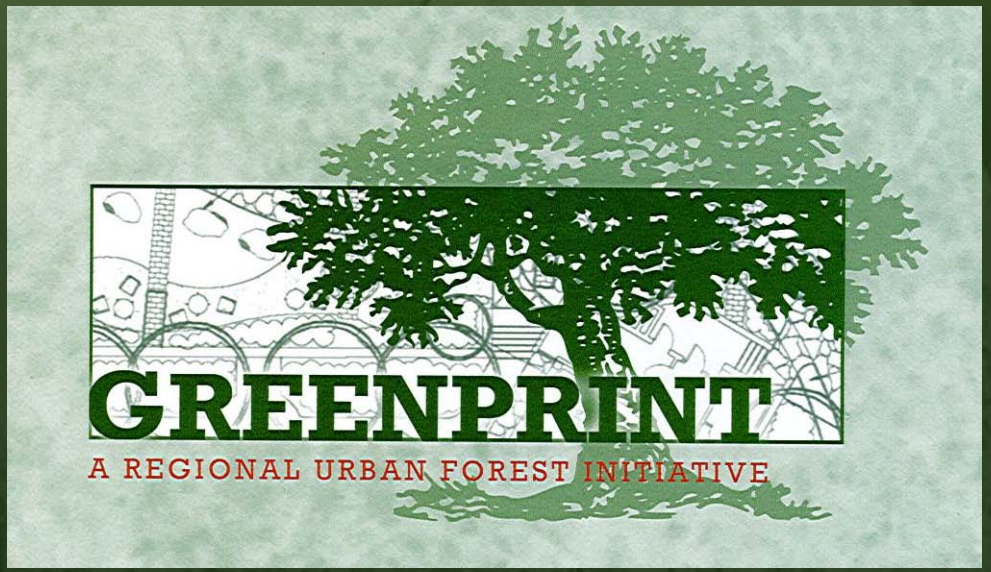
Therefore, the designer should facilitate ecologists involvement in order to more rigorously address key issues. Still, the ecologist needs to permit the designer "room to breathe."

Communication during the construction period will maximize efficiency and accountability in following the established planning and design goals.

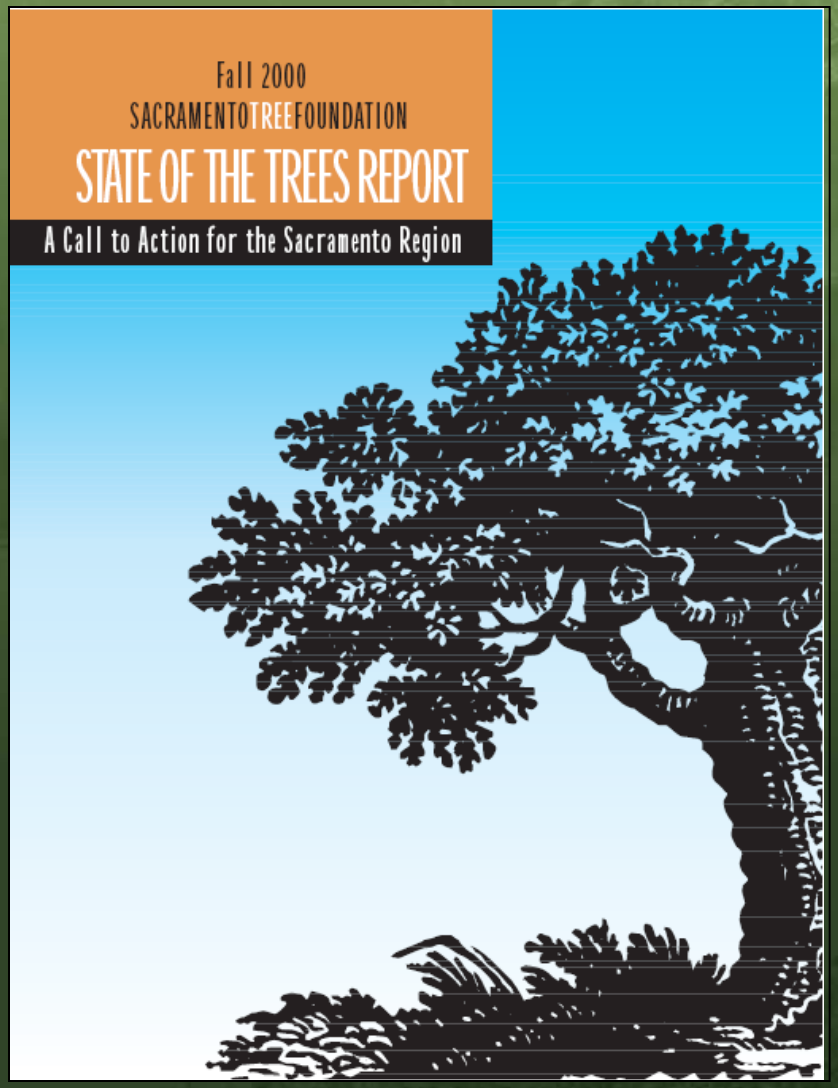
Ecologists should rigorously monitor design projects to assess performance over time and educate designers to integrate lessons learned. This will create knowledge building feedback loops for future projects.

Greenprint Regional Initiative

- 22 cities
- Six counties
- Double the region's canopy
- 5 million trees



Telling the Story



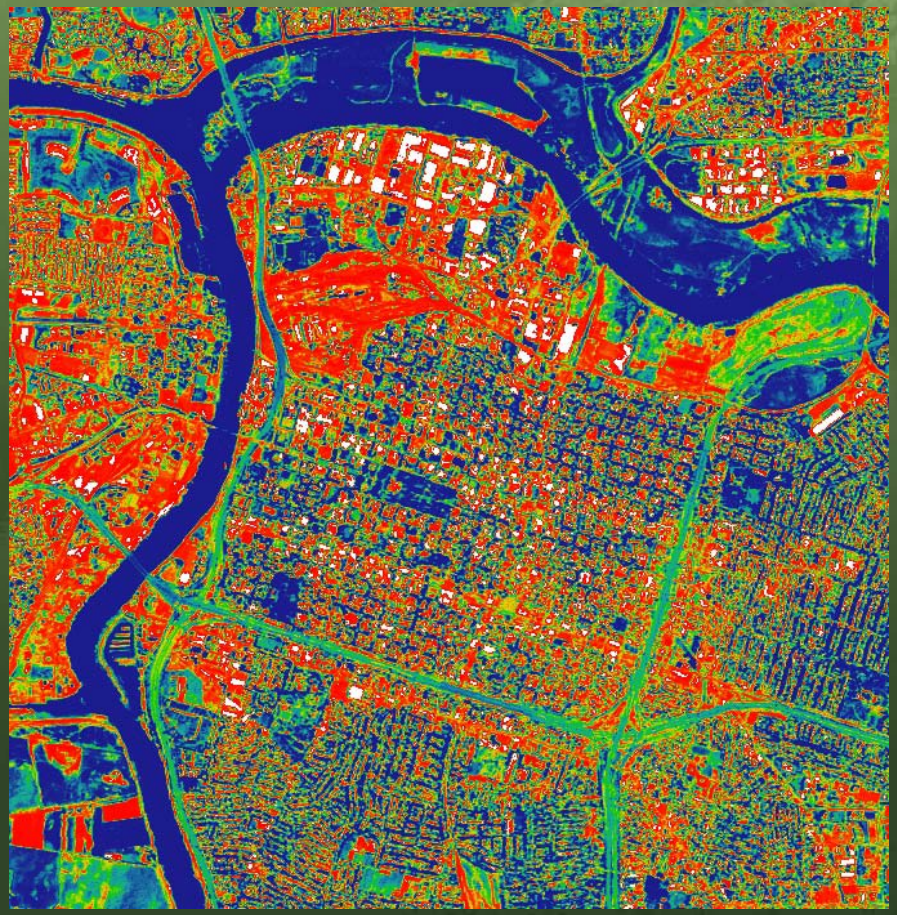
City Street & Park Trees Fail to Keep Pace with Population Growth[5]

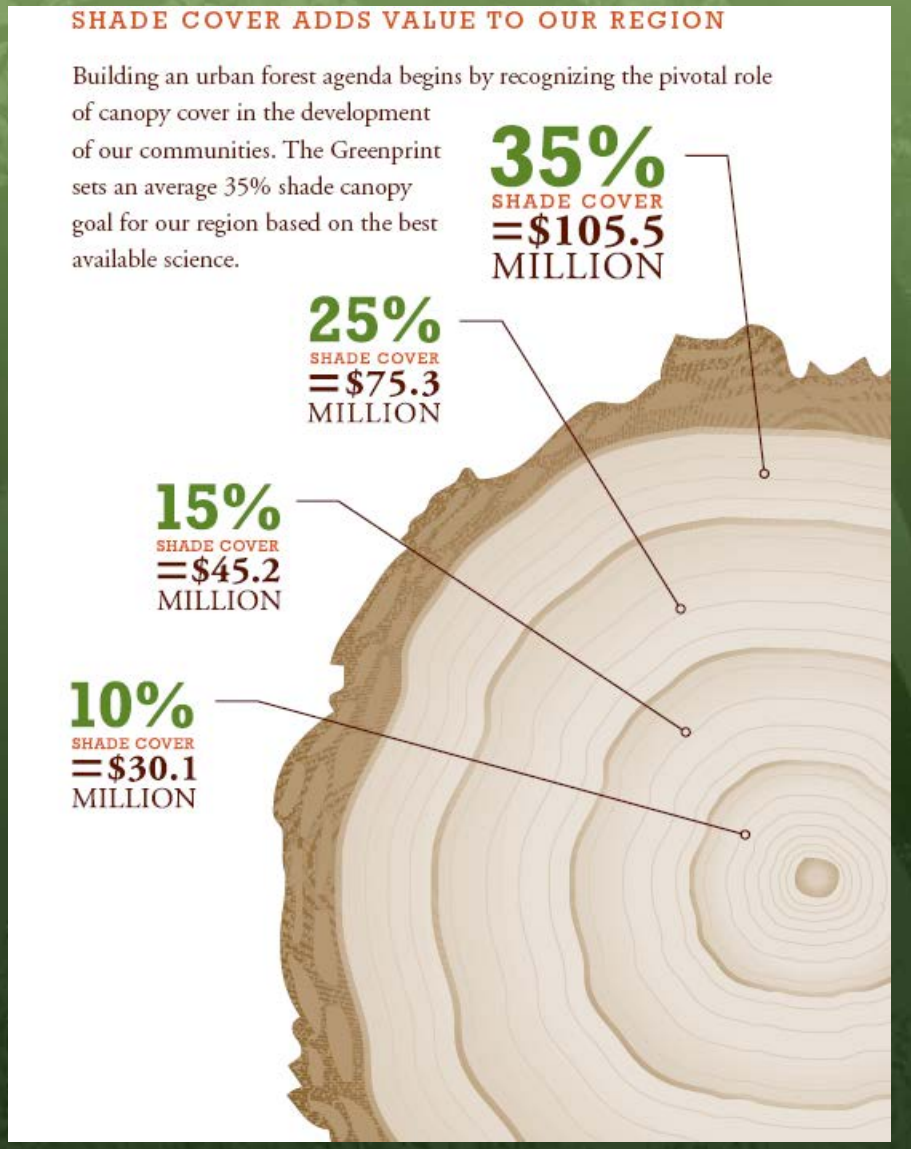
YEAR	POPULATION	SQ. MILES	TREES	TREES/ CAPITA
1940	106,000	14	60,000	.56
1955	170,000	38	100,000	.58
1995	394,000	111	155,000	.39

Annual Environmental Benefits of Sacramento's Urban Forest[27]

	Annual Benefit	Total Value	Average Annual Benefit /Tree
Air Conditioning Saved	157 GWh	$18.5 million	$3.08
Air Pollutant Uptake	1,603 Tons	$28.7 million	$4.78
Carbon Dioxide Reduction	334,400 Tons	$3.3 million	$0.55
Total Benefits		$50.5 million	$8.41

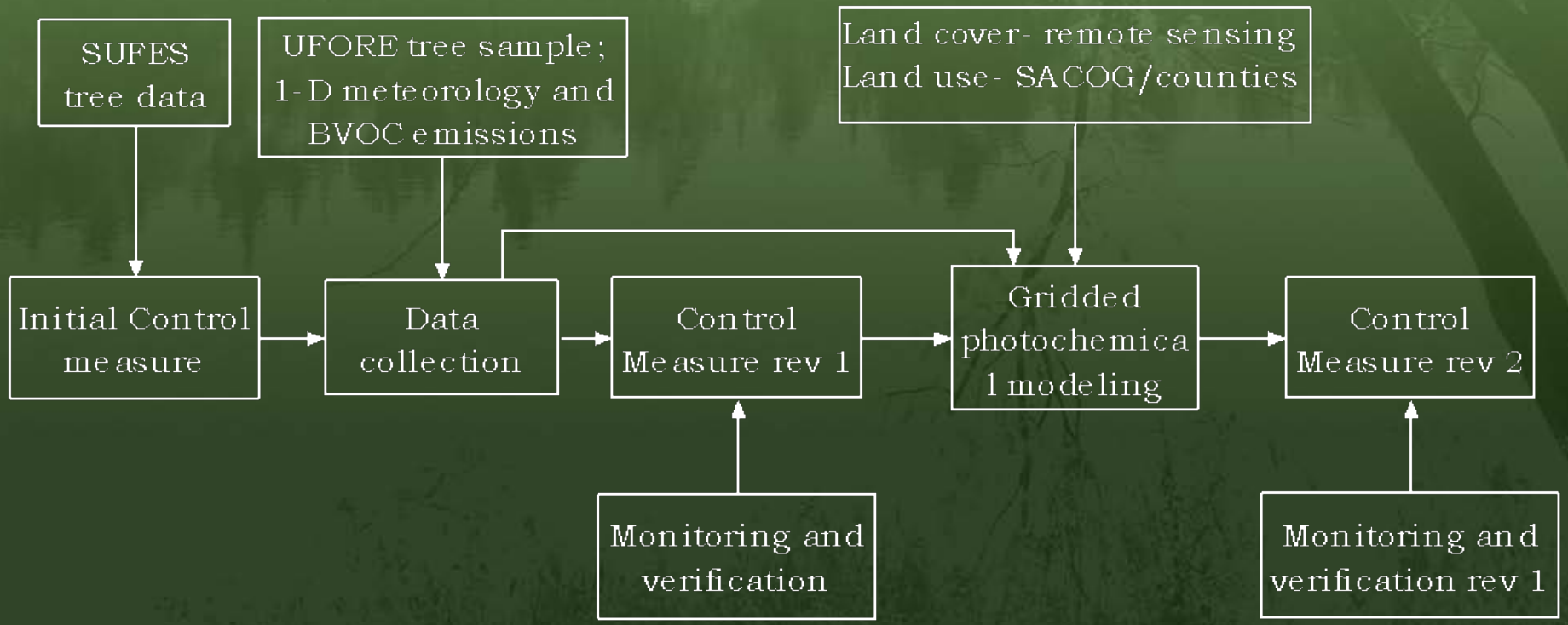
Heat Island Mitigation

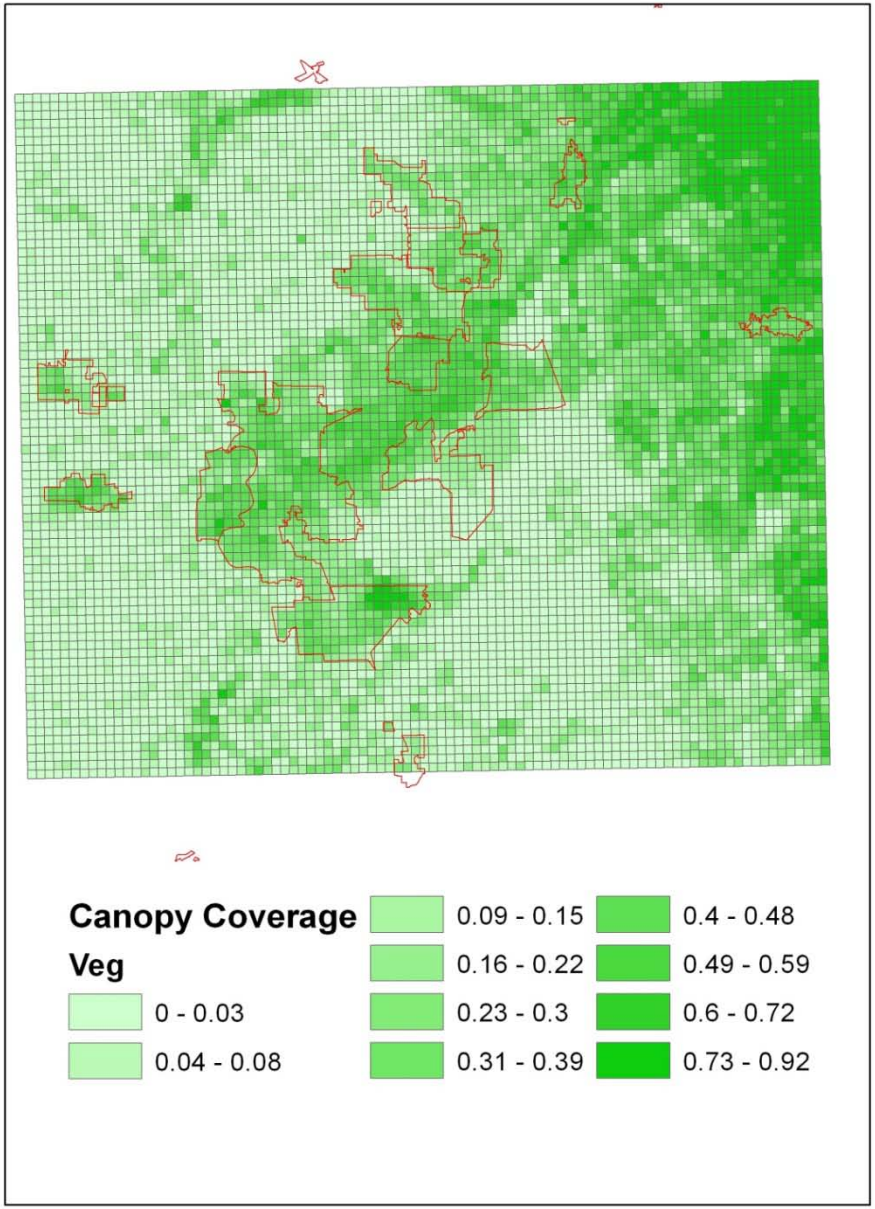




Urban Forests for Clean Air Project

- Air quality effects of trees for SIP measure

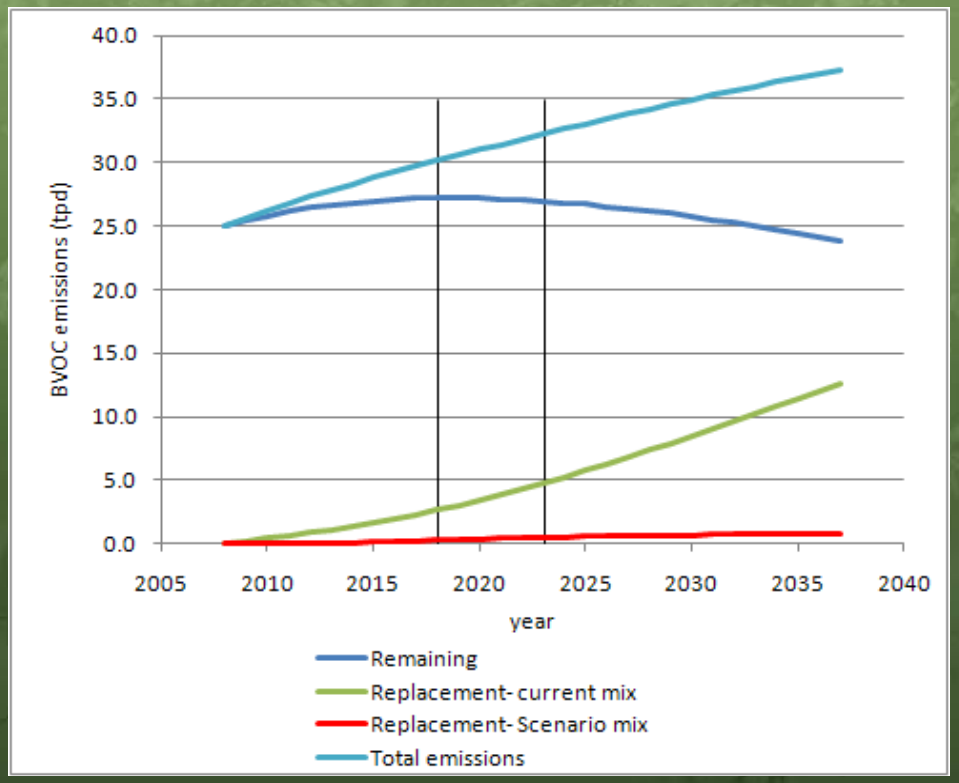




Land Use & Cover

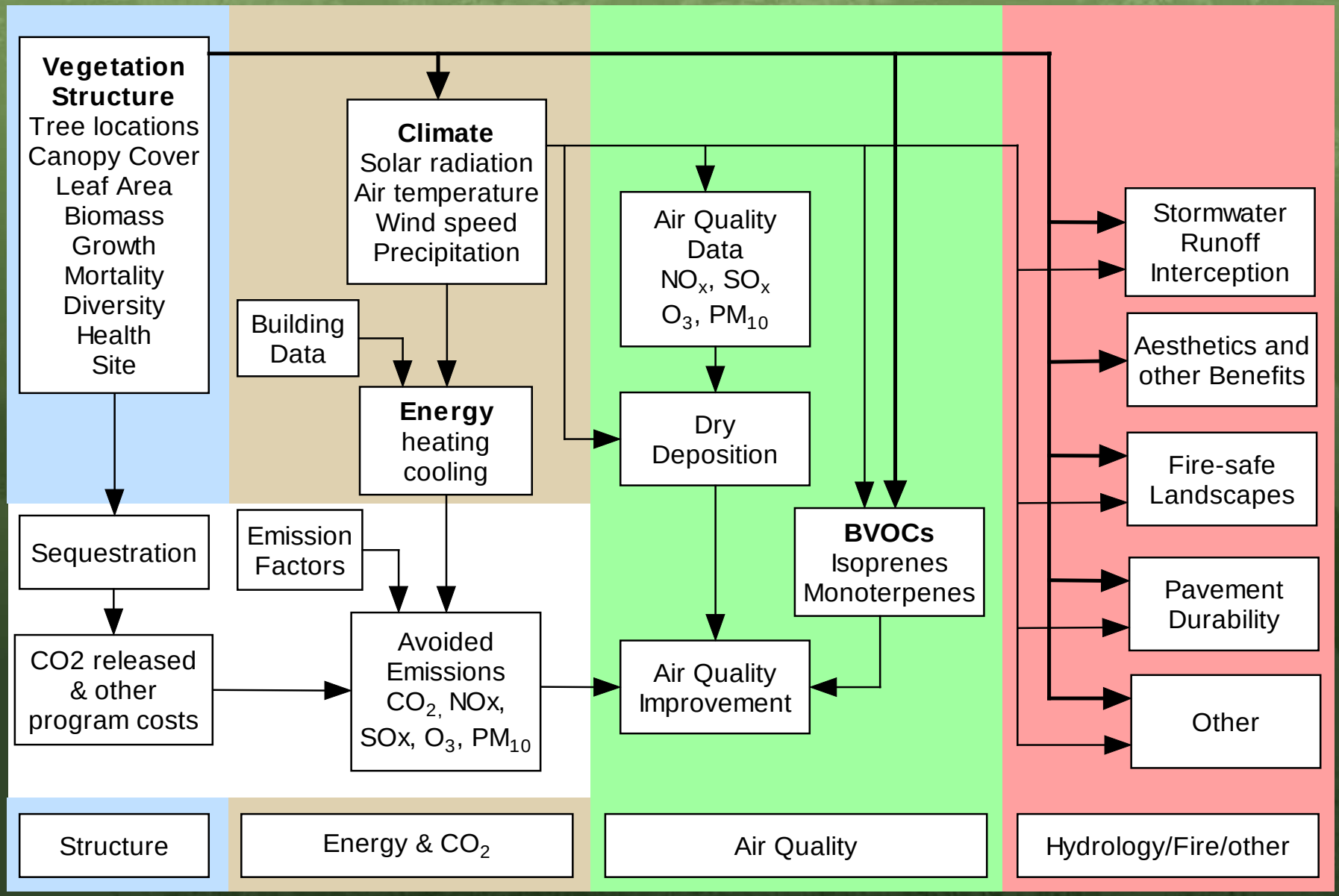
- Current land use- counties & SACOG
- Future land use modeled
- Current land cover from QuickBird imagery
- Future land cover f(LU, tree population model

BVOC Emissions



- Changing species mix of replacement trees only
- Total emissions f(mortality, average tree age)
- Scenario mix 6% of all replacement trees
- 0.3 tpd reduction in 2018 (0.18 tpd allowed)

Comprehensive Net Benefit Modeling



FOUNDING SPONSORS

A PROGRAM OF

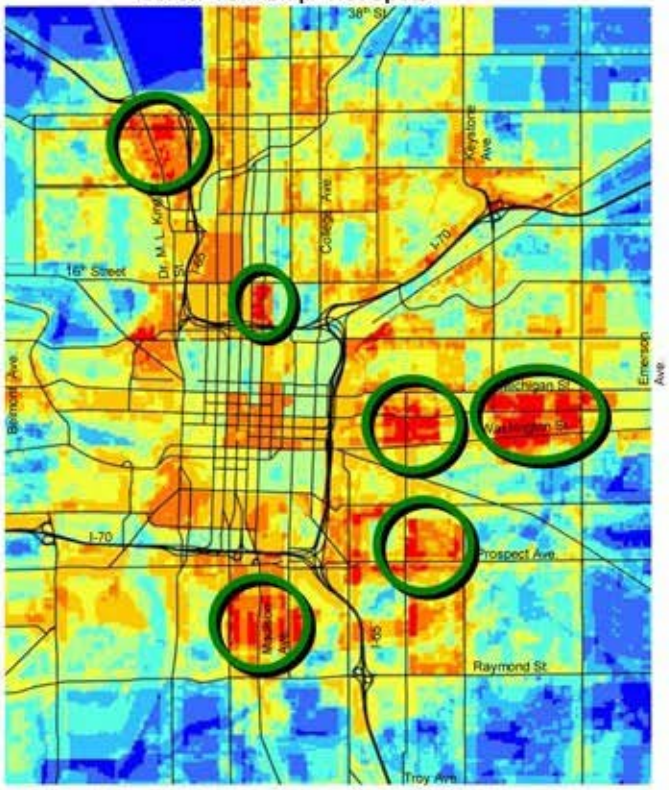
IN PARTNERSHIP WITH

The goal of this research was to identify priority areas in Indianapolis where trees can meet critical environmental and human needs.

Methods:
Areas were evaluated based on the following criteria:

- Lower than average income
- Higher than average crime rates
- Residential areas
- Air quality concerns (based on proximity to industrial and auto emissions),
- Higher than average pediatric asthma rates
- Higher than average surface temperature
- Lower than average tree cover
- Water quality concerns (based on amounts of impervious surfaces)

Center Township "Hot Spots"



Results:
Based on this research, there is clearly a need for more trees in Indianapolis.

Yellow and orange areas meet more than half of the criteria. Red areas meet all criteria.

Six areas (circled) were identified by researchers as examples of "hot spots" in critical need of trees.

Objective:
Plant 100,000 trees over the next ten years, with emphasis on "hot spot" neighborhoods.

Research provided by:
IUPUI Department of Geography

OTHER SPONSORS AND PARTNERS

Indianapolis Garden Club
ALCOA Foundation
Covanta Energy
Shell Oil Company
MIBOR

Income

Median household income.
Darker colors indicate higher income

Crime

Crimes per square mile (adult and juvenile)
Darker colors indicate higher crime density

Zoning

Zoning with residential shown in pink.

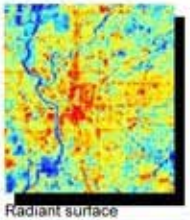
Industrial Emissions

Industrial emission sites with a designation of Title V
Within ¼ mile (red)

Pediatric Asthma

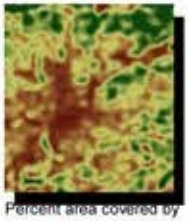
Pediatric asthma hospitalization rates per 100,000 children ages 5-14
Above average rates (pink)

Radiant Temperature



Radiant surface temperature
Highest temperatures (red)

Canopy Density



Percent area covered by tree canopy within 800'.
Brown indicates lower than average tree canopy

Auto Emissions

Major streets with a 500 foot buffer.

Impervious Surfaces

Impervious surfaces (black)

Policy & Research Needs

- Policy Integration
  - Greenprint & Blueprint
  - Multi-service ecosystem markets
  - New policy objectives/measures
- Performance Metrics & Models
  - Net effects, affordable models
- ROW Design Guidelines & Specs
  - Standardized LCA, economics
- Monitoring Case Studies

New Approaches

- Urban Forest Performance
  - Attributes by species
  - Management-site, condition-size, performance
  - Monitoring
  - Wash-off & bioremediation
- ROW & Urban Forest Design
  - Porous pavements, soils, roots, utilities
  - Pavements, climate, shade, AQ
  - Trees, safety, walkability, health
- Barriers and Incentives

Communication

- Agencies & Developers
- Consultants & Staff
- General Public

Urban
Advantage

Urban
Advantage

Conclusions

- 50% of built environment we will see in 2025 did not exist in 2000 (Nelson, 2005)
- More evidence to drive policy
- More collaboration
- More communication