





Seeing Trees Differently – *Trees and Stormwater Guide*

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COMING SOON



Integrating Trees Into Stormwater Management Design and Policy



- A Guide for Local Decision Makers

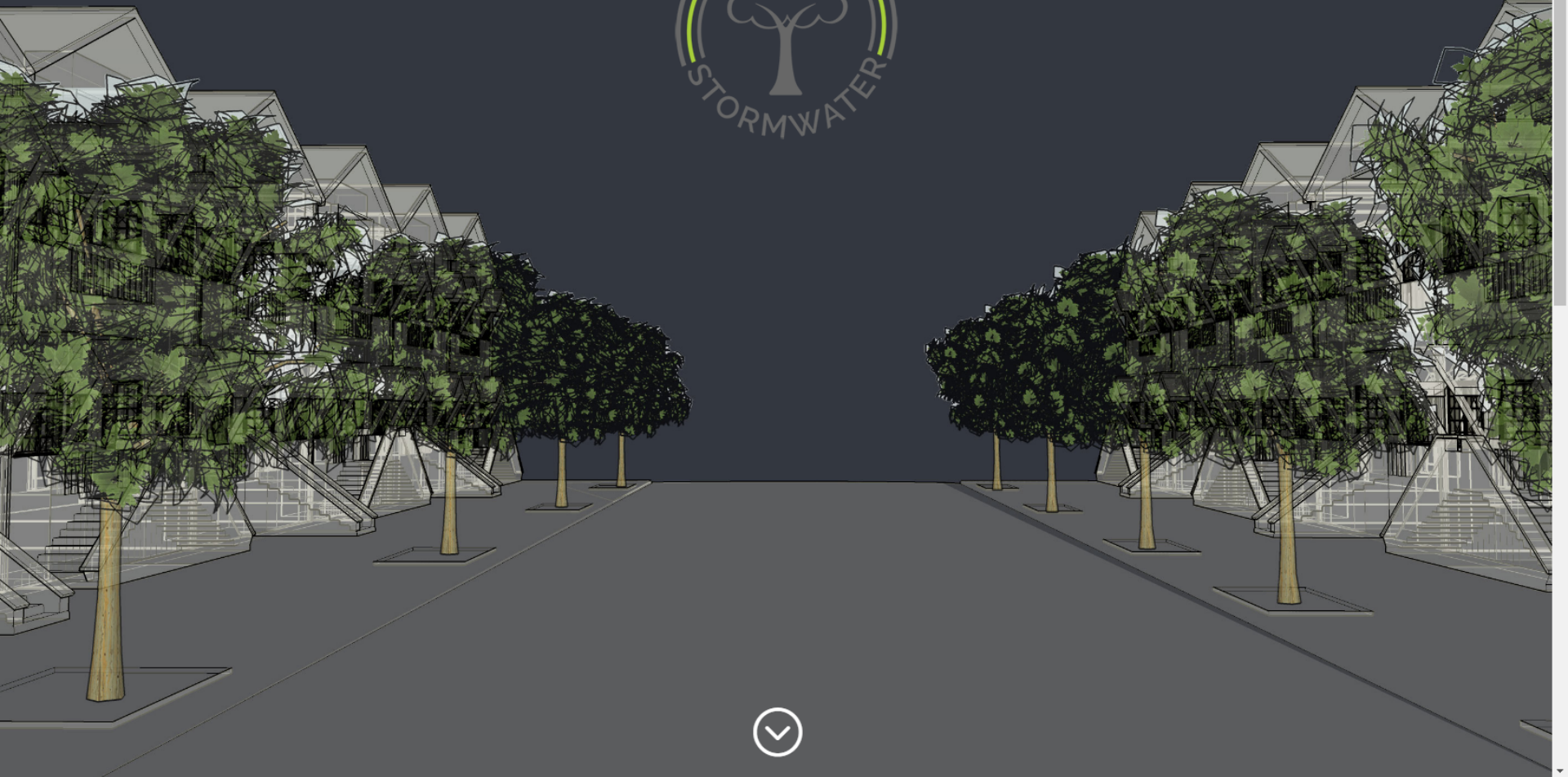


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It Works

Return On Investment

 Resource Library

 Document Builder





? Why should you implement community forestry practices as part of your community's stormwater management plan?

It Works

Trees can add another dimension to both your "gray" and "green" stormwater management practices – slowing flow, increasing infiltration and evapotranspiration and removing pollutants.

[Learn More](#)

It Offers the Highest ROI

Maybe it won't be the biggest part of your investment, but it can pay the biggest dividends.

[Learn More](#)

? Ready to Begin?
We've organized the site so that you can both learn about using trees in stormwater management, and make the case for doing just that in your own community.

[Get Started](#)

TIP
First, we've organized our **resource library** so you can easily locate and download the data you'll need to document your proposal.

TIP
Second, we've prepared a **"document builder"** based on your answers to some common questions. By adding local information, the "document builder" can help you organize your points and make the case that forestry practices improve stormwater management – and delivery many other benefits to residents.



It Works!

Trees intercept rainfall and help increase infiltration and the ability of soil to store water. By retaining water in its canopy – even for a short time – trees can disperse precipitation over a longer time period, and reduce velocity of the water when it does fall. Depending on species, some trees can absorb water through their leaves and transpire it directly to the atmosphere; all trees absorb water through their root structure. Depending on species, some trees can remove pollutants (through a process called phytoremediation) and thus contribute to groundwater recharge. [View an excellent overview of “why’s and how” of trees in urban stormwater management.](#)

Explore how trees manage stormwater.



Evapotranspiration

In a study of a large parking lot transected with bioswales planted by trees, transpiration by trees accounted for 46 to 72% of total water outputs from the system. This clearly demonstrates that trees are an integral component of a green infrastructure system, and function to reduce runoff and discharge from an area with significant impermeable surface.

[Learn More](#)





UNMATCHED RETURN ON INVESTMENT

Trees in the built environment provide many benefits to the community – almost all of which can be measured in dollars and cents. So it makes sense to incorporate tree planting as part of your stormwater management plan. Or, alternately, to make stormwater management part of your urban forestry master plan.



FACT

Trees and shrubs often comprise the most "natural" vegetation for use in stormwater management. Unlike grasses, which require periodic mowing, established trees and shrubs offer substantial savings in maintenance costs – sometimes in excess of \$1,500 per acre, per year.

Pennsylvania Stormwater Design Manual, 2008 Chapter 5



STORMWATER MANAGEMENT & SO MUCH MORE...

- Air Quality +

- Public Health +

- Education +

- Energy Conservation +

- Urban Heat Island +

- Vibrant Business Districts +

- Cohesive Neighborhoods +

[Now Let's Do the Math for your Community](#)





KNOW YOUR COMMUNITY



PLACE

Even though you hear it everywhere, each community is unique – especially when it comes to something as complex as introducing new forestry practices into existing programs.

Here's what you'll need to know about your community. [🔗](#)



PLANS

Every community tries to shape its future – often through a whole suite of planning processes. Individually and together, these plans can shape how, and where, urban forestry practices can be seeded and grow.

Review the policies and plans that can advance or retard your efforts to introduce tree-based green infrastructure in your community. Identify “areas of opportunity.” [🔗](#)



PEOPLE

Nothing happens in a community without a critical mass of people behind it. That's especially true for green initiatives – where professionals from different disciplines and public alike come together to make their places more vibrant, vital and verdant.

Click here for examples of how successful communities assemble the people and the organizations that can help convert ideas to action. [🔗](#)



POLICIES

There's no clean slate. All communities are subject to local, regional or state programs that guide or dictate zoning, development, building codes, transportation infrastructure and, yes, stormwater. But that's not all.

Click here for ideas on engaging stakeholders behind a jointly-developed strategy that maximizes benefits for your community and its residents. [🔗](#)



PROCESS 1 – MAP IT



Assemble as many data sets as you can that describe the ecological, environmental, economic and demographic features of your community. Your first stop will be your own community's planning or GIS staff. Then you might consult regional planning organization. Many will have collected at least some of the information you'll need. Other sources include Community Commons, US EPA's green infrastructure website, US Forest Service research reports, others.



- Tree Canopy +

- Impervious Surfaces +

- Air Pollution and Public Health +

- Watershed maps +

- Soil Maps +

- Demographics +

- Climate Change/Temperature/Heat Island +

Diagnosis
 As you review your community's circumstances, you'll find problems and natural solutions which can attract substantial support among stakeholders. Some may be directly related to stormwater management; others may offer important co-benefits when applied to stormwater management.

Barrier
 Often, community-specific natural resource data won't be readily available, or easily layered into GIS analyses. You can find alternatives – workable but less precise – from public data sources. Or, try yourself to create a simple sample-based inventory of your own.

Barrier
 Don't rely too heavily on case studies – especially from communities in a different climatic or soil zone. As one tree advocate from Southern California put it: "There's not much we can learn from studies done in places where rainfall is three times what we get, and drought doesn't matter." Look



Using More Trees in Stormwater Management: An Interactive Tool to Help You Make the Case

How to weave green infrastructure into stormwater management remains, at once, one of the most complex issues facing local governments and, at the same time, one of the most place-specific.

Of course, examining what others have done can help identify pathways and approaches. Casestudies open eyes and minds; they can serve as powerful “teaching tools” for policymakers. We urge you to seek the amount [this tool will help] and to make them part of your proposals for more green infrastructure and urban forestry.

But strategies adopted in one jurisdiction can rarely be plucked whole and inserted into another. The fact is, where you stand determines what you do; every community’s stormwater issues are unique. That’s why green infrastructure practices developed to deal with stormwater must be tailored to local circumstances: climate and geography, patterns of development, regional context and municipal resources.

This interactive tool will help you explore and document why and how green infrastructure strategies – in particular, urban forestry – can be introduced to meet your community’s stormwater challenges.

By answering the questions below, you’ll create the elements you need to assemble a text- and graphic-rich document that describes how green infrastructure and urban forestry can improve your stormwater management program, save money and deliver specific, quantifiable benefits to your community. You can return to this tool at any time; completed work will be saved in your user file.

<http://treesandstormwater.org/an-interactive-tool-to-help-you-make-the-case/>

Community Characteristics



Name Your Community and Click on Your State



Name of Community:

Type Here:

Urban Forestry in Your Community- Please click on the phrases that best describes your community's urban forestry programs.

- We adhere to an urban forestry master plan developed with community and multi-agency input.
- No urban forestry master plan, but we monitor and maintain publicly-owned trees on a set schedule.
- Our community employs a professional urban forester.
- We employ and/or contract with at least one ISA Certified Arborist.
- We train our staff and contractors to use best practices in urban forestry.
- We have measured and assessed our urban tree canopy, or plan to do so in the near future.





Many communities already have urban forestry projects and programs underway. In this section, we'll ask you to describe – to the best of your ability – the extent of your **urban forest** [link to definition]. Often expressed as **urban tree canopy**, these numbers may be available from your community's urban forester or arborist, or from your state forestry agency's urban forestry coordinator. Likewise, you may find them by searching online.

If you'd like to get a rough idea of what benefits trees are already providing in your community, click here to visit i-Tree Landscape – a free and easy-to-use tool that does the calculation for you, translates it into dollars and cents, and provides a rundown of which neighborhoods have adequate tree canopy, and which don't.

Our current urban tree canopy covers this % of our community:

I can't locate these figures and/or to my knowledge, they don't exist:

Does your community maintain an inventory of street-side and road-side trees:

- Yes No Not Sure

Has a comprehensive plan ["comp" plan] been adopted for your community?

- Yes
 No
 Not Sure



Your Sewer System: Rules, Regulations and BMPs

Are you aware of any exemplary projects in your community that use trees to help manage stormwater?

- Yes
- No
- Not Sure

Can the project[s] serve to help demonstrate the value of trees as a stormwater management practice?

- Yes
- No
- Not Sure

Describe the project[s] as you would like them included in your document:

Making it Happen in Your Community

Creating a Coalition for Change

Tree planting and urban forestry programs sprout up in many different ways. Sometimes, initiatives are led by elected officials ["big number" tree planting campaigns, for example]. In other cases, they're embedded in plans and policies adopted by different municipal agencies – or by active citizen groups and major landowners like universities or corporate campuses. Each of these entities can be a leader or an ally in mounting a campaign for using trees in stormwater management. Likely as not, they'll already be sold on the benefits. If not, check out arguments that can help you make the sale.

City arborist or forester

- Yes
- No

Public works department

- Yes
- No

Parks department

- Yes
- No



The Case for Urban Forestry and Stormwater in **Souwest City**

Urban forestry in communities in the **arid southwest** presents unique challenges. Climate, precipitation and soil types dictate not only the extent of your tree canopy and the types of trees we might wish to plant. But they also influence the range of benefits urban forestry can offer.

Case Studies

Perhaps the best way to understand the “why” and “how” of urban forestry and stormwater management in our region is to examine case studies from communities facing similar challenges.

Case Study One: Phoenix

Phoenix undertook a comprehensive review of their municipal codes and regulations to identify which elements were helping to manage stormwater, and what needed to change to improve their overall performance. Included are lists of ordinances that would benefit from modification, as well as policy changes that the City itself should consider. The standards and objectives they’ve set can provide guidance for our own community.

Case Study Two: Los Cruces



Our Current Situation

We employ at least one professional urban forester.

And we manage to monitor and maintain publicly owned trees on a set schedule.

But there are significant gaps in our policies and programs:

1. Developing an urban forestry master plan can assure we maximize the benefits from our urban forests, expand them to areas that need more trees, and focus our resources – now and in the future – on sustaining our forests, not reacting to threats.
2. To develop an urban forestry master plan, we must measure and assess the extent and condition of our current tree canopy.
3. Work on our trees must be done right. We should hire and contract with ISA Certified Arborists.
4. Our staff and contractors should be trained, through continuing education, in the best practices for urban forestry.

Assessing Your Urban Trees

Why It's Important to Know Your Canopy Cover. Trees have long been deemed an essential part of the urban landscape. At the end of the 19th century, advocates praised the cooling, calming effect of trees and noted that their interlocked canopy created healthier neighborhoods. By the late 20th century and into the 21st we learned how to measure and quantify these benefits and more, and to assess their monetary value to the community.

Because we need to know where to start – and more important, what we stand to gain – we should develop at least a rough estimate of both the extent of our tree canopy and the services it provides to our residents. I-Tree Landscape does both.

[Attach i-Tree Landscape Report]

The obvious lesson: maintaining and growing the urban forest is not an optional amenity for flush times, but an integral element of our community's basic infrastructure. For every dollar invested in tree care and maintenance, Pittsburgh netted values and avoided costs of \$2.00; New York pegs the figure at \$5.60 for every dollar invested. We can do it too.

Street Tree Inventory. With one, we can plan periodic inspections, check for pests and disease, remove hazardous trees and reduce liability. Without one, we're stuck in a reactive mode, fixing problems as they're reported – often spending more to accomplish less.

Good Practices: Streets and Rights of Way

Aside from parks, roadsides often constitute the largest area under direct municipal control. Likewise, curb and gutter systems that line these streets historically have constituted a primary pathway for moving stormwater from site to receiving waters. For a variety of reasons, many communities are beginning to implement what are known as “green streets” strategies to help manage stormwater – and create a more vibrant, walkable streetscape.

We have attempted, on a few streets, to plant trees to help reduce stormwater flow and pollutant loads. Our work on [name streets] was modeled on what we then considered to be best practices for site selection, soil type and volume.

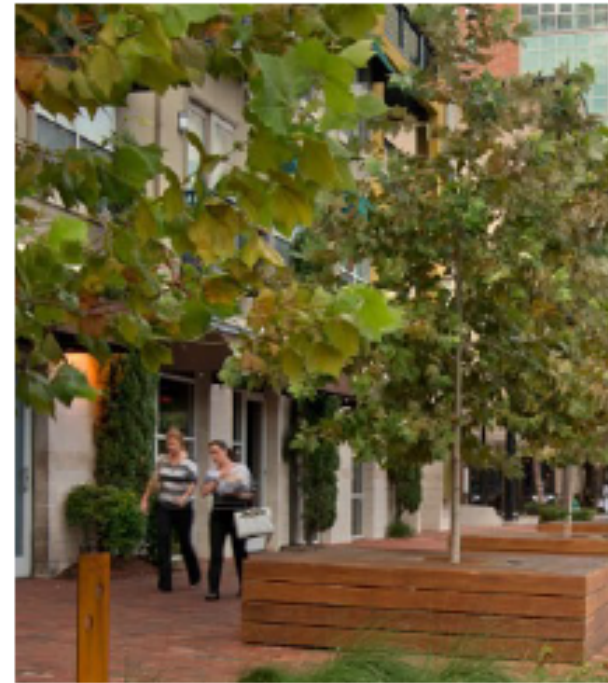
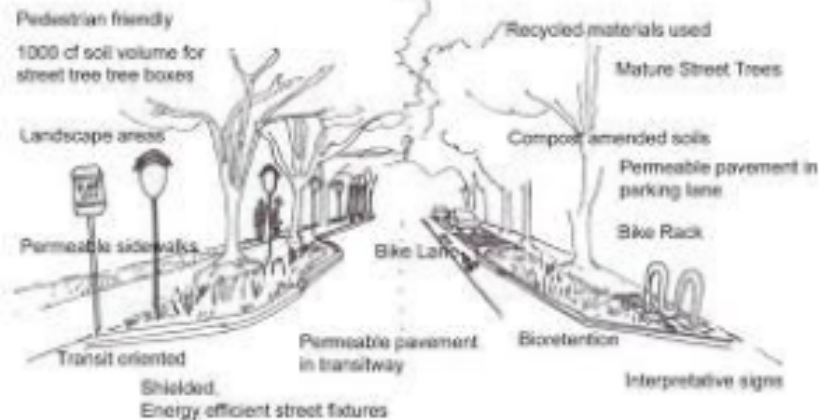
But we can do much more!

If trees become a key component of our stormwater infrastructure, success will depend on:

- a. Understanding what we have already by assessing our tree canopy and taking inventory of our street trees
- b. Aligning goals and plans with all involved agencies
- c. Promoting effective public engagement in both the plan and its execution
- d. Developing standards for site, soil volume and type, species selection, as well as planting and early-stage maintenance specifications to help assure survivability.

We can earn maximum benefits from street-trees if we consider the entire streetscape in our planning. The city of Cleveland planned [“Green Streets”](#) to deliver much more than stormwater management. They meshed “green streets” with “complete streets” to revitalize business districts, raise property values, improve public health, reduce the heat island effect, cut energy costs, and promote community spirit.

Anatomy of a Green Street



Making it Happen: Creating a Coalition

Allies in Government

READY TO COMMIT	WHERE DO THEY FIT IN?	WHAT CAN THEY DO?	HOW DOES IT ADVANCE THEIR MISSION?
PARKS	Recreation, Outdoor Experiences	Plan for tree canopy	Multiple, including improved public health
EDUCATION	Greener campuses	Plan new and retrofit campuses using green infrastructure practices.	Inviting play spaces, more outdoor activity, healthier children, improved student performance
PLANNING	Zoning, development	Maximize green space, minimize development impact [LID]	More tree canopy creates healthy, vibrant neighborhoods
SUSTAINABILITY OFFICE	Climate adaptation and mitigation	Commit to trees as solution to problems [e.g. urban heat island, energy use]	Greener, healthier, more resilient communities
NEED TO ENGAGE	WHERE DO THEY FIT IN?	WHAT CAN THEY DO?	HOW DOES IT ADVANCE THEIR MISSION?
TRANSPORTATION	Roads, street and sidewalk design	Complete <i>and</i> Green Streets	Vibrant, safe neighborhoods and stormwater management
PUBLIC HEALTH	Promote healthy places	Assure people in "health hotspots" have access to nature	Improved health outcomes for many chronic conditions
REGIONAL PLANNING ORGANIZATION [COUNCIL]	Often the hub for future-oriented planning	Convene like-minded officials from member municipalities	Stronger foundation for effective region-wide [and watershed level] action
COUNCIL, MAYOR OR COMMISSIONER	The decider.	Become a champion for change.	Save money on stormwater, energy costs. Lower heat island effect and

Secure long-term funding for urban forestry so that our initial investment in trees can be maintained and grow.

Many different sources are available to support long-term urban forestry programs. Some are outlined in the chart below. Each of these options is examined in detail [in this EPA publication](#).

Funding Source	Description	Advantages	Disadvantages
Taxes/General Funds	Funds raised through taxes such as, property, income, and sales that are paid into a general fund.	<ul style="list-style-type: none">• Consistent from year-to-year• Utilizes an existing funding system	<ul style="list-style-type: none">• Competition for funds;• Tax-exempt properties do not contribute;• System is not equitable (does not fully reflect contribution of stormwater runoff)
Fees	Funds raised through charges for services such as inspections and permits. Funds raised through developer impact fees are one-time charges linked with new development.	<ul style="list-style-type: none">• Specific permit and inspection fees allow for more direct allocation of costs for services provided• Addresses potential stormwater impacts related to new construction	<ul style="list-style-type: none">• Funding not available for larger projects or system-wide improvements• Developer impact fees may be an unreliable source when development slows (due to market downturns/contractions)• Requires administrative framework to assess and manage
Stormwater Utility	A stormwater utility generates its revenue through user fees and the revenues from the stormwater charges will go into a separate fund that might be	<ul style="list-style-type: none">• Dedicated funding source• Directly related to stormwater impacts• Sustainable, stable revenue• Shared cost	<ul style="list-style-type: none">• Feasibility study required for implementation, fee structure, and administration of utility• Approval by vote of the local legislative body



Thank You

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