Trees, the Unheralded Giants for Stormwater Management

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The Hydrologic Cycle



Land Cover is Critical



Stream Corridor Restoration Principles, Processes, and Practices. Federal Interagency Steam Restoration Working Group. 1998



Changes in Ground Cover Alter Stream Flow



Consequences

- Floods Damage to public and private property, including infrastructure
- Eroded Streambanks Sediment-clogged waterways, filled lakes, reservoirs
- Widened Stream Channels Loss of valuable property
- Damaged Aesthetics Dirty water, increased trash and debris, foul odors
- Damaged Fish and Aquatic Life -Impairment/destruction
- Impaired Recreational Uses Decreased opportunities for swimming, fishing, boating, and other water sports
- Threatened Public Health Contamination of drinking water, fish/shellfish, increased exposure to harmful pollutants.
- Threatened Public Safety Increased exposure to drownings in flood waters
- Economic Impacts Fisheries, shellfish, tourism, recreation related businesses
- Increased Cost of Water and Wastewater Treatment
 increased raw water treatment costs and reduced assimilative capacity of waterbodies.



Resource Group

Street trees can contribute positively to

stormwater management

Year Completed	i-Tree Reference City	Number of Trees Studied	Annual Stormwater Benefits (dollars)	Rainfall Intercepted Annually by Trees (million gallons)
2006	Albuquerque, N.M.	4,586	\$55, <mark>833</mark>	11.1
2005	Berkeley, Calif.	36,485	\$215,645	53.9
2004	Bismarck, N.D.	17,821	\$496,227	7.1
2007	Boise, Idaho	23,262	\$96,238	19.2
2005	Boulder, Colo.	25,281	\$357,255	44.9
2006	Charleston, S.C.	15,244	\$171,406	28.3
2005	Charlotte, N.C.	85,146	\$2,077,393	209.5
2004	Cheyenne, Wyo.	17,010	\$55,301	5.7
2003	Fort Collins, Colo.	31,000	\$403,597	37.4
2005	Glendale, Ariz.	21,480	\$18,198	1.0
2007	Honolulu, Hawaii	235,800	\$350,104	35.0
2008	Indianapolis, Ind.	117,525	\$1,977,467	318.9
2005	Minneapolis, Minn.	198,633	\$9,071,809	334.8
2007	New York City, N.Y.	592,130	\$35,628,220	890.6
2009	Orlando, Fla.	68,211	\$539,151	283.7
2003	San Francisco, Calif.	2,625	\$466,554	99.2
2001	Santa Monica, Calif.	29,229	\$110,784	3.2

USEPA, 2013. Stormwater to Street Trees, Engineering Urban Forests for Stormwater Management. EPA 841-B-13-001.







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Reforestation of Upland Areas

Reduce

20,000 gallons PER DAY An acre of maple trees can put as much as 20,000 gallons of water into the air each day.



enough 🕊

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A single tree produces approx. 260 lbs of oxygen per year, meaning two mature trees provide enough oxygen for a family of four.

~CarbonDay.com

one person causes 10 TONS OF CO2 PER YEAR

S One person causes about 10 tons of carbon dioxide to be emitted a year. One tree removes about 1 ton of CO2 per year, and 1 acre of trees absorbs 2.6 tons of CO2 per year.

Trees muffle urban noise

almost as effectively as stone

walls. A properly designed buffer of trees and shrubs can reduce

noise by about 5-10 decibels. -USDA National Agroforestry Center



SOIL

In 50 years one tree produces \$31,250 worth of oxygen, provides \$62,000 worth of air pollution control, recycles \$37,500 worth of water and controls \$31,250 worth of soil erosion.

~USDA Forest Service

TEAM means.....

Together Everyone Achieves More!







Trees and Stormwater A Guide for Local Decision Makers www.treesandstormwater.org



The natural solution is the best solution

Trees intercept rainfall and help increase infiltration and the ability of soil to store water. By retaining water in their 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.















Partners & Stakeholder Engagement

- Regional Advisory Committee
- National Advisory Committee
- Expert Consultations
 - Engineers
 - Urban Foresters
 - Stormwater Managers
- Webcasts, Surveys, Workshops













Understanding the Role of Trees

Integrating Trees as Component of Stormwater Management

















The Findings

- It Works!
- Return on Investment
- Regionally relevant case studies
- Create a customizable report to inform and base decisions



www.treesandstormwater.org





Stormwater and Trees Project & Video



www.stormwaterandtrees.org







Why Build a Document?

- Because you want to learn about stormwater management and trees
- Because you want someone else to learn the same thing
- Because adding trees to new development and redevelopment initiatives and save money and create healthier, more livable neighborhoods.

Think of this as both a learning and teaching tool ... and a way to stimulate policymakers











How Does it Work?









So What is It?

A detailed questionnaire which enables you to characterize your community, and how it manages its trees.

Our current urban tree canopy covers this % of our community:		ere:	
I can't locate these figures and/or to my knowledge,			
they don' <mark>t exist:</mark>			
and the second se			
Does your community maintain an inventory of	□Yes	□No	■Not
street-side and road-side trees:	Sure		
Has a comprehensive plan ["comp" plan] been	□Yes	■No	□Not
adopted for your community?	Sure		
If yes, are there specific provisions that deal with	□Yes	■No	□Not
your community's water resources?	Sure		
If there are provisions that deal with water	□Yes	■No	□Not
resources,	Sure		
do they call for use of green infrastructure to help			
implement the plan?			
Is your community part of a regional planning	■Yes	□No	□Not
organization?	Sure		

Urban Forests in Your Community

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.

Our current urban tree canopy covers this % of our community:	sert % here	
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
To the best of your knowledge, is your urban tree canopy distributed through <u>all</u> neighborhoods in your community?	□ _{Yes} □No	□Not Sure
Take 20 Minutes to Find Out About Your Urban Forest: Link to I Tree Landscape	Where It Is, and \	What It Does!

Download results to your user library.





The Value of Urban Forestry

Trees in neighborhoods provide many vital benefits that aren't well-known or even acknowledged. And the value of these benefits far outweighs the cost of managing the trees that deliver them.

Tell us what benefits you'd like to explore – and that others in your community need to know about. We'll add a brief description to your case statement for each of the benefits you mark.

For Stormwater Management	[✓] if Interested
Interception	
Infiltration	
Pollution Reduction	
Evapotranspiration	
Soil Conditions [macropores]	
Flood Control	





The Value of Urban Forestry

Benefits to the Public	[✓] if Interested
Air quality	
Public health	
Children's health and well-being	
Energy conservation	
Carbon sequestration	
Mitigating urban heat island	
Vibrant business districts	
Safer, healthier and more cohesive neighborhoods	
Other [Type]	
Other [Type]	







The Answers

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.

If No or Not Sure, ADD: 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.

Street Tree Inventory. A street tree inventory enables us to plan periodic inspections, check for pests and disease, remove hazardous trees and reduce liability.

If No or Not Sure, ADD: Without one, we're stuck in a reactive mode, fixing problems as they're reported – often spending more to accomplish less.







Excerpts from a "Built Document



Region:

Great Lakes:

This region is characterized by cold winters and warm to hot humid summers. Heavy precipitation can fail anytime of the year but occurs most often in the spring and summer. Snow is common in the winter with heavy accumulations in the northern portions of the region especially the narrow bands on the eastern south eastern shores of the great lakes. This region is home to the world's largest supply of liquid fresh water. Precipitation range 30 – 50 inches annually.

Urban Forestry in Your Community

With our urban forestry master plan, we can identify the benefits we get from trees, and make certain that these benefits are equitably distributed. 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.

An urban forestry master plan would help identify opportunities to assure healthy trees on both public and private lands, and assure that the community [including the owners] accrue all the benefits these trees deliver – energy savings, stormwater management, ideaner air, and others.

- Covers all sections
- Text correlated to answers from questionnaire
- Can be edited off-line
- Images, maps, charts and tables can be added
- Exportable







What's Covered

- **Urban Forestry in Your Community**
- The Value of Urban Forestry
- **Characteristics of Your Urban Forests**
- **Private Land Policies in Place in Your Community**
- **Demonstrating How Urban Forestry Helps Manage Stormwater**
- Exemplary projects, including schematics
- Case studies
- Flow reduction calculators
- Creating coalitions
- Common barriers and solutions
- Funding





Partnerships are the key to success

KNOW YOUR COMMUNITY - IMPLEMENT - MONITOR AND MAINTAIN - RESOURCE LIBRARY DOCUMENT BUILDER



Finding and Recruiting Allies

You can't do it alone. To make yours a tree-rich community, you'll need to find and recruit allies from other municipal departments, community leaders, and the public itself.



Engaging and Motivating Stakeholders

To achieve green infrastructure and tree canopy goals, you must influence what residents, businesses, and institutions do on their own property.





The Guide Has Resources for You



urbancanopy



Case Studies	Stormwater Impact
Community Engagement (8)	
General Guidance (23)	Best Management Practice (10)
Innovative Design (4)	Fact Sheet (7)
Modeling Impacts (4)	General Guidance (19)
Multi Agency Alignment (7)	
Plans (35)	Tools & Calculators (12)
Public Private Partnerships (3)	Tree Selection (6)
Use of Available Technologies (8)	
Zoning, Ordinances, Regulations, Incentives (7)	Useful Approaches (10)

Case Studies & Stormwater Impacts





Project Design

- Examples (15)
- Fact Sheet (12)
- General (13)

Manuals (19)

- Tools (11)
- Tools & Calculators (2)
- Tree Selection (7)

Col	Benefits		
	Air Quality (3)		
	All (12)		
	Community (3)		
	Economic (4)		
	Education (3)		
	Public Health (7)		
	Urban Heat Island (3)		
	Water Quality (6)		

Project Design & Co-Benefits





Public Policies & Planning Resources

ub	lic Policies
	Best Management Practices (8)
	Community Engagement (4)
	General Guidance (28)
	Manuals (3)
	Model Ordinance (16)
	Plans (6)
	Tools (2)
	Zoning, Ordinances, Regulations, Incentives (8)





Online Guide helps you build the case for trees and stormwater management, and.....



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Partnerships are the key to success

Trees & Stormwater (beta)

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Trees Bring Out Partners







Partnerships will make the Lick Run Greenway a Reality

Housing Opportunities Made Equal

Communities of the Future Advisory Committee

Agenda 360 Center for Sustainable Urban Engineering Cincinnati Historic Preservation Association Cincinnati Public Schools Cincinnati State Center of Innovative Technologies City of Cincinnati: Department of Transportation & Engineering City of Cincinnati: Cincinnati Community Development City of Cincinnati: Code Enforcement City of Cincinnati: Department of City Planning & Buildings City of Cincinnati: Office of Environmental Quality City of Cincinnati: Parks Department City of Cincinnati: Stormwater Management Utility Community Building Institute: Xavier University Community Development Corporations Association of Greater Cincinnati and Northern Kentucky Duke Energy Greater Cincinnati Energy Alliance Greater Cincinnati Foundation Green Partnership for Greater Cincinnati Hamilton County Board of County Commissioners Hamilton County Development Company Hamilton County Planning & Development Hamilton County Prosecutor Hamilton County Public Health Hamilton County Soil & Water

IMAGO Interfaith Business Builders Keep Cincinnati Beautiful Local Initiatives Support Corporation Metropolitan Sewer District of Greater Cincinnati Mill Creek Watershed Council of Communities Mill Creek Restoration Project Ohio Department of Development Ohio Department of Natural Resources Ohio Environmental Protection Agency Ohio Valley and Southern States Laborers-Employers Cooperation and Education Trust Ohio-Kentucky-Indiana Regional Council of Governments Ohio Balanced Growth Program: Cleveland State University Port of Greater Cincinnati Development Authority Price Hill Will Queen City Catalytic Development Corporation San Antonio Church Santa Maria Community Services Sieirra Club South Fairmount Business Association South Fairmount Community Council Southwest Ohio Regional Transit Authority (SORTA)

United States Department of Housing and Urban Development' United States Environmental Protection Agency (Office of Research & Development) United States Green Building Council (Cincinnati Chapter) University of Cincinnati

Communities





Hamilton County Storm Water District

Banklick Watershed Plan

"Efforts should be focused to preserve and protect high quality forested areas where features are present that significantly contribute to protecting water quality and quantity."

















Critical Areas Identification

 Using GIS tools to identify forests most valuable for protecting watersheds.









Critical Areas for Protection

- Total = 12,188 acres
- 33% of entire watershed



urbancanopy







Don't Go It Alone!







urbancanopy works, LLC

Trees Are the Answer!

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