

NATIONAL WATERSHED AND STORMWATER CONFERENCE | 2019

APRIL 29 - MAY 2, 2019
Historic Charleston, South Carolina

#CWPConference19



Speakers

Neely Law, PhD

Director of Education and Training with the Center for Watershed Protection

Trisha Moore, PhD

Assistant Professor, Department of Biological and Agricultural Engineering at Kansas State University

Dane Wudel, P.E.

Water Resources Engineer for MARS-EOR

Charles Barden

Professor, Department of Horticulture and Natural Resources at Kansas State University



Urban Trees & Stormwater Management Workshop

AGENDA

- 1:00 Welcome and Introductions (Kuehler, Law)
- 1:10 Unraveling the influence of trees on urban stormwater quality and quantity: Digging into the data (Moore)
- 1:45 Making Urban Trees Count: Taking credit for trees in stormwater designs
- 2:20 BREAK
- 2:35 Integrating a canopy interception spreadsheet tool with WinSLAMM for site stormwater design: potential water quantity and quality benefits (Wudel)
- 3:10 Filling a Need: Developing training for stormwater managers on the influence of trees on urban stormwater (Barden)
- 3:45 Panel Discussion, Q&A (Kuehler, Law)



Resources and handouts provided on flashdrive



MAKING URBAN TREES COUNT: TAKING CREDIT FOR TREES IN STORMWATER DESIGNS

Center for Watershed Protection

Neely L. Law, PhD, Karen Cappiella, Bill Stack, P.E., Deb Caraco, P.E.

Justin Hynicka



OUTLINE

- Current application of trees for stormwater management, Q&A
- Urban Forestry Stormwater Calculator
- Application of calculator (see handout or view calculator)
- Discussion of results





The Urban Tree Canopy

Review of Existing Tree Stormwater Credits

Community	Type of Credit	Credit for a Deciduous Tree
Sacramento, CA	IC	100ft ² – 200 ft ²
Seattle, WA	IC	20ft ² – 50 ft ²
Pine Lake, GA	Volume	<12" DBH: 10 gallons/in; >12" DBH: 20 gallons/in
Washington, DC	Volume	10ft ³ (20ft ³ for preservation)
Vermont	Volume	5ft ³
Minnesota	Volume and P load	Depends on soil volume and other factors
Chesapeake Bay Program*	N, P and S load	Relative reduction % for area tree planted

Source: Stone Environmental, 2014, *Law and Hanson, 2016



“Making Urban Trees Count”: A stormwater credit framework for urban tree planting

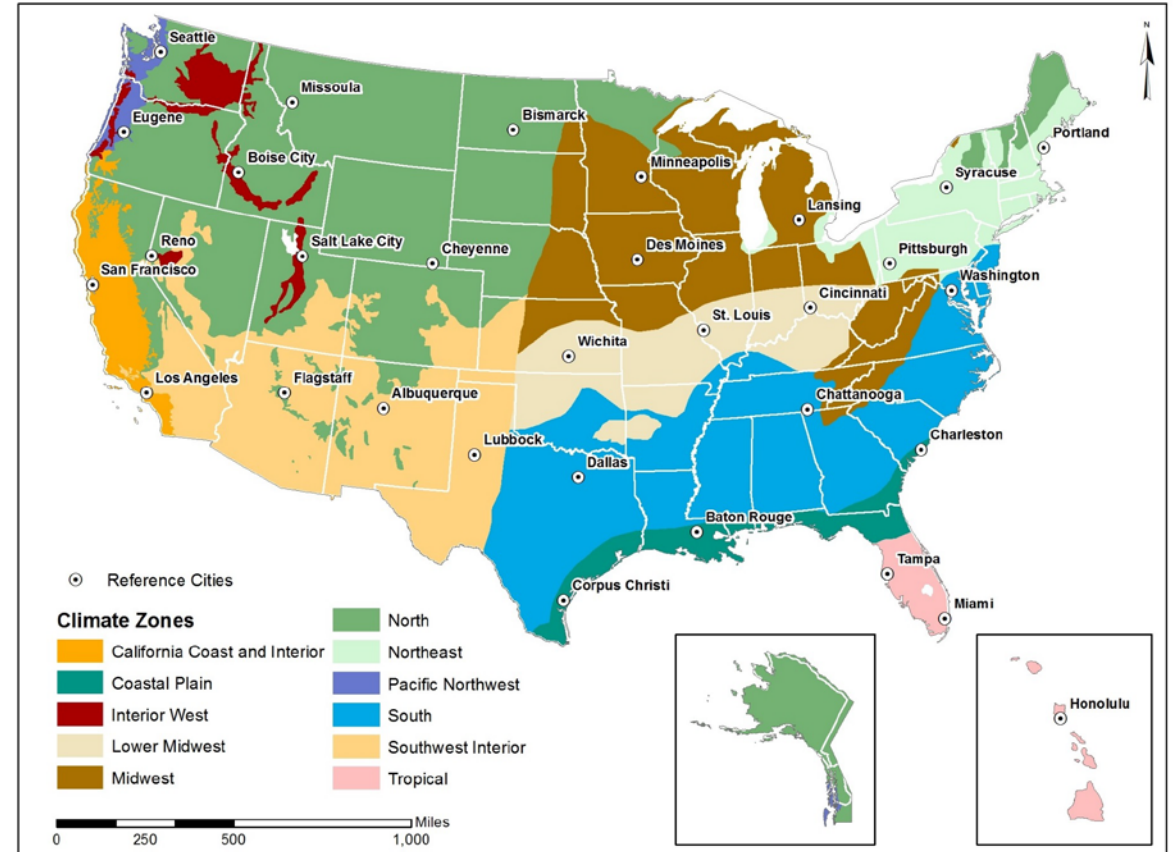
- To provide science-based credit to encourage use of trees to meet stormwater management requirements
- Elements for consideration:
 - Location
 - Regulatory context
 - Stormwater Credit Currency

National Urban and
Community Forestry
Challenge Cost-
Share Grant
Program



Urban Forestry Stormwater Calculator Overview

- i-Tree Forecast
- Water balance model
- 11 Climate zones
- 31 locations
- 2 Reference land covers
- 4 Hydrologic Soil Groups
- 5 Tree Types

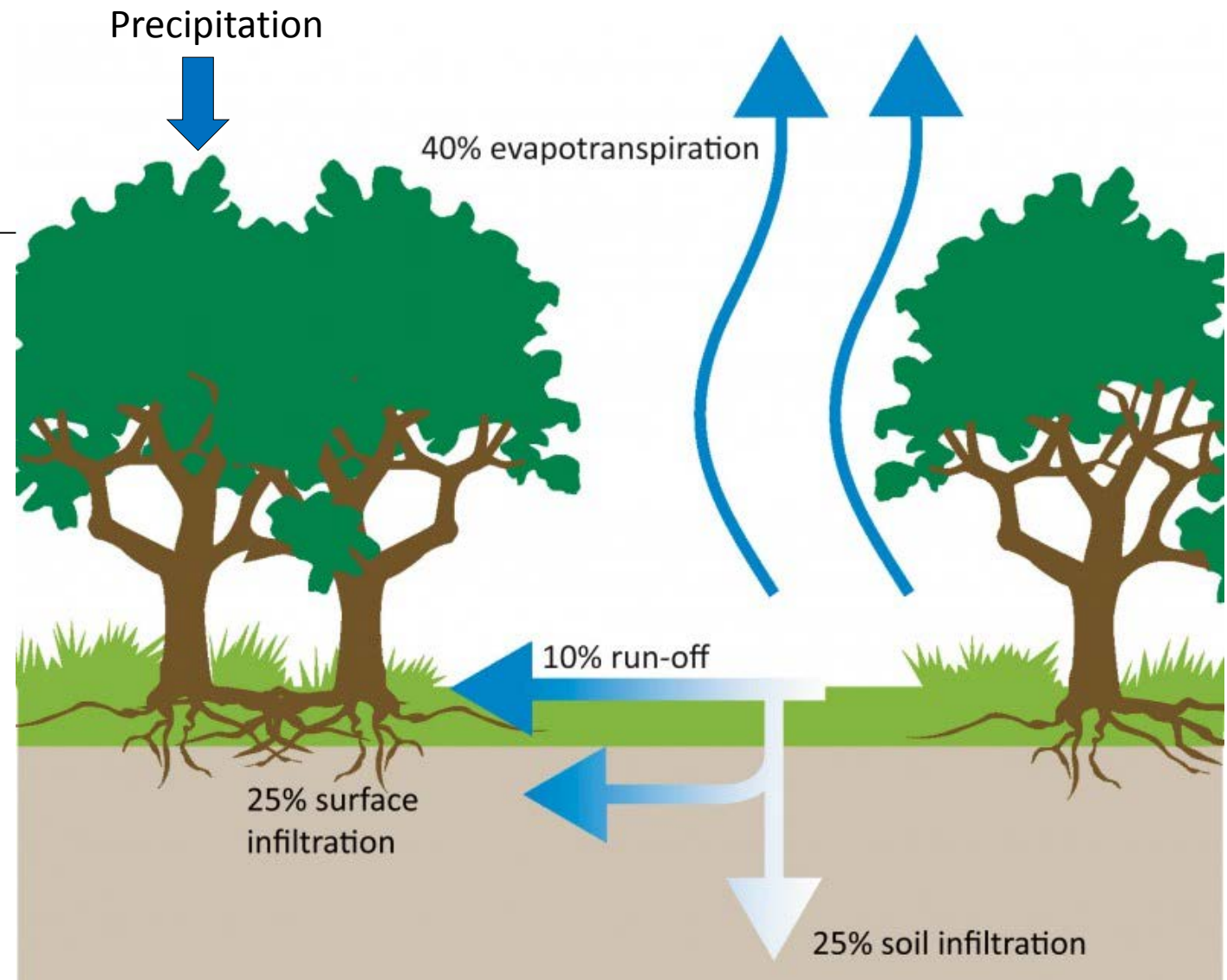




Water Balance Approach

General Mass Balance:

$$\text{Input} = \text{Outputs} + \text{Storage}$$



http://www.urbangreenbluegrids.com/uploads/Hittestress_illustraties-3-e1370973625797-793x630.jpg



Annual TMDL Credit Calculation Inputs

User Input

- Climate zone
- Soil Type
- Land Cover with default land use concentrations
- Qualifying conditions
- Tree Type (5)
- Number of trees planted

1	The Credit Calculator calculates the credit associated with planting a specified number of trees, based on user inputs. The calculator provides an example of how the credit works and can also be			
2	incorporated into the TMDL planning and crediting process. Results reflect the annual pollutant reduction benefits provided by trees at maturity. Adopters of this credit framework may opt for a			
3	credit release schedule to incentivize tree care and ensure the tree reaches maturity.			
4				
5	STEP 1	Select Climate Zone:		
6		South		
7				
8	STEP 2	Select Soil Type:		
9		HSG C		
10				
11	STEP 3	Select Land Cover:	Default TN Concentration (mg/L)	Default TP Concentration (mg/L)
12		Pervious	1.45	0.25
13			User-Defined TN Concentration (mg/L)	User-Defined TP Concentration (mg/L)
14	STEP 4	Enter User-Defined Pollutant Concentrations (Optional) >>		
15				
16	STEP 5	Have all the qualifying conditions listed below been met?		
17		Yes		
18		Qualifying conditions:		
19		Maintenance plan is in place		
20		Qualified professional (e.g., licensed arborist, urban forester) was consulted on selection of appropriate species, site preparation and siting to provide sufficient soil volume		
21		Leaf litter pickup program is present for the planting site (required only when seeking credit for trees planted over impervious cover)		
22				
23	STEP 6	Select Tree Type:		
24		Broadleaf Deciduous medium (BDM)		
25				
26				
27	STEP 7	Enter Number of Trees Planted:		
28		100		
29				
30				
31		RESULTS:		
32		TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	TSS Reduction (lbs/yr)
		2.8	0.48	267
				Runoff Reduction (gallons)
				229,204



Resources and handouts provided

- CWP Urban Forestry Stormwater Calculator Tool
- Calculator Tool Documentation
- Summary of results from example scenarios
- Characteristics of representative trees used in scenarios
- Comparison of models used to estimate hydrologic benefits of trees



Let's take a look

- 2 Scenarios
 - Urban street trees (100 broadleaf medium)
 - Urban woodlot (50 broadleaf large, 25 broadleaf medium, 25 broadleaf small)
- 4 Climate Regions
 - Coastal Plain, South, Pacific NW, Midwest



Making Urban Trees Count: A Project to Demonstrate the Role of Urban Trees in Achieving Regulatory Compliance for Clean Water

Center for Watershed Protection
December 2017



CREDITING FRAMEWORK PRODUCT #4: Pollutant Load Reduction Credit Tool

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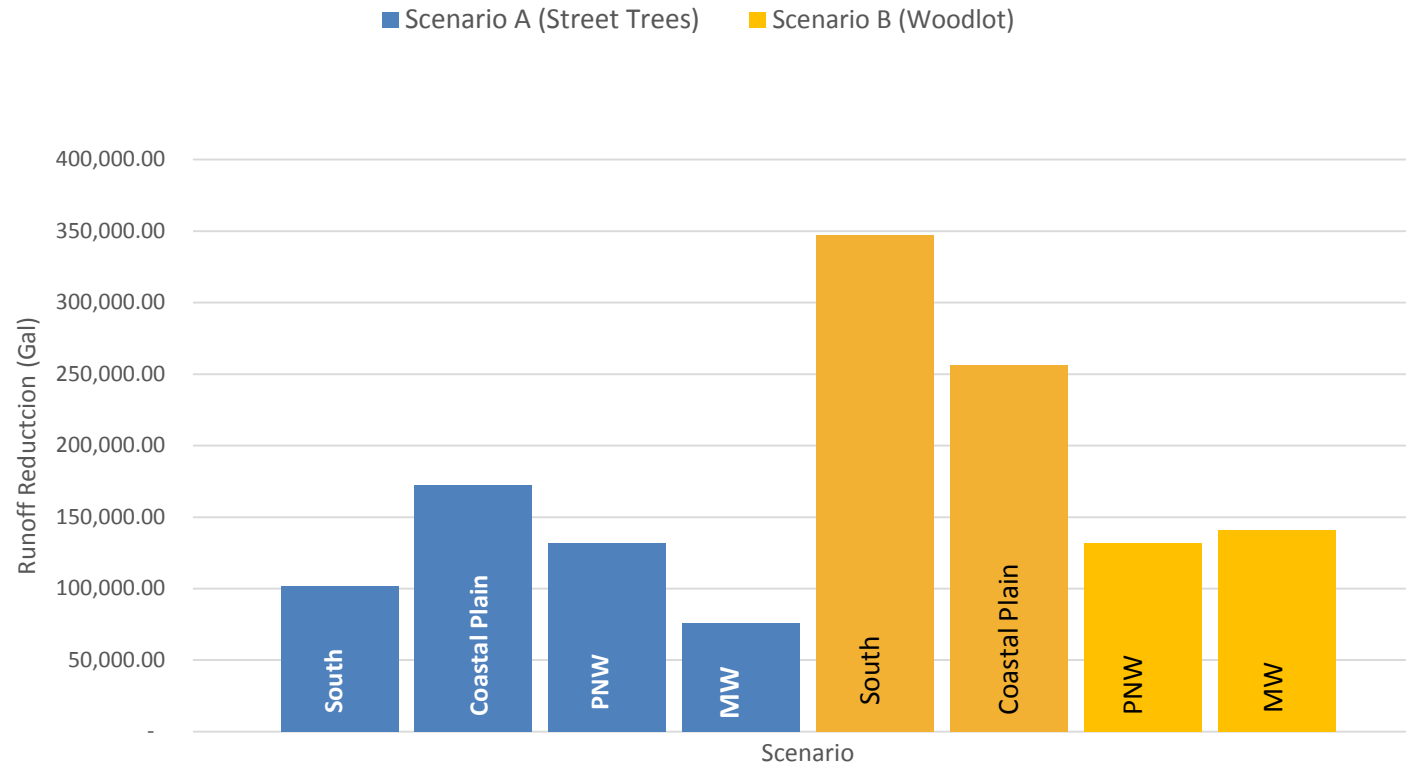
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Results



Let's Wrap It Up

- Evaluate existing 'one size fits all' credit
- Tool may provide guidance on variable credit
- Effect of local climate, tree species and land cover
- Significance of soil environment and effect on ET and Runoff
- Existing need to better understand pollutant dynamics and urban tree canopy
- Additional calculators developed for 'event' or performance-based credit also available at www.cwp.org
- Learn more about Trees & Stormwater on Wednesday, Session 4

