

Urban Watershed Forestry and Strategic Tree Planting

Urban watershed forestry is an integration of the fields of urban and community forestry and watershed planning. *Urban and community forestry* is the management of the urban forest for environmental, community, and economic benefits, while *watershed planning* promotes sound land use and resource management to improve water resources within a watershed. Therefore, urban watershed forestry sets watershed-based goals for managing the urban forest as a whole rather than managing forest resources on a site-by-site or jurisdictional basis, and provides strategies for incorporating forests into urban watershed management.

This integration of urban forestry techniques into urban watershed management acknowledges the importance of trees and forests in protecting water resources. This approach encourages watershed managers and urban foresters to systematically assess existing urban forests to determine how best to manage them to meet watershed protection and restoration goals.

Goals of Urban Watershed Forestry are:

Protect undeveloped forests through planning.

Enhance the health, condition, and function of urban forests fragments.

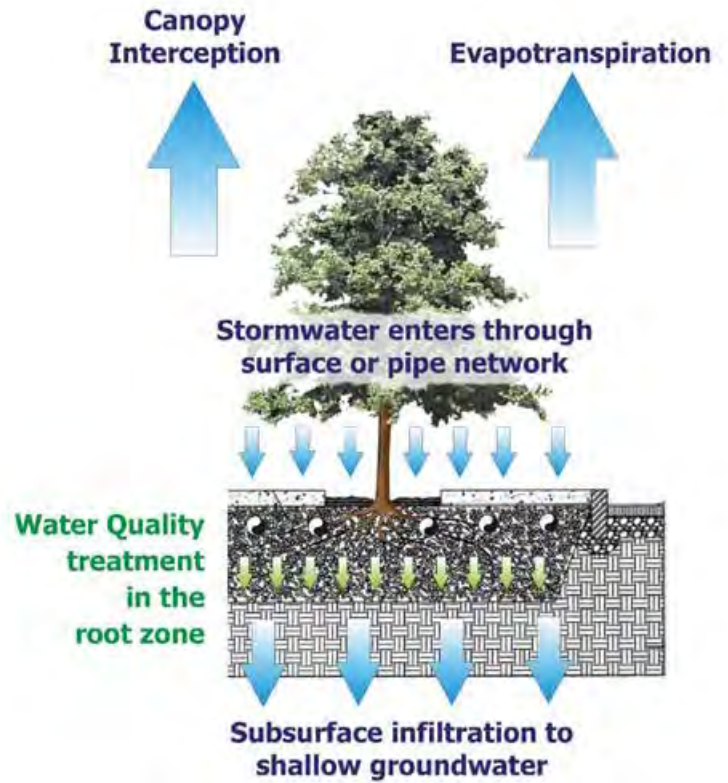
Reforest open land through active replanting.

Urban Watershed Forestry Objectives, by Goal		
Goal	Objective	Description
1. Protect	A. Protect Priority Forests	Select large tracts of currently unprotected and undeveloped forest to protect from future development.
	B. Prevent Forest Loss During Development and Redevelopment	Directly or indirectly reduce forest clearing during construction.
	C. Maintain Existing Forest Canopy	Prevent clearing and encroachment on existing protected and unprotected forest fragments on developed land.
2. Enhance	D. Enhance Forest Fragments	Improve the structure and function of existing protected forests.
3. Reforest	E. Plant Trees During Development and Redevelopment	Require on-site reforestation as a condition of development.
	F. Reforest Public Land	Systematically reforest feasible planting sites within public land, rights-of-way, or other priority sites.
	G. Reforest Private Land	Encourage tree planting on feasible locations within individual yards or property.

Tree-based Stormwater BMP

Four Functions

1. Canopy Interception
2. Evapotranspiration
3. Subsurface infiltration
4. Water quality treatment in root zone








hydrologic and water quality benefits of trees		
benefit	Per tree annual quantification of benefit	source and description
Rainfall interception	760 gallons of water per tree per year	Annual rainfall interception by a large deciduous front yard tree
Evapotranspiration	100 gallons of water per tree per year	Transpiration rate of poplar trees for one growing season
Nutrient uptake	0.05 pounds nitrogen per tree per year	Based on daily rate of nitrogen uptake by poplar trees

*A 40-year-old London plane tree growing in a semi-arid climate

Planting trees as storm water treatment practices can increase nutrient uptake, reduce storm water runoff through rainfall interception and evapotranspiration, enhance soil infiltration, provide bank stabilization, increase esthetic appeal, provide wildlife habitat, provide shading, discourage geese, and reduce mowing.

Planting Trees in Storm Water Treatment Practices

Special Considerations		
Storm water treatment Practices	Special considerations for tree planting	Related storm water forestry Practices
Storm water wetland 	<ul style="list-style-type: none"> • Storm water runoff • Poor soils (e.g., pollutants from storm water runoff) • Inadequate soil volume (from compacted side slopes) • Human impacts (mowing) 	<p>Wooded wetland</p> <p>Urban Watershed Forestry Manual: Part 2, page 29.</p>
Bio-retention – Bio-infiltration 	<ul style="list-style-type: none"> • Storm water runoff • Poor soils (e.g., pollutants from storm water runoff) • Infrastructure conflicts (underdrain) 	<p>Bio-retention and bio-infiltration facilities</p> <p>UWF Manual: Part 2, page 35.</p>
Dry swale 	<ul style="list-style-type: none"> • Storm water runoff • Poor soils (e.g., pollutants from storm water runoff) • Human impacts (mowing) • Inadequate soil volume 	<p>Alternating side slope plantings: UWF Manual: Part 2, page 38.</p> <p>Tree check dams: UWF Manual Part 2, page 40.</p>
Filter strip 	<ul style="list-style-type: none"> • Storm water runoff • Poor soils (e.g., pollutants from storm water runoff) • Human impacts (mowing) 	<p>Forested filter strip: UWF Manual: Part 2, page 43.</p> <p>Multi-zone filter strip: UWF Manual: Part 2, page 46.</p>
Urban tree pit 	<ul style="list-style-type: none"> • Inadequate soil volume • Storm water runoff • Poor soils (e.g., pollutants from storm water runoff) • Infrastructure conflicts (under drain) 	<p>Linear storm water tree pit (Part 2, page 49)</p>

Reforestation Public Lands

Public lands often present the best opportunities for reforestation in a watershed. Reforestation public lands allows the entire community to enjoy the recreational, educational, and esthetic benefits of trees.

Priority Reforestation Sites	Description	Guidance
<p>Highway rights-of-way</p> 	<ul style="list-style-type: none"> • Large parcels of unused land in the form of clover-leaves near interchanges, median strips, and buffers. • Can provide a visual screen and buffer from noise and highway fumes. 	<ul style="list-style-type: none"> • Follow highway planting guidelines. • Plant trees in groups to provide shared rooting space and allow mowing around trees to control invasive species. <p>Urban Watershed Forestry Manual Part 1, page 63.</p>
<p>Parks & School grounds</p> 	<ul style="list-style-type: none"> • Often large underutilized open spaces available for planting trees. Added benefits include wildlife habitat, shading, and improved recreational and educational opportunities. • Integrate trees with recreational uses. 	<ul style="list-style-type: none"> • Plant to provide shade to playgrounds and bleachers. Use trees to create screens and boundaries between different areas. • Use mulch to retain moisture and protect trees from mowers and foot traffic. <p>UWF Manual – Part 1, pages 72-79.</p>
<p>Parking lots</p> 	<ul style="list-style-type: none"> • Two distinct areas where trees can be planted-the interior and the perimeter - each with unique considerations. • Benefits include shade, reduction of heat island effect, improved esthetics, and improved air quality. 	<ul style="list-style-type: none"> • When properly built, these landscaped areas can double as storm water treatment facilities, which can result in cost savings for the developer. • Provide clear lines of sight, safe travel surfaces, and overhead clearance for movement of vehicles and pedestrians. <p>UWF Manual– Part 2, page 61.</p>
<p>Storm water dry ponds</p> 	<ul style="list-style-type: none"> • These areas are devoted to treating urban storm water and can comprise up to 3% of the total land area. • Trees can increase the esthetic value, and may increase pollutant removal. 	<ul style="list-style-type: none"> • Plant trees in groups to provide shared rooting space and allow mowing around trees to control invasive species. • When planting on pond side slopes, create small earthen berms around trees to help retain moisture. <p>UWF Manual - Part 1, page 80.</p>
<p>Streams and shorelines</p> 	<ul style="list-style-type: none"> • Provides many benefits, including regulation of stream temperature, stabilization of stream banks, enhancement of habitat for both aquatic and terrestrial species, and pollutant removal. 	<ul style="list-style-type: none"> • Storm water treatment practices such as filter strips and bio-retention may work best here, although depending on space available, storm water wetlands could also be used. <p>UWF Manual - Part 1, page 83</p>