

Pollinator Plants for Stormwater Management Facilities

PLSC 460

Adelaide Figurskey, Israel Orellana, Liz Pritchett

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Stormwater Management

What is stormwater?

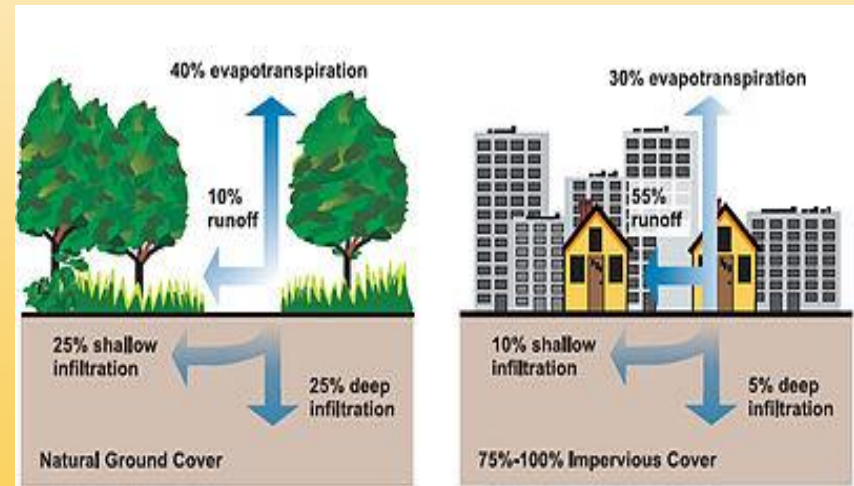
Precipitation that accumulates in natural and/or constructed storage and stormwater systems during and immediately following a storm event.

Why is managing stormwater important?

- Hard surfaces (streets, parking lots, rooftops) increase runoff
- Runoff carries sediment, chemicals, debris, toxins, and pollutants to waterways
- Pollutants in waterways affect ecosystem balance and human activities

What is stormwater management?

The control of stormwater in order to reduce the amount of runoff into waterways and allow water to drain more naturally in urban ecosystems.



Background Information

Project Deliverables

Pollinator Plant Selection Guide

- Literature review on stormwater management
- Review three stormwater sites to test plant materials for a building, parking lot island, and open field
- Plant palette fact sheet



Project Goal & Sample Sites

Design a plant palette for three potential stormwater management system sites:

Site 1: Kentland Community Center, Landover, MD

Site 2: View from a Building

Site 3: Stormwater Pond

Project Goal & Sample Sites

Site 1: Kentland Community Center, Landover, MD

Already established SWM systems:

stormwater swales, large bioretention
swales, wet pond

Issues:

heat in parking lot islands
lack of staff to control weeds, invasive plants,
geese and deer presence



Kentland - System 1



Parking Lot Island (stormwater swales)

Kentland - System 2



Large Bioretention Swales



Photo credit: Aashade Egunyale

Kentland - System 3

Wet Pond



Plant Palette Criteria

Plant selection based on these requirements:

1. **Native:** ~80%-100% native plant material
2. **Growth Habit:** aggressive spread and establishment to compete with invasives
3. **Wildlife Attraction:** attractive to native wildlife and pollinators (bees, butterflies, birds, hummingbirds)
4. **Aesthetic Value:** aesthetically pleasing, attractive to visitors
5. **Low Maintenance**
6. **Deer Tolerant/Resistant**
7. **Soil Tolerance:** survivability in extreme dry/wet conditions



Photo credit: Adelaide Figurskey

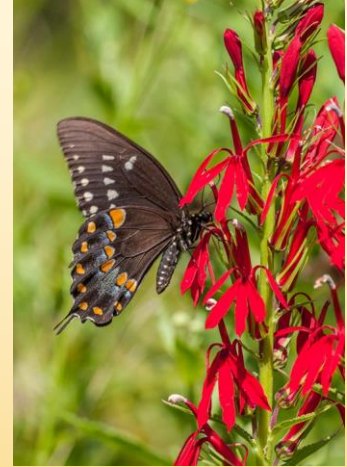


Photo credit: Adelaide Figurskey

Pollinator Plant Selection Guide

Information on the Pollinator Plant Selection Guide:

- Common Name, Scientific Name
- Native or Non-Native
- Plant Hardiness Zone
- Height and Spread (ft.)
- Wetland Indicator Status
- Site Recommendation - i.e. suitability for specific stormwater infrastructure
- Light Requirements
- Bloom Time and Color
- Wildlife Attractants
- Erosion Tolerance
- Deer Resistance
- Special Requirements
- Plant Pictures



<https://the-natural-web.org/2012/07/23/ruby-throated-hummingbirds-and-cardinal-flowers-a-perfect-partnership/>

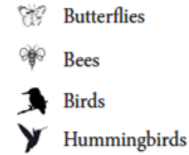


<https://www.gardenia.net/plant/eutrochium-purpureum>

Sample Plant Palette Key

Stormwater Management Plant Palette Key

Wildlife Attraction



Light Tolerance



N Native

 Suitable for slopes

Flower color



Wetland Indicator Status Rating

Indicator status (abbreviation)	Ecological description (Lichvar and Minkin 2008)
Obligate (OBL)	Almost always is a hydrophyte, rarely in uplands
Facultative Wetland (FACW)	Usually is a hydrophyte but occasionally found in uplands
Facultative (FAC)	Commonly occurs as either a hydrophyte or nonhydrophyte
Facultative Upland (FACU)	Occasionally is a hydrophyte, but usually occurs in uplands
Upland (FAC)	Rarely is a hydrophyte, almost always in uplands.

Permanent
water pool



Regularly
inundated



Periodically
inundated



Infrequently
inundated



Upland slope,
withstand
high-runoff



Sample Plant Palette Page



Cornus florida
Flowering Dogwood

N zones 5 - 9 30' ↑ 22' →

FACU



Showy white to pink/red flowers in May to June. Red to maroon fall color. Lower branches droop to create landscape value. Tolerates deer and clay soil.

Gordonia lasianthus
Loblolly-Bay

N zones 7 - 9 60' ↑ 15' →

FACW



Flowers bloom from May to October.

Liquidambar styraciflua
American Sweetgum

N zones 3 - 9 75' ↑ 50' →

FAC



Flowers bloom in March to May. Purple and red fall foliage. Fruit hangs on until January.

Magnolia virginiana
Sweetbay Magnolia

N zones 5 - 9 35' ↑ 20' →

FACW



Showy, fragrant flower in May to June. Tolerates clay soil, wet soil, and air pollution.



Nyssa sylvatica
Black Gum

N zones 2 - 9 50' ↑ 30' →

FAC



Insignificant flower in May to June. Shade tree and street tree Tolerates clay soil and wet soil.



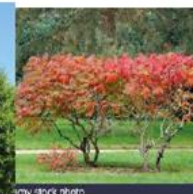
Quercus palustris
Pin Oak

N zones 4 - 8 70' ↑ 40' →

FACW



Insignificant flower in April. Shade tree. Tolerates wet soil.



Rhus glabra
Smooth Sumac

N zones 2 - 9 15' ↑ 15' →

FACW



Showy flower in June. Tolerates rabbits, drought, erosion, dry soil, and shallow-rocky soil.



Sassafras albidum
Sassafras

N zones 4 - 9 60' ↑ 40' →

FACU



Showy flower in April to May. Tolerates deer, drought, and clay soil.

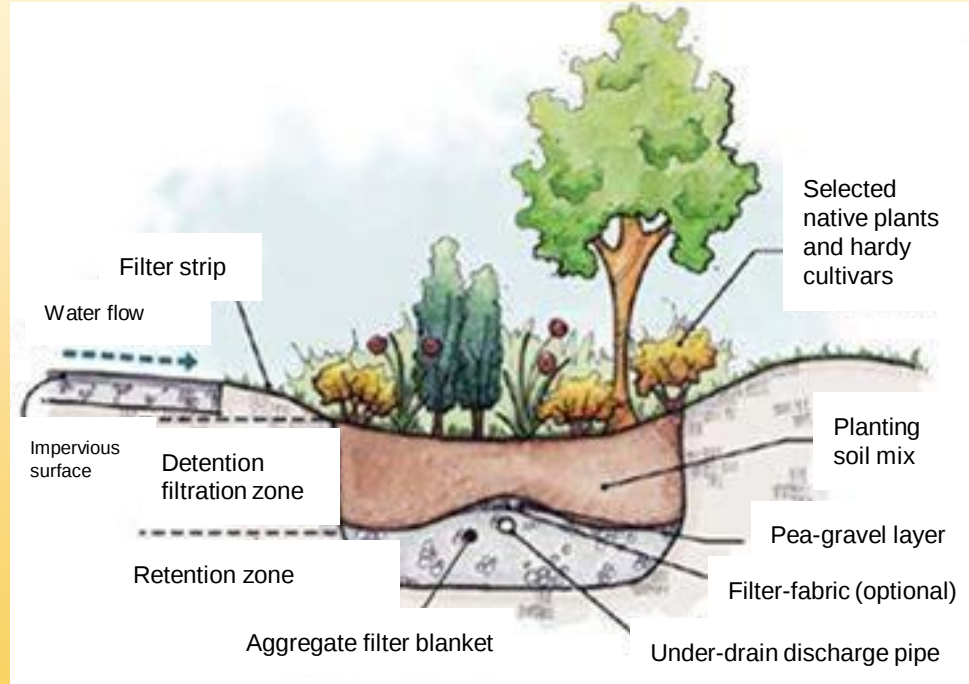
Site 1 (parking lot island) Micro-bioretention

Micro-bioretention captures and treats runoff by passing it through a mixture of sand, soil, and organic matter.

Ideally the bioretention should drain within 24-48 hours after a rain event.

Use native wetland plants that can tolerate both wet and dry conditions.

Plants enhance nutrient and pollutant uptake, and can also provide habitat and aesthetic value.



https://www.researchgate.net/figure/Typical-design-of-a-bioretention-area-with-underdrain-2_fig3_332623263

Site 1: Plant Material Samples

Golden Ragwort
(*Packera aurea*)



http://missouriplants.com/Packera_aurea_page.html

Black Chokeberry
(*Aronia melanocarpa*)



<https://greatplainsnursery.com/product/iroquois-beauty-black-chokeberry-2/>

Pink Muhly Grass
(*Muhlenbergia capillaris*)



<https://www.plantingtree.com/blogs/gardening/pink-muhly-grass-care>

Site 2: View from a building, Bioretention

Daily activities cause pollutants to collect on impermeable surfaces and wash into waterways during rain events. Pollutants, including dirt, oil, fertilizers, yard waste and litter, poison streams and watersheds.

Educational signage will attract visitors and provide information about stormwater management and pollinators.



<https://mde.maryland.gov/programs/Water/SSDS/Pages/index.aspx>



<https://mde.maryland.gov/programs/Water/SSDS/Pages/index.aspx>

Site 2: Plant Materials Sample

New York Aster
(*Symphyotrichum novi-belgii*)



<https://plants.ces.ncsu.edu/plants/symphyotrichum-novi-belgii/>

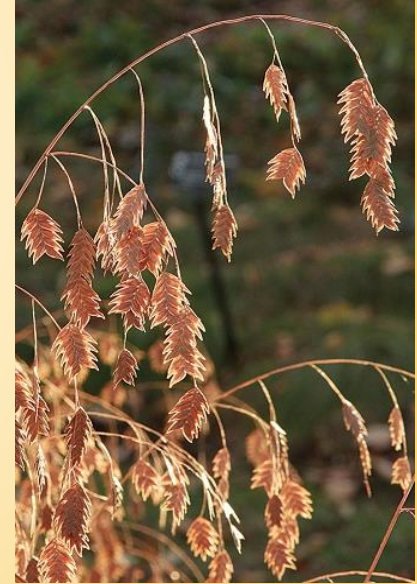
Swamp Azalea
(*Rhododendron viscosum*)



© 2012 Janet Novak

<https://www.ct-botanical-society.org/Plants/view/518>

River Oats
(*Chasmanthium latifolium*)



https://mowidflowers-net.3dcartstores.com/River-Oats-Chasmanthium-latifolium_p_88.html

Retrofitting Existing Parking Lot Islands



https://stormwater.pca.state.mn.us/index.php?title=MS4_fact_sheet_-_Retrofitting:_Infiltration,_Filtration_%26_Bioretenion

Retrofitting can achieve highly effective stormwater management that reduces runoff volume, increases groundwater recharge, improves surface water quality, provides thermal benefits, and helps mimic pre-development hydrology.

Retrofits such as [rain gardens](#) and [swales](#) are versatile because they can be constructed in small areas and easily integrated into existing residential or commercial sites.

Site 3: Open Field - Stormwater Pond



Stormwater ponds are small permanent pools that treat and extend the detention storage of stormwater.

They collect rainwater along with sediment and pollutants, which then settle out before being released into the watershed.

One of their benefits is their aesthetic appearance and introduction of habitat.

Site 3: Plant Material Sample (Stormwater Pond)

Blue Flag
(*Iris*

versicolor)



<https://www.usperennials.com/iris-versicolor-blue-flag-iris/>

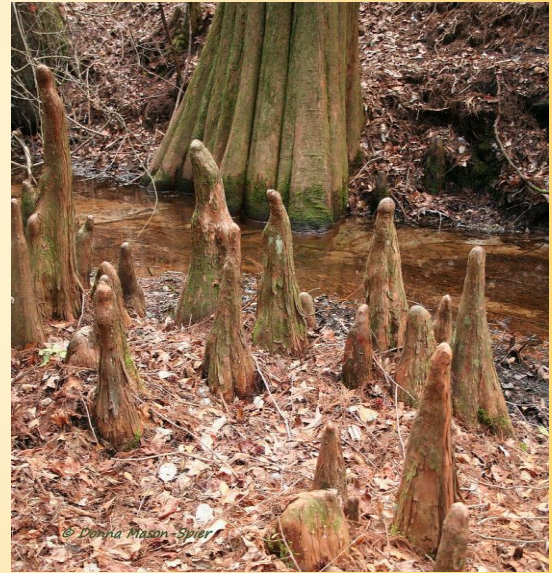
Three Square Bulrush
(*Schoenoplectus*

pungens)



<https://inaturalist.nz/taxa/59072-Schoenoplectus-pungens>

Bald Cypress
(*Taxodium distichum*)



<https://www.marylandbiodiversity.com/viewSpecies.php?species=320>

Site 3: Open Field, Wet Meadow

A wet meadow is an open wetland habitat with soils that are saturated for part or all of the growing season.

Wet meadows share some of their plants with upland meadows.

Certain rare butterfly species are closely tied to wet meadows and similar habitats because as caterpillars they feed on wetland plants such as sedges (Black Dash, Mulberry Wing), Turtlehead (Baltimore Checkerspot) and Water Docks (Bronze Copper).



<https://wisconsinbutterflies.org/butterfly/species/80-baltimore-checkerspot>



<https://www.marylandbiodiversity.com/view/864>



<https://extension.umd.edu/resource/how-make-meadow>

Site 3: Plant Material Sample (Wet Meadow)

New York Ironweed
(*Vernonia
noveboracensis*)



<http://www.missouribotanicalgarden.org/PlantFinder/FullImageDisplay.aspx?documentid=2432>

Cardinal Flower
(*Lobelia cardinalis*)



<https://www.blazingstargardens.com/plants/p/cardinal-flower-lobelia-cardinals>

Soft Rush
(*Juncus effusus*)



<https://www.longislandnatives.com/product/juncus-effusus-soft-rush/>

Educational Signage: Sample 1

Bioretention

Captures and treats runoff by filtering it through a mixture of sand, soil, and organic matter.

Native plants enhance nutrient and pollutant uptake, and can also provide habitat and aesthetic value.

Educational Signage: Sample 2



Rudbeckia laciniata
Cutleaf Coneflower

Thank you!

Questions?

Discussion Question

What kind of educational signage/information would you like to see at these sites?

What are students' general interest in stormwater management?

References

- “Environmental Plant Stormwater Management Terms and Definitions”, Maryland Department of Transportation <https://mdot.ms.gov/documents/Environmental/Plan/Stormwater%20Management%20Terms%20And%20Definitions.pdf>.
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