

Maintaining Stormwater to Improve Ecosystem Services

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Lessons Learned



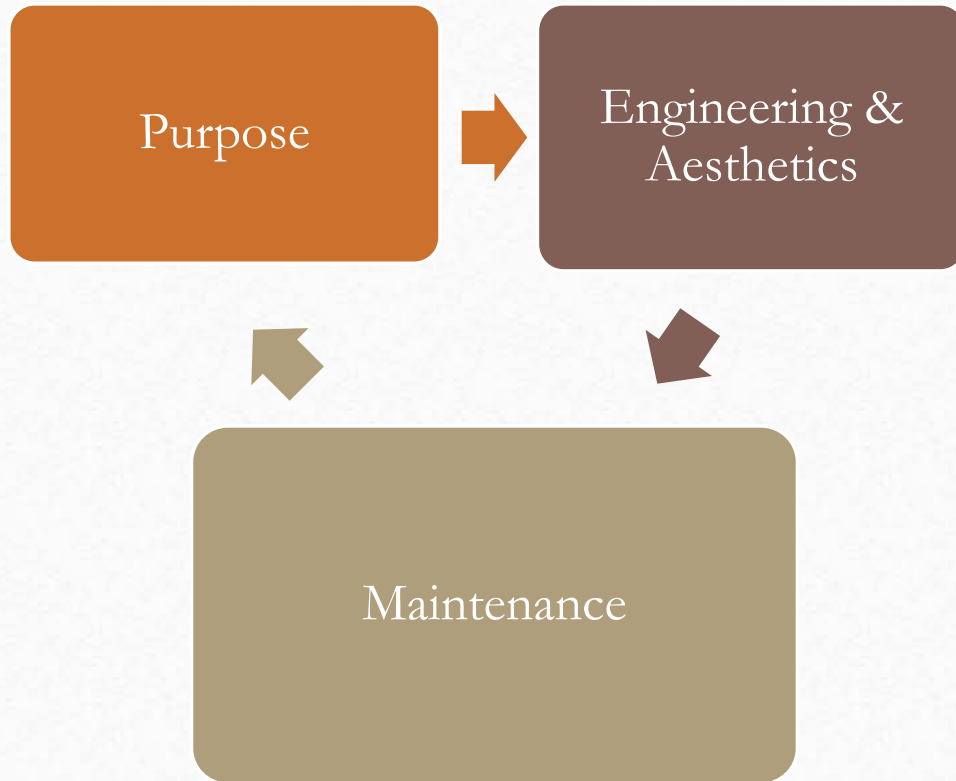
Supporting Ecosystems



New initiatives



RWP Maintenance



- Purpose: mitigate stormwater
- Engineered to function
- Designed with plants for mitigation and aesthetics.
- Municipality maintains BMP to assure its main purpose.



RWP Maintenance

- The ability of the municipality to maintain the BMPs is a function of:
 - Money to maintain inhouse or with contractors
 - Employees
 - Stormwater knowledge
 - Plant knowledge
 - Interest/motivation to properly care for plant material
 - Equipment on hand or funding to purchase equipment

40 RWP Stormwater Sites



RWP Maintenance

- Lessons learned in limiting factors:
 - Staffing
 - Knowledge
 - Killed many plants
 - Errors costly in materials or labor.
 - BMP'S Not always working properly





Lessons Learned

- *Intense Labor Inputs*
- Sites with a mix of grass, smaller plantings and basins require a most labor input.
- Aesthetic is intentional.
- Numerous tools and knowledge sets are required.





Lessons Learned

- *Less Intensive Labor*
- Pavers were less labor intensive, frequent visits.
- Minimal plant material.
- Able to use some mechanized equipment, weed whackers, blowers.





Lessons Learned

- *Least Labor Intensity*
- The sites with heavily naturalized plantings require the least amount of labor input.
- Mostly debris/trash pick-up.





Biggest Lesson Learned?



- Naturalized BMP sites cost less to maintain as they required less visits and less skilled labor.
- Incorporated these maintenance practices to other sites.
- These sites functioned as a part of the naturalized ecosystem.
- As part of the native ecosystem, they increased overall ecosystem services.
- This seemed like a win-win strategy!

Ecosystem Services



- **Regulation (purpose):** climate, erosion control, flood mitigation
- **Provisions:** fresh water, food, habitat, wood
- **Supporting Services:** pollination, nutrient cycling, soil fertility
- **Cultural:** spiritual, aesthetic, recreation, tourism, impacts economy



Maintenance Strategies to Support Ecosystem Services

- Consider Timing of Maintenance:
 - Spring clean ups occur after tax day to accommodate eclosure of overwinter native beneficial insects and bees.
 - Leaf debris from the previous season is left for microbial decay and insect habitat. Soil microbes increase nutrient absorption and release nutrients to plants.
 - Fall plants are left with seed heads to feed migrating and over wintereing birds.
 - When Plants are cut back, 6 to 18 inch stems remain in order to provide nesting sites for native mason bees.



Photo credit: Gardenseeker.com Illustration credit: Illinois Natural History Survey



Maintenance Strategies to Support Ecosystem Services

- IPM Approach for Pest Problems:
 - Qualitative monitoring
 - Insects, both pest & beneficial
 - Native plants vs. Weed plants
 - Invasives



Photo credit: Minnesota Cedar Creek Reserve



Maintenance Strategies to Support Ecosystem Services

- What happens when we are beyond a threshold or at an action phase?
 - Define the goal of mitigation approach, we seek balance, not eradication.
 - Knock down the population with mechanical controls.
 - Introduce bio-controls if applicable



Photo credit: Geochaching.com

Maintenance Strategies to Increase Ecosystem Services

- Purple Loose Strife, *Lythrum salicaria* Control:
 - Goal: Restore balance to the ecosystem by reducing presence.
 - Knock down method: Hand prune to reduce vegetation and seed heads where possible.
 - Increase presence of bio-control *Galerucella pusilla* beetle.



Maintenance Strategies to Increase Ecosystem Services

- Poison Ivy and other noxious weeds
 - Goats!
 - Easily the most joyous aspect of our IPM program is the use of goats as biological controls for poison ivy and noxious weeds.
 - They are part of the knock down strategy.



✓ Initiatives to Continue to Support Ecosystem Services

- **Increase Bio-Controls:**
- Collect and rear *Galerucella pusilla* at the Botanical Center for release in other Parks.
- Partner with URI to introduce *Aphalara itadori*, a psyllid insect, to control Japanese knotweed, *Fallopia japonica*, in the Park.
- Once a successful population is reached, rear psyllid insect in the park.



Photo credit: Carol Bell



Photo credit: Invasiveplantcontrol.com



Summation

- Maintenance is the biggest factor in sustaining functioning BMPs.
- Naturalized designs using native plant material is the easiest BMP to maintain for functionality.
- Maintenance is multi-pronged approach with the most success found when it works in conjunction with the ecosystem.

Thank you!

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