Managing Stormwater Runoff to Our Lake

Presented by Christopher C. Obropta, Ph.D., P.E. on October 9, 2019 at the West Milford Harmful Algal Blooms (HABs) Workshop
Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.
Water Resources Program

Our Mission is to identify and address community water resources issues using sustainable and practical science-based solutions.
The Environmental County Agents teach people new skills and information so they can make better informed decisions and improvements to their businesses and personal lives.

- Michele Bakacs, Middlesex and Union
- Amy Rowe, Essex and Passaic
- Mike Haberland, Camden and Burlington
- Sal Mangiafico, Salem and Cumberland
- Steve Yergeau, Ocean and Atlantic
- Vacant, Morris and Somerset
- Vacant, Sussex and Warren
Managing Stormwater

• Water Quality Management
  – Reduce pollutants from entering the waterway
  – Systems manage the frequent storms (NJ Water Quality Storm = 1.25” of rain over 2-hours)
  – Manufactured treatment devices
  – Green infrastructure practices

• Flood Control Management
  – Reduce runoff volumes and peak runoff rates
  – Systems manage bigger storms (100-year storm = 8.9 inches of rain over 24-hours)
  – Large storage systems (detention basins or underground storage reservoirs)
  – Some green infrastructure practices
Water Quality
Manufactured Treatment Devices
(Hydrodynamic Separators)

Typically removes 50% of total suspended solids (TSS)
Manufactured Treatment Devices (Filter Systems)

Typically removes 80% of total suspended solids (TSS)
Green Infrastructure

...an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly.

Green Infrastructure projects:

- capture,
- filter,
- absorb, and
- reuse

stormwater to maintain or mimic natural systems and treat runoff as a resource.
Green Infrastructure Practices

- Rain Gardens/Bioretention Systems
- Bioswales
- Downspout Planters
- Stormwater Planters
- Rainwater Harvesting
- Permeable Pavements
- Tree Filter Boxes
- Dry Wells
- Green Roofs
- Naturalizing Detention Basins
- Green Streets
Stormwater Management for Flood Control (Detention Basins)
Stormwater Management for Flood Control (Retention Basins or Wet Ponds)
A Retention Basins or Wet Pond
Stormwater Management for Flood Control (underground detention)
Stormwater Management for Water Quality and Flood Control

Bioretention systems or rain gardens
Stormwater Management for Water Quality and Flood Control

Porous Asphalt Parking Lot
Addressing the Problem

• Regional Scale (municipalities working together)

• Lake Community Scale (residents and businesses working together)

• Residential Scale (individual property owners doing their part on their own property)
Addressing Stormwater at the Regional Scale

• Regional Stormwater Management Planning
  • Watershed Restoration and Protection Plans
  • Green Infrastructure Feasibility Study/Strategic Plan

• Intergovernmental Cooperation

• Available land to implement stormwater treatment solutions

• Ability to transport stormwater to treatment location

• Commitment to maintain treatment facilities

• Funding (see Jim’s presentation)
The Deal Lake Watershed Protection Plan Milestone 5 Report
Grant #RP04-082

Grantee and Lead Planning Agency:

Deal Lake Commission
John Everson, Chairman
c/o Village of Loch Arbour Municipal Offices
550 Main Street
Loch Arbour, NJ 07711
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GREEN INFRASTRUCTURE FEASIBILITY STUDY

DEAL LAKE WATERSHED

Ocean Township
Interlaken Borough
Allenhurst Borough
Asbury Park
Neptune Township
Deal Borough
Charlton Village
Deal Lake Subwatershed: Green Infrastructure Sites

**SITES WITHIN ASBURY PARK**
1. Asbury Park Board of Education
2. Our Lady of Mount Carmel Church

**SITES WITHIN INTERLAKEN**
3. Interlaken Boro Office
4. Interlaken Park

**SITES WITHIN NEPTUNE CITY**
5. Church of God of Prophecy
6. Good Samaritan Church
7. Liberty Park
8. Loffredo Fields
9. Monmouth County Vocational School
10. Shoprite of Neptune

**SITES WITHIN OCEAN TOWNSHIP**
11. Colonial Terrace Golf Club
12. Ocean Township Maintenance Shop
13. Open Grass Lot on Logan Road
14. Planning Incentive
15. Vacant Lot on Wickapecko Drive
16. Wannamassa Firemen’s Field
17. Wannamassa First Aid & Fire Police
Stormwater planters can be installed along the roadsides, and a rain garden can be installed in the middle of the triangle to capture, treat, and infiltrate stormwater runoff from the road and paved areas. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

<table>
<thead>
<tr>
<th>Impervious Cover</th>
<th>Existing Loads from Impervious Cover (lbs/yr)</th>
<th>Runoff Volume from Impervious Cover (Mgal)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TP, TN, TSS</td>
<td>From the 1.25&quot; Water Quality Storm</td>
</tr>
<tr>
<td>%</td>
<td>sq. ft.</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>13,458</td>
<td>0.010</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Infrastructure Practices</th>
<th>Recharge Potential (Mgal/yr)</th>
<th>TSS Removal Potential (lbs/yr)</th>
<th>Maximum Volume Reduction Potential (gal/storm)</th>
<th>Peak Discharge Reduction Potential (cu. ft./second)</th>
<th>Estimated Size (sq. ft.)</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioretention system</td>
<td>0.046</td>
<td>8</td>
<td>3,370</td>
<td>0.13</td>
<td>440</td>
<td>$2,200</td>
</tr>
<tr>
<td>Stormwater planters</td>
<td>0.067</td>
<td>11</td>
<td>4,930</td>
<td>0.19</td>
<td>650</td>
<td>$243,750</td>
</tr>
</tbody>
</table>

VACANT LOT ON WICKAPECKO DRIVE
Addressing Stormwater at the Lake Community Scale

- Common goal (e.g., To protect our lake or pond)
- Local champion to rally the troops (Check out our Green Infrastructure Champions Program)
- Technical expertise
Hunts Club Pond, Hillsborough, NJ

- Township organized a couple of meetings with residents and interested stakeholders
- Rutgers Cooperative Extension presented solutions to addressing stormwater pollution to pond
- Rutgers offered free rain garden designs to homeowners
- Rutgers helped install rain gardens
- Program generated lots of excitement and lots of action
Hunts Club Pond Neighborhood
Residential Programs

• Rain Garden Program
  – Rebate Program
  – Neighborhood Rain Garden Program

• Rain Barrel Program
  – Build-A-Rain Barrel Workshop
  – Rain Barrel Rebate Program
  – One Barrel at a Time Co-op
Rain Garden Rebate Program

• 45-minute Educational Session
• 30-minute Design Session
• $3 per square foot rebate
• Assistance with installation is available
Design Example for Roof Runoff

Design

Installed Rain Garden
Design Example for Parking Lot Runoff

Design

Installed Rain Garden
Roof, Sump Pump and Driveway Runoff – WOW!

Design

Installed Rain Garden
Another Roof Runoff Example

Design

Installed Rain Garden
Another Driveway Runoff Example

Design

Rain Garden Installed
Roof Runoff from Rain Barrel Overflow

Design  Installed Rain Garden
How can Rutgers Cooperative Extension help?

- Watershed Restoration and Protection Plans
- Green Infrastructure Feasibility Studies
- Neighborhood Rain Garden Programs
- Rain Garden Rebate Programs
- Green Infrastructure Champion Training
- Assist with Grant Writing

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