Flooding your Community with Solutions, Not Stormwater

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Agenda

Stefanie Covino
• The big picture in MA
• Climate change & development
• Nature based solutions at every scale
• Co-benefits and cost effectiveness
• Climate planning – MVP
• Tools and resources

Laurie Connors
• LID project example
• Existing site conditions
• Proposed improvements
• Benefits
• Funding sources
• Next steps
What’s the problem?

Development is sprawling
What’s the problem?

Impervious surface → Runoff

Large lawns → Fertilizer

25% shallow infiltration
40% evapotranspiration
10% runoff

25% deep infiltration

75%-100% Impervious Cover
5% deep infiltration
30% evapotranspiration
55% runoff

Source: EPA
IMPACTS

flooding
dry rivers
algae blooms
More Precipitation

Total annual precipitation has increased by:

15%

1.2 trillion more gallons of water or equivalent snow falling on Massachusetts each year.

~9,700 filled Prudential Towers

Changes are calculated from a linear regression of annual totals from 1895-2015, 1901-2000 reference period.

Source: NOAA
Key Observed Climate Changes in MA

- **Temperature:** 2.9°F
  - Since 1895
- **Growing Season:** 11 Days
  - Since 1950
- **Sea Level Rise:** 11 inches
  - Since 1922
- **Strong Storms:** 55%
  - Since 1958
Climate change

- Increased precipitation
- Stormwater & WQ issues
- Flooding & infrastructure damage

Increased temperature
- Heat-related illnesses
- More cooling shelters

Sprawling Development
- Impervious surfaces

Development
- More cooling shelters
There are real solutions.
One of the best adaptation practices is preserving natural areas.
Nature Based Solutions

use natural systems, mimic natural processes, or work in tandem with traditional approaches to address natural hazards like flooding, erosion, drought, and heat islands.

Incorporating nature-based solutions in local planning and built projects can help communities reduce their exposure to these impacts, resulting in reduced costs, economic enhancement, and safer, more resilient communities.
Nature based solutions keeps water where you need it most

In 2016, the City of Worcester’s reservoirs went try and spent >$1M to purchase MWRA water.

This takes money from our local budget for infrastructure repairs, monitoring, education, and more.
What does sustainable development really look like? Actions at every scale

**Conserve** the natural green infrastructure already providing free ecosystem services  
**Integrate** LID and green infrastructure design into development  
**Restore** the resiliency of urban landscapes through LID in redevelopment
Conserve the natural green infrastructure already providing free ecosystem services
Integrate LID and green infrastructure designs into current development projects
Restore the resiliency of urban landscapes through LID in redevelopment

Pingry Hill, Ayer, MA
Integrate

Conserve the natural green infrastructure already providing free ecosystem services
Integrate LID and green infrastructure designs into current development projects
Restore the resiliency of urban landscapes through LID in redevelopment
**Restore**

**Conserve** the natural green infrastructure already providing free ecosystem services  
**Integrate** LID and green infrastructure designs into current development projects  
**Restore** the resiliency of local landscapes through LID in redevelopment
Avoided Costs

Heat island effects

Stormwater flooding

Coastal flooding

Coastal erosion

Riverine flooding

Nature-based solutions

Conserve natural areas

Restore ecosystems

Integrate Low Impact Development

Municipal benefits

Avoided Costs

Enhanced Safety

Environmental Services

Climate Hazards

Municipal benefits

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Environmental Services
Return on Investment Studies in MA

Trust for Public Land

- Outdoor recreation generates:
  - $10 billion in consumer spending
  - $739 million in state and local tax revenue
  - 90,000 jobs
  - $3.5 billion in annual wages and salaries
- Agriculture, forestry, commercial fishing, and related activities generate:
  - $13 billion in output
  - 147,000 MA Jobs
- Conservation Projects Return $4 : $1 spent
Return on Investment Studies in MA

Div. Ecological Restoration

DER aquatic restoration projects produce an average employment demand of 12.5 jobs and $1.75 Million in total economic output from each $1 Million spent, contributing to a growing “restoration economy” in Massachusetts.
Return on Investment Studies in Northeast US

Scientific Reports

• In Hurricane Sandy, wetlands reduced $625,000,000 in direct flooding damages in New Jersey

• In New England, wetlands reduce storm damage by approximately 16%

https://www.nature.com/articles/s41598-017-09269-z
Municipal Vulnerability Preparedness (MVP)

State and local partnership grant to build resiliency to climate change

1. Engage Community
2. Identify CC impacts and hazards
3. Assess vulnerabilities & strengths
4. Develop and prioritize actions
5. Take Action

www.mass.gov/municipal-vulnerability-preparedness-program
MVP Example: identified intersection that floods?

Bioretention bump outs & street trees can help to...

• capture & filter excess water – alleviate pressure on MS4
• improved pedestrian safety – better visibility, shorter walkway
• enhance aesthetics to encourage visitors & walking

without altering existing parking or bus stops
5 Things Planners Can Do

1. **Become** an MVP community & participate in the core team

2. **Talk to your neighbors**, fellow board members, and community members about climate change and nature based solutions

3. **Advocate** to adopt the Community Preservation Act or support CPA projects

4. **Adjust local bylaws & regulations** that support climate smart nature based solutions

5. **Vote** in local, state, and federal elections to promote candidates that support climate smart solutions and funding
Resources for Nature-Based Solutions

**Guidance/Case Studies**

- **Naturally Resilient Communities** successful project case studies from across the country to help communities learn and identify nature-based solutions
- **EPA’s Soak Up the Rain** stormwater outreach tools, how-to guides and resources
- **EPA’s RAIN database** of vulnerability, resilience and adaptation reports, plans and webpages at the state, regional and community level.
- **Climate Action Tool** explore adaptation strategies and actions to help maintain healthy, resilient wildlife communities in the face of climate change.

**Mapping/Planning**

- **Mapping and Prioritizing Parcels for Resilience (MAPPR)** Identify priority parcels for protection and climate change resilience
- **Living Shorelines in New England: State of the Practice** and **Profile Pages for Solutions** are case studies, siting criteria, and regulatory challenges for coastal resilience in New England.
- **Low Impact Development Fact Sheets** cover valuing green infrastructure, conservation design, development techniques, regulations, urban waters, and cost calculations.

**Cost/Benefit**

- **EPA’s Green Infrastructure cost/benefit/tools** Database of tools for comparing solution costs
- **Massachusetts Division of Ecological Restoration’s** economic benefits of aquatic restoration based on MA case studies

**Bylaws/Ordinances**

- **EEA’s Smart Growth Toolkit** access to information on planning, zoning, subdivision, site design, and building construction techniques
- **Guide for Supporting LID in Local Land Use Regulations** provides a framework for communities to review their zoning, rules, and regulations for a number of factors.
# Supporting LID in bylaws & regulations

[link to massaudubon.org/lidcost](massaudubon.org/lidcost) or [download here](download here)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Conventional</th>
<th>Better</th>
<th>Best</th>
<th>Community's Zoning</th>
<th>Community's Subdivision Rules &amp; Regulations</th>
<th>Community's Site Plan Review</th>
<th>Community's Stormwater/LID Bylaw/Regulations</th>
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<tbody>
<tr>
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<td>GoL 1: Protect natural resources and open space</td>
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<td>Soils managed for reseeding</td>
<td>Not addressed</td>
<td>Limitations on removal from site, and/or requirements for stabilization and reseeding</td>
<td>Prohibit removal of topsoil from area. Require reseeding and other prep of soils compacted during construction</td>
<td>(Not applicable)</td>
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<td>Limits lawn size, require retention or planting of native vegetation/naturalized areas</td>
<td>Not addressed or general qualitative statement not tied to other design standards</td>
<td>Encourage minimization of clearing/grabbing</td>
<td>Require minimization of clearing/grabbing with specific standards</td>
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<td>Require native vegetation and trees</td>
<td>Require or recommend invasives</td>
<td>Not addressed, or mixture of required plantings of native and nonnative</td>
<td>Require at least 75% native plantings</td>
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| Goal 2: Promote efficient, compact development patterns and infill | | | | | | | |
| Let sit | Required minimum lot sizes | OSRD/NRPZ preferred. Special permit with incentives to utilize | Flexible with OSRD NRPZ by right, preferred option | (Not applicable) | (Not applicable) | (Not applicable) | |
| Setbacks | Required minimum front, side, and rear setbacks | Minimize, allowing flexibility | Clear standards that minimize and in some instances eliminate setbacks | (Not applicable) | (Not applicable) | (Not applicable) | |
| Frontage | Required minimum frontage for each lot | Minimize especially on curved streets and cul-de-sacs | No minimum in some instances, tied into other standards like OSRD design and shared driveways. | (Not applicable) | (Not applicable) | (Not applicable) | |
| Common driveways | Often not allowed, or strict limitations | Allow for 3-3 residential units | Allow for up to 4 residential units, preferably constructed with permeable pavers or pavement. | (Not applicable) | | | |
Ensuring Success Webinars
MVP Tool Box

www.mass.gov/municipal-vulnerability-preparedness-program

• Working with MVP Service Providers: View recording
• Advancing Social Equity in Climate Adaptation Planning: View recording
• Alternatives for engaging your community: View presentation slides
• The importance of listening: View recording
• Bylaw Review –Encouraging Nature Based Solutions: View recording
• Nature Based Solutions: View recording
• Characterizing coastal flood hazards and increasing resilience: View recording
Thank you!

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