

Greening Your Community

Cost-effective LID solutions



conserve



restore



protect



save money

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Shaping the Future of Your Community

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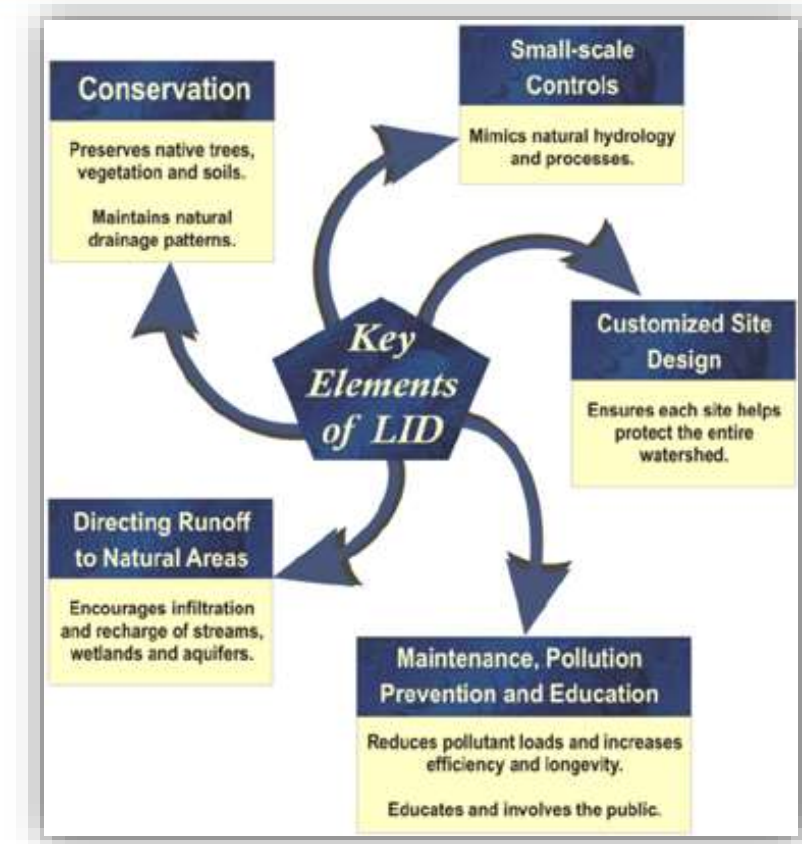


This project was funded by an agreement (CE96184201) awarded by the Environmental Protection Agency to the New England Interstate Water Pollution Control Commission on behalf of the Narragansett Bay Estuary Program.



What is Low Impact Development?

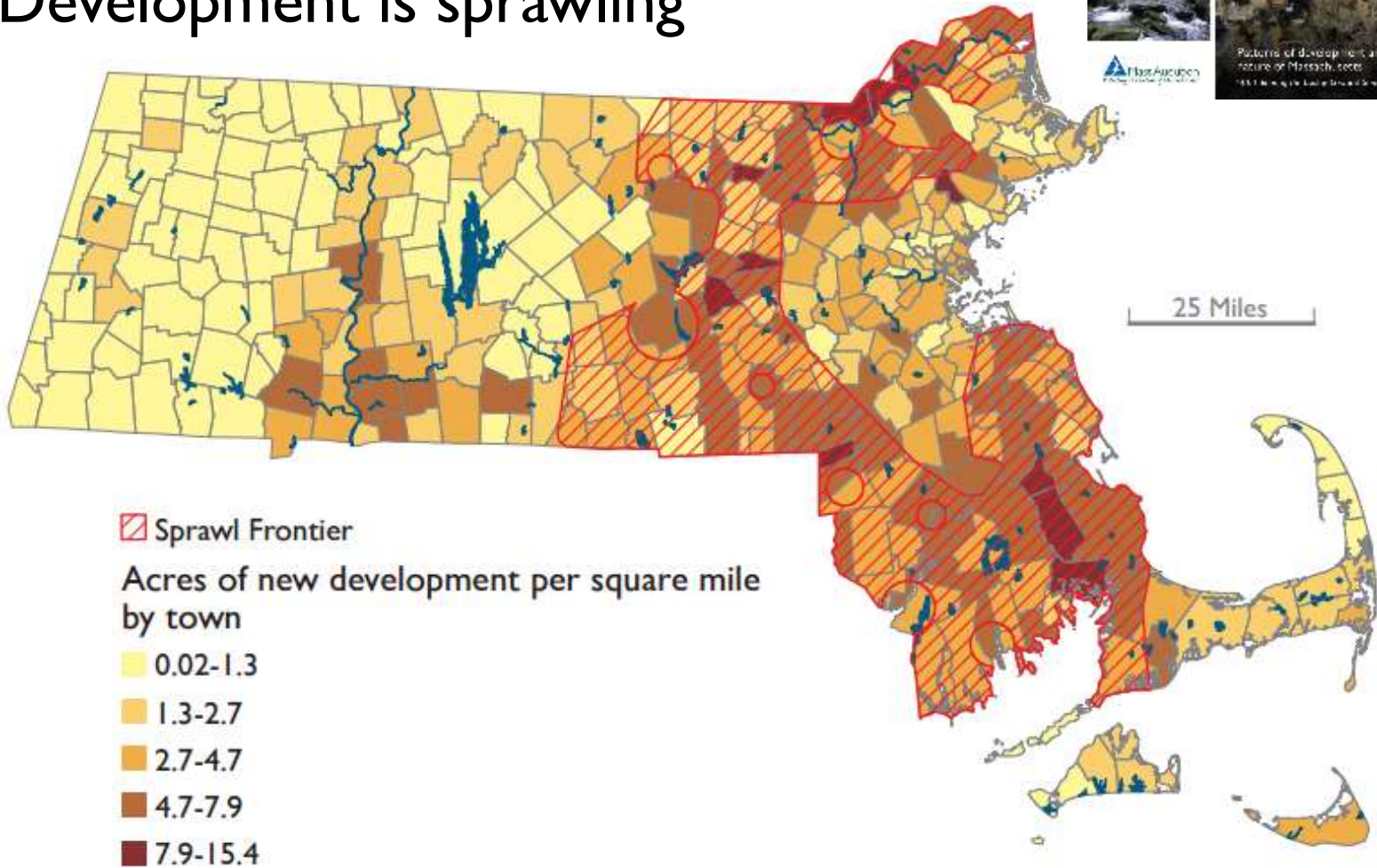
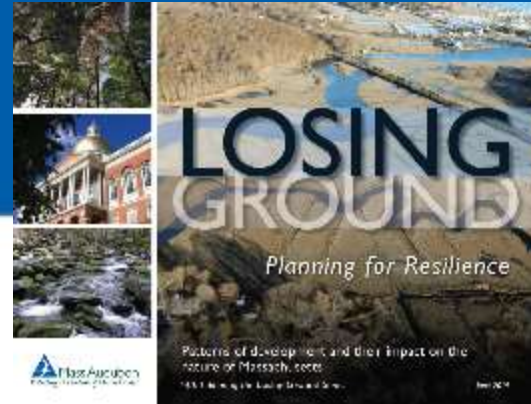
“ LID is an approach to land development (or re-development) that **works with nature to manage stormwater** as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that **treat stormwater as a resource** rather than a waste product. ”



Source: Whole Buildings Design Guide, wbdg.com

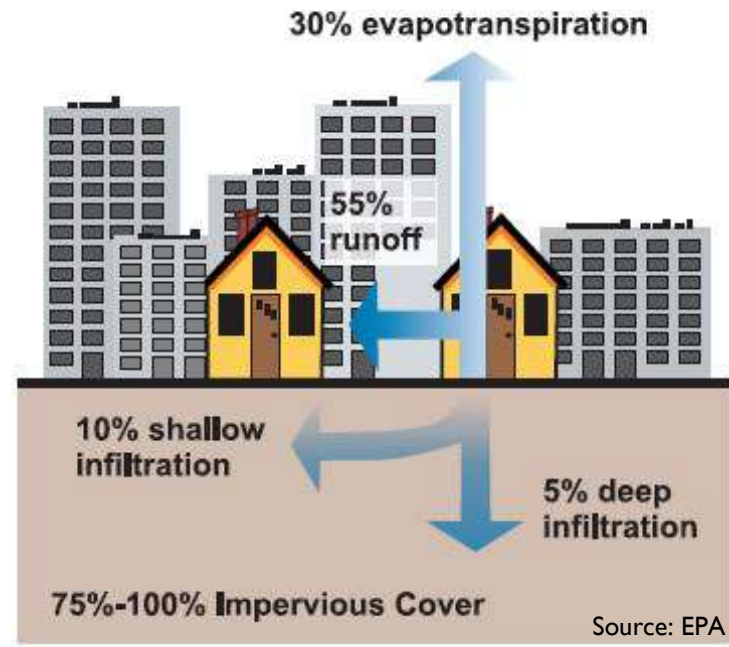
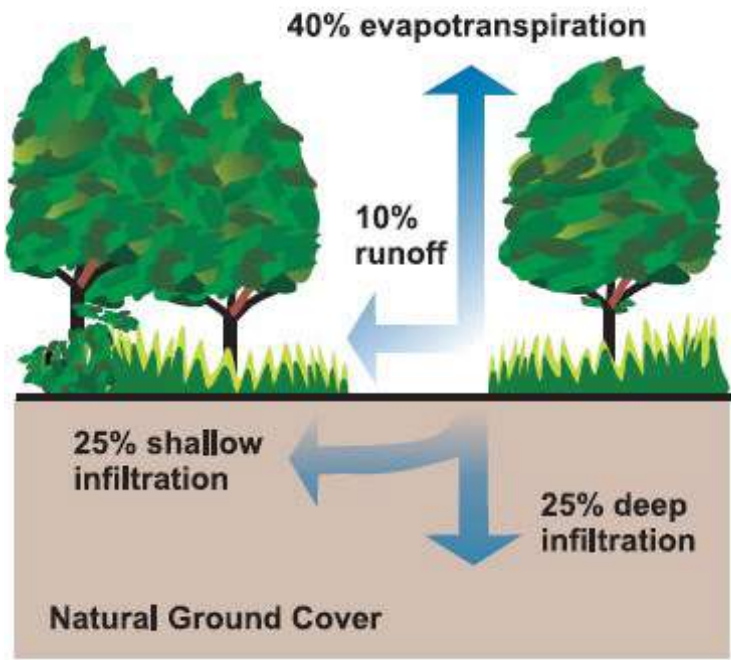
What's the Problem?

Development is sprawling



What's The Problem?

Everywhere we develop, we reduce our resilience



We Need to Change Course

Traditional development



Impervious surfaces



Stormwater runoff

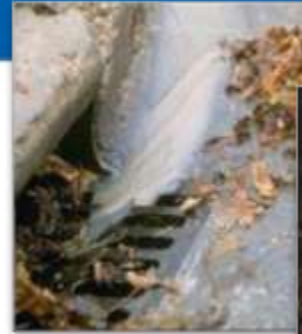


Water quality impairment

Infrastructure impacts



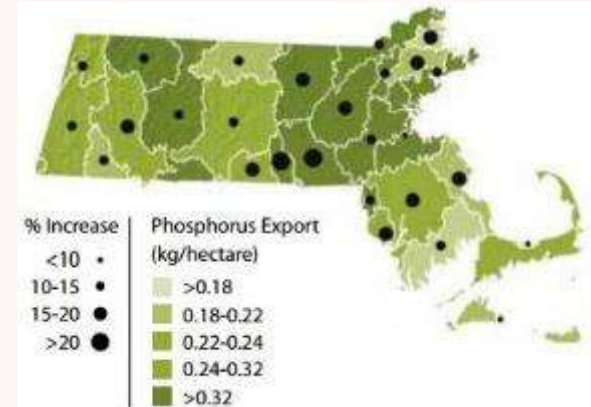
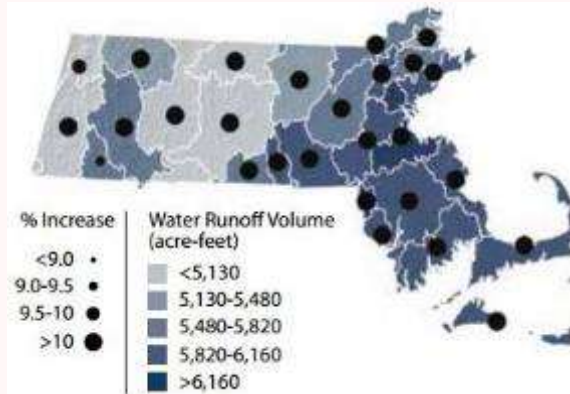
Financial and regulatory burden



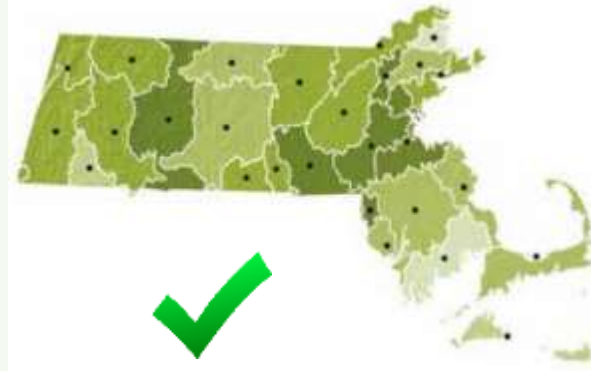
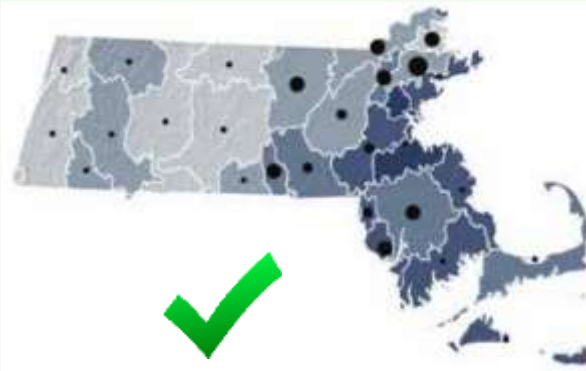
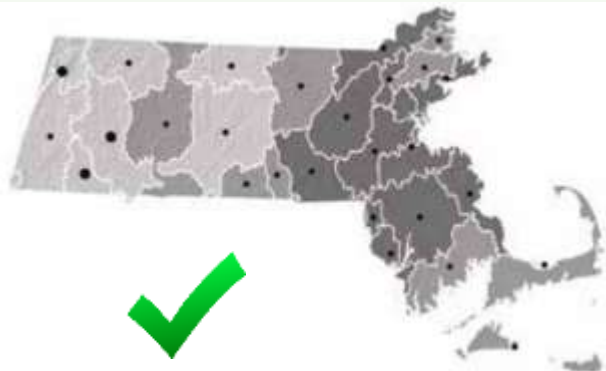
The Value of Green: Impervious, Runoff, Nutrients

Source: Harvard Forest *Changes to the Land* 2014

If we continue to follow opportunistic growth, in 2060:



If we value forests as infrastructure, in 2060:



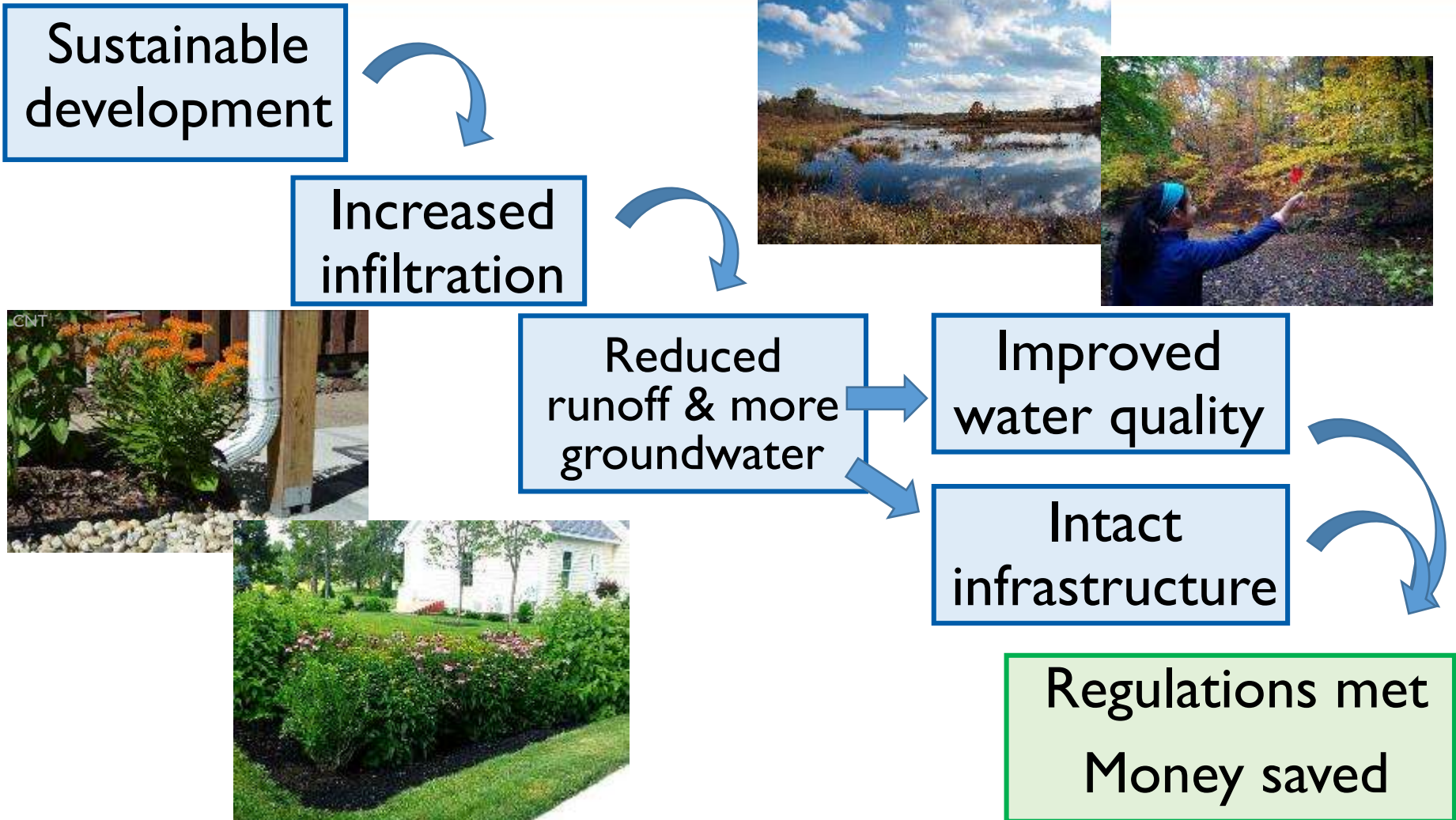
The Value of Green: Reducing Runoff

Source: Harvard Forest *Changes to the Land* 2014

By 2060	Number of MA watersheds experiencing >10% increase in runoff
Opportunistic Growth	25
Forests as Infrastructure	1

“Forests as Infrastructure” allows for nearly the **same amount of development** as what we’re experiencing now, but 2/3 of it is **clustered** development.

A Different Direction: Greening Your Community



Start Here.★

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



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Conserve

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



Integrate

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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 urban landscapes through LID in redevelopment



Benefits of LID Practices

Benefit	Reduces Stormwater Runoff				Increases Available Water Supply	Increases Groundwater Recharge	Reduces Salt Use	Reduces Energy Use	Improves Air Quality	Reduces Atmospheric CO ₂	Reduces Urban Heat Island	Improves Community Livability					Improves Habitat	Cultivates Public Education Opportunities
	Reduces Water Treatment Needs	Improves Water Quality	Reduces Grey Infrastructure Needs	Reduces Flooding								Improves Aesthetics	Increases Recreational Opportunity	Reduces Noise Pollution	Improves Community Cohesion	Urban Agriculture		
Practice																		
Green Roofs	●	●	●	●	○	○	○	●	●	●	●	●	◐	●	◐	◐	●	●
Tree Planting	●	●	●	●	○	◐	○	●	●	●	●	●	●	●	●	◐	●	●
Bioretention & Infiltration	●	●	●	●	◐	◐	○	○	●	●	●	●	●	◐	◐	○	●	●
Permeable Pavement	●	●	●	●	○	◐	●	◐	●	●	●	○	○	●	○	○	○	○
Water Harvesting	●	●	●	●	●	◐	○	◐	◐	◐	○	○	○	○	○	○	○	●

● Yes

◐ Maybe

○ No

Free Ecosystem Services:

Free services provided by the natural landscape

For every \$1 invested in land conservation, there is a \$4 *Return on Investment* in terms of these ecosystem service values

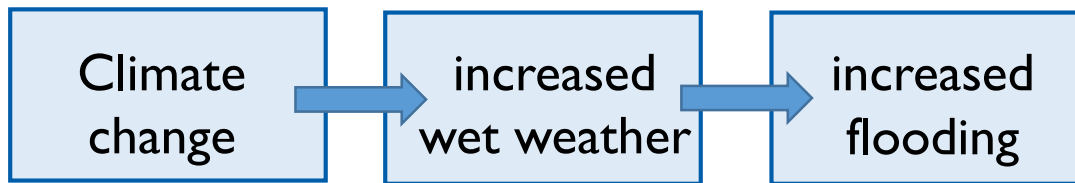
- **Flooding:** Floodplains provide flood protection and reduce infrastructure damage
- **Public Health:** Managing stormwater and reducing retention ponds reduces creation of mosquito habitat
- **Air Quality & Public Health:** Trees reduce the urban heat island effect, reducing smog creation and resulting asthma occurrences as well as reducing nitrogen dioxide and particulate matter
- **Water Quality:** Streamside vegetation filters pollutants and reduces erosion
- **Water Quantity:** Forests and wetlands store water, improve water quality, and recharge groundwater
- **Recreation:** Clean, flowing waters support recreation, including boating, fishing, and swimming while open space provides areas for hiking and biking
- **Quality of Life:** Open space and street trees create a more enjoyable walking environment, benefiting community connection, health, and economic benefit in downtowns and commercial areas
- **Property Value:** Healthy, mature trees add an average of 10-30% to a property's value

Addressing Regulations

Possible Action	Addresses Stormwater (MS4)	Addresses Water Management Act Mitigation	Helps with Climate Resilience
Revise bylaws to allow for Low Impact Development	★	★	★
Require porous pavement in certain situations, and allow for curb cuts to improve drainage to swales	★	★	★
Culvert replacements meeting stream crossing standards		★	★
Acquire/preserve property for resource protection	★	★	★

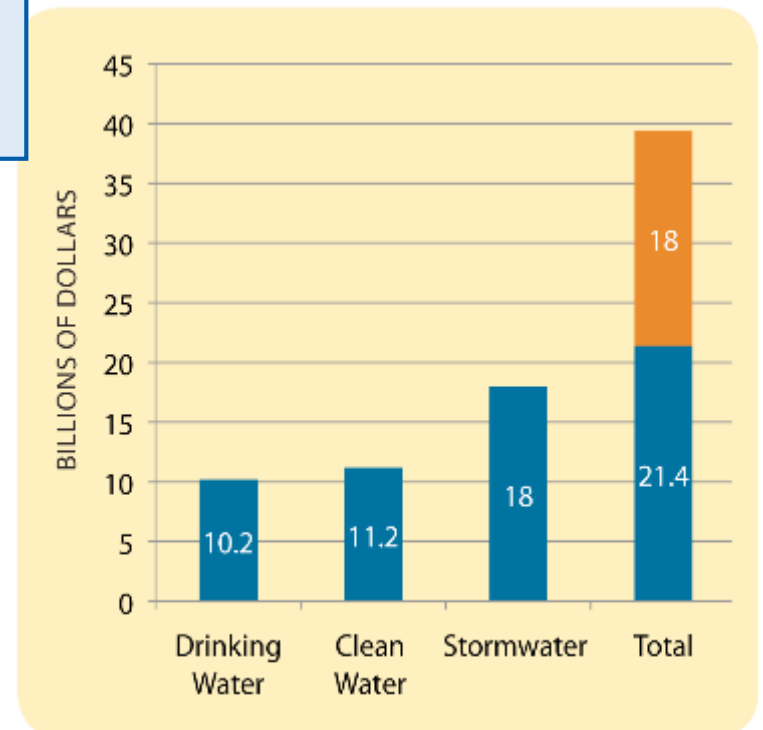
The Value of Green: Stormwater Infrastructure

Massachusetts is already facing a projected \$18 billion in stormwater upgrades over the next 20 years



“ As Massachusetts faces water management challenges related to aging civil waterworks and more intense storms, **forest protection and land use offer a low-cost option** for minimizing stormwater challenges and maintaining water quality. ”

- Harvard Forest: Changes to the Land



Gap in water infrastructure funding over next 20 years, Water Infrastructure Finance Commission, 2012

Funding Stormwater Management

*There are costs to stormwater management even with LID.
Options for funding include:*

- Utilities: dedicated funding based on impervious surfaces, incentives to reduce effective imperviousness

www.mapc.org/Stormwater_Financing

- Private commercial/industrial site maintenance and annual reporting requirements (Westboro)
- Regional Stormwater Collaboratives provide efficiencies and cost savings

www.centralmastormwater.org



Take Home Messages

- Green infrastructure provides numerous **free** or low cost **services** – through both natural and engineered plants and soils.
- We need to treat stormwater and precipitation as a **resource**, not a waste product.
- LID and GI provide several value-added **financial** and **quality of life benefits** for communities of all types – rural, suburban, urban.



Take Home Messages

We can't continue on our current, business as usual path.

- Conservation design, narrow streets, LID drainage need to be the **preferred**, easy-to-permit development/redevelopment option.
- Does **your** LID bylaw work well with your subdivision and other regulations?



For more information, please visit www.massaudubon.org/LIDcost

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