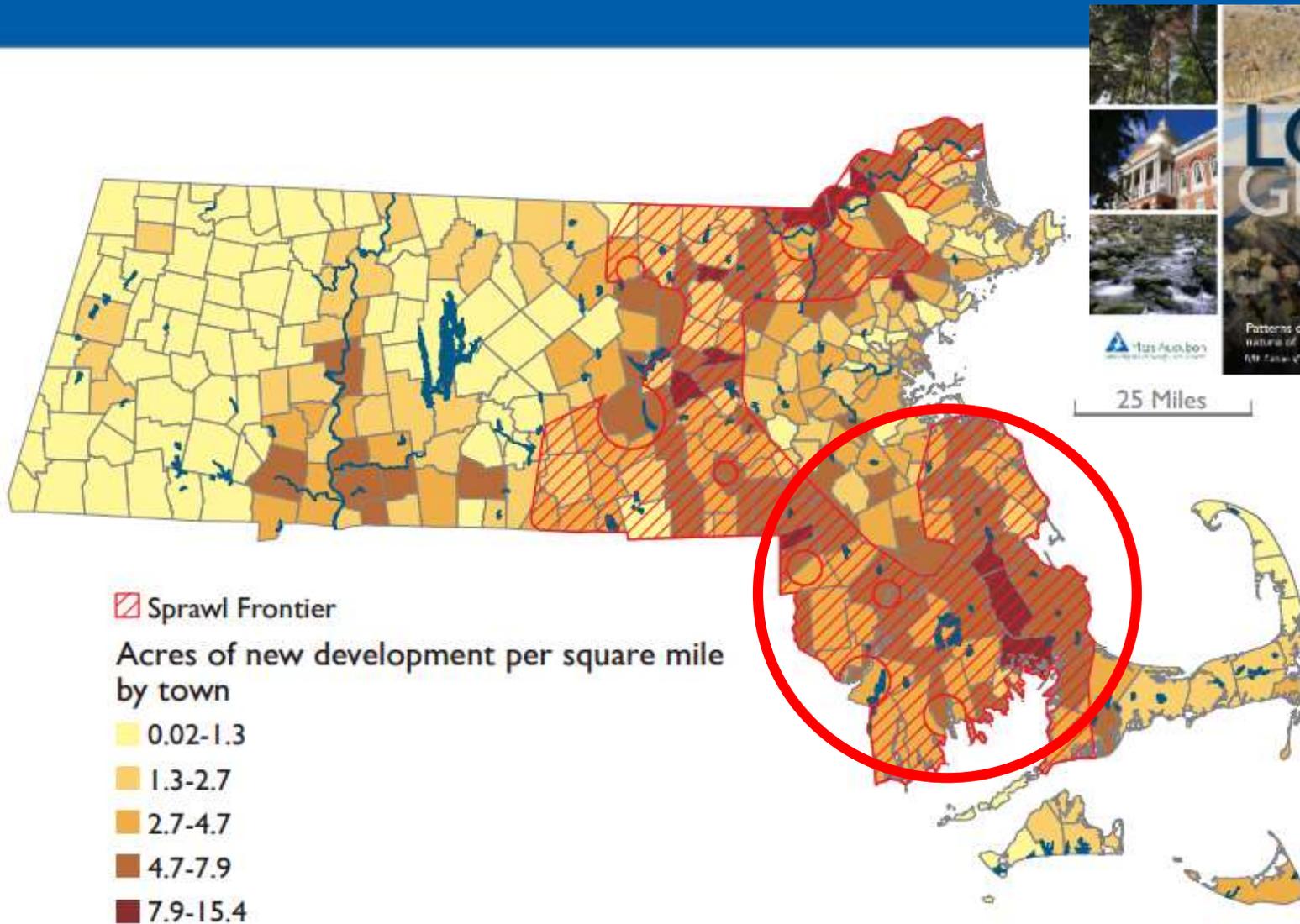


# Valuing Green Infrastructure in a Changing Climate

**Stefanie Covino, Coordinator,  
Shaping the Future of Your Community**  
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UMass Dartmouth  
**Summit on Climate Resilience**  
December 4, 2015

# Development is Sprawling



Massachusetts Department of Environmental Protection

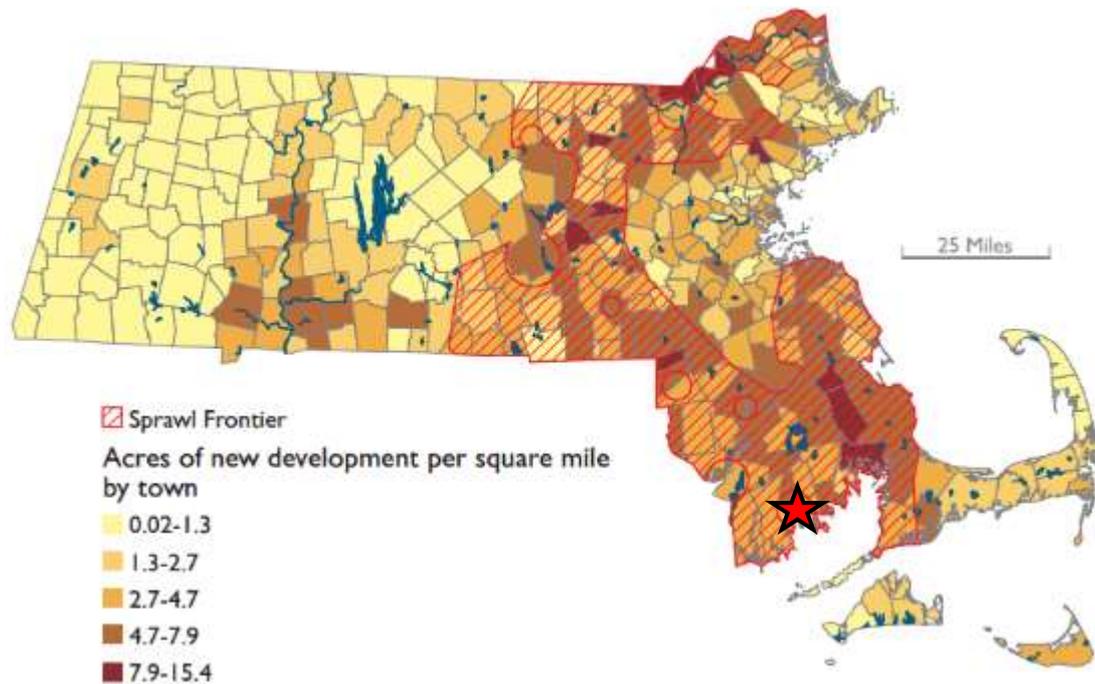
25 Miles

# Shaping the Future of Your Community

- Works with communities in fastest developing areas of MA to chart a more sustainable future
  - ✓ Customized workshops
  - ✓ Planning advice
  - ✓ Technical assistance



SHAPING  
the Future of  
YOUR  
COMMUNITY



# Traditional, sprawling development =

**Less open space**



=



# Conservation and development working together

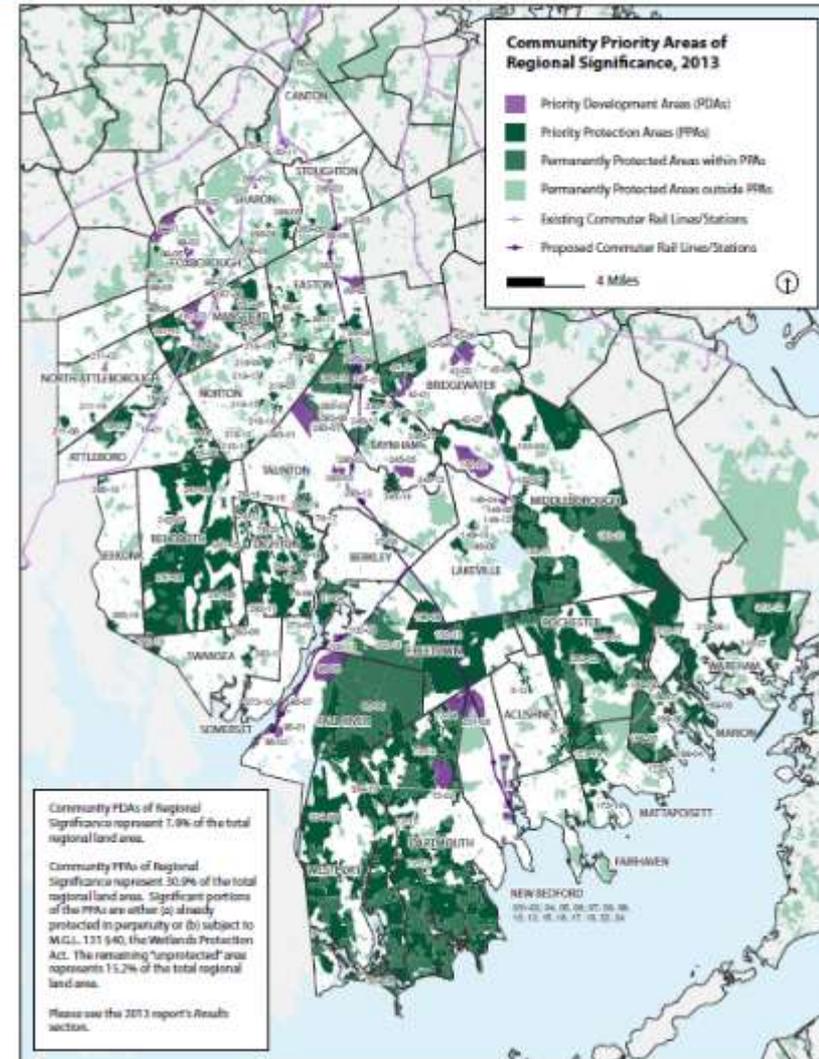
## Areas of both

### Priority Protection:

Important habitat and  
Green Infrastructure

### Priority Development:

Concentrate near  
infrastructure and away  
from important natural  
resources



# We need to change course

Sprawling development



Reduced green space



Water quality impairment

Infrastructure damage

Urban heat island effect

Increased stormwater

Habitat loss



# This is a compounding issue exacerbated by climate change

climate change

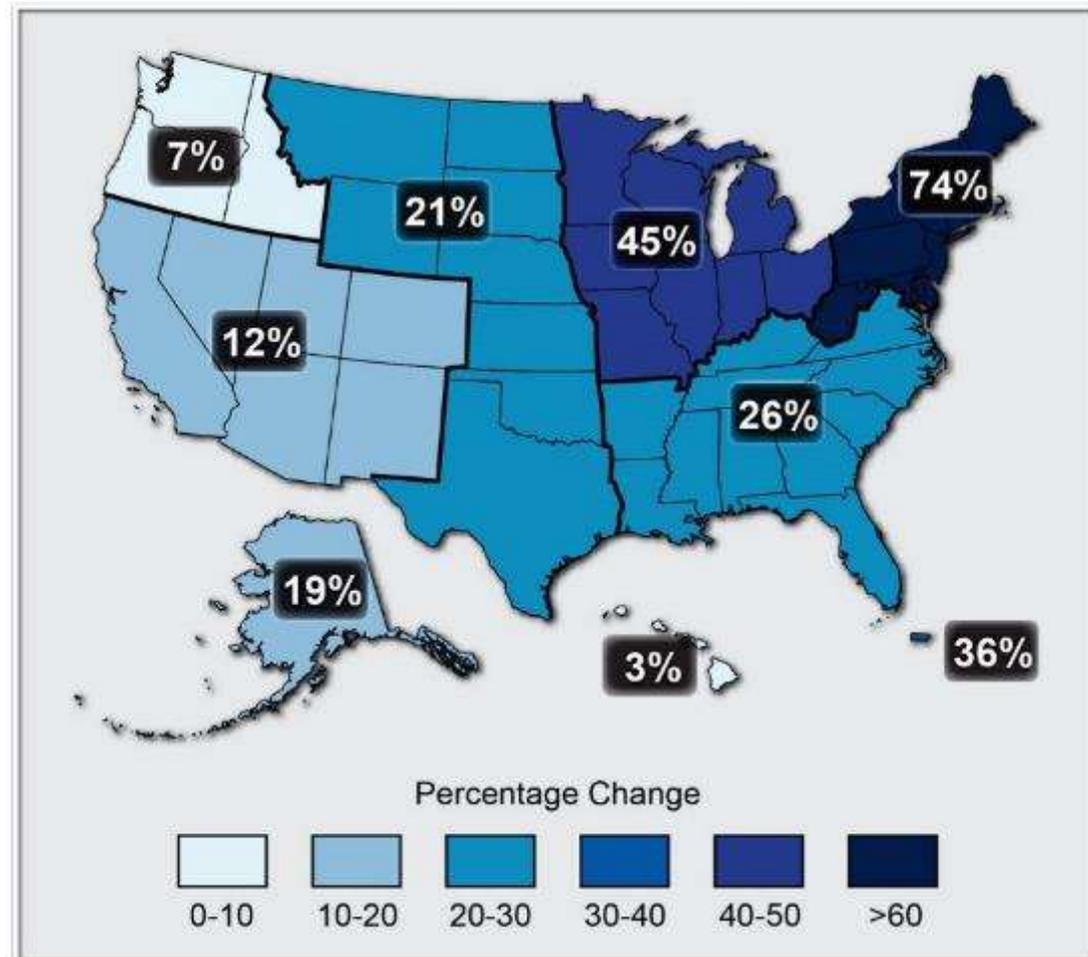
increased precipitation

increased stormwater

increased flooding

infrastructure damage

Percentage Change in Very Heavy Precipitation



# It's getting hotter – especially in our cities

## Northeast

Projected Increases in the Number of Days over 90°F

Historical Climate



Lower Emissions (B1)

Higher Emissions (A2)

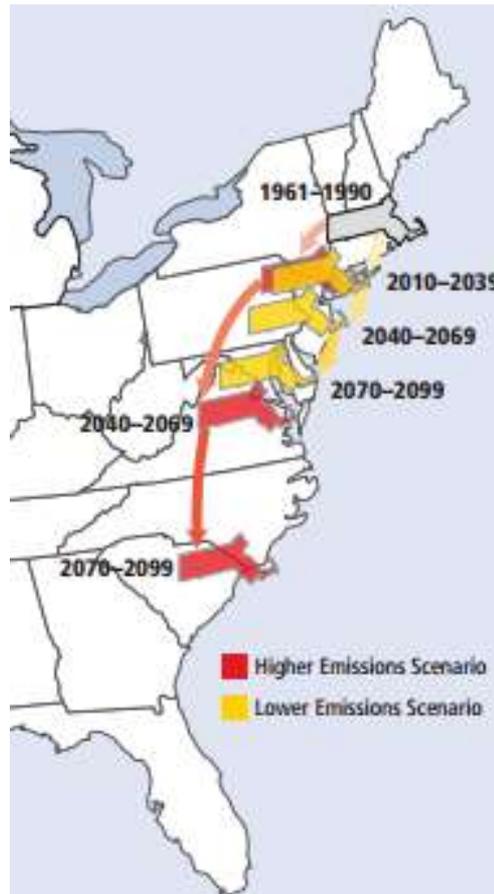


Number of Days



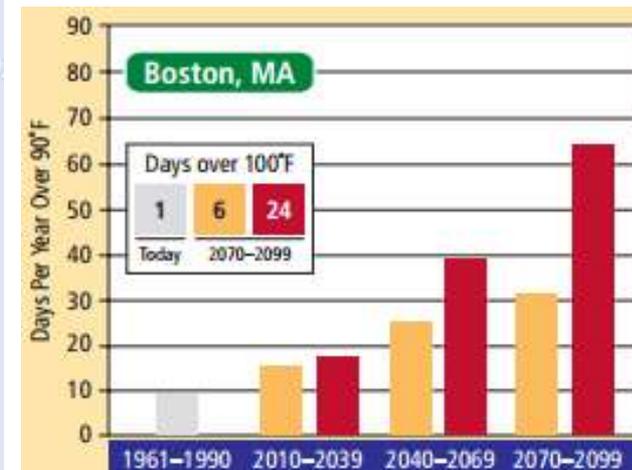
Source: Northeast National Climate Assessment, NOAA

## Massachusetts



Source: The Changing Northeast Climate, Union Concerned Scientists

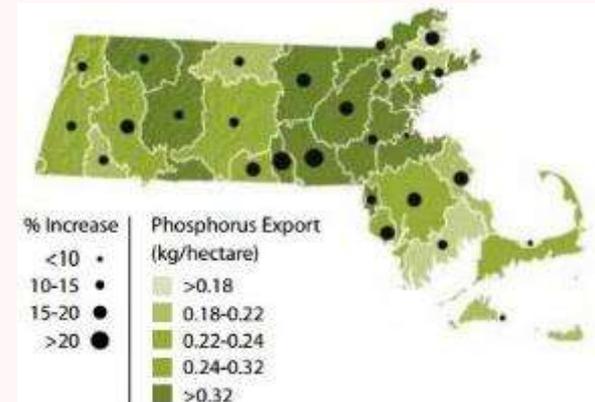
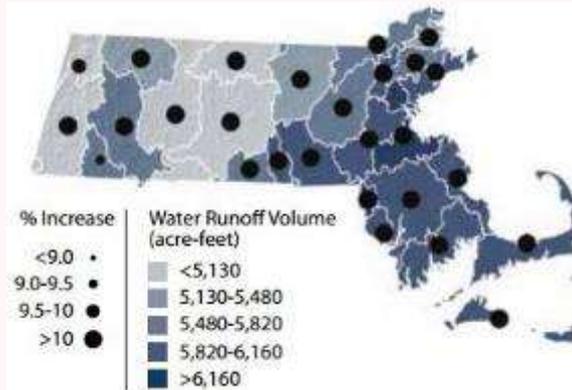
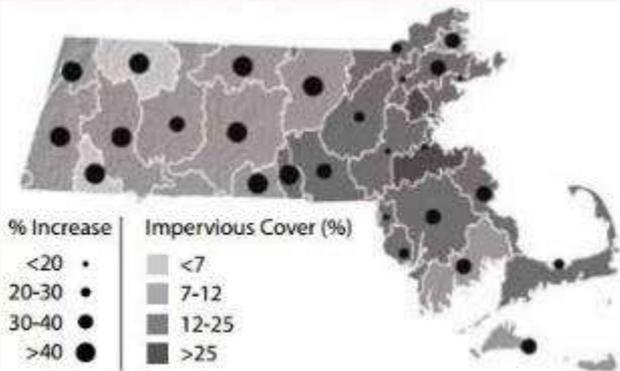
## Boston: Urban heat island effect



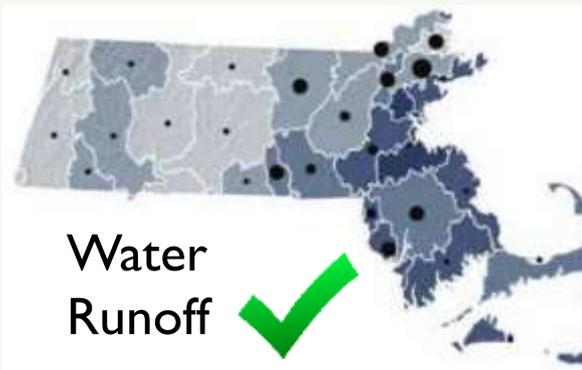
Source: The Changing Northeast Climate, Union Concerned Scientists

# We can change our priorities

If we continue to follow opportunistic growth, in 2060:



If we value forests as infrastructure, in 2060:



# A different direction: Greening Your Community

Sustainable  
development



Green  
infrastructure  
maintained



Improved  
water quality

Improved  
public safety

Reduced  
energy use

Recreation  
and habitat

Cost savings

# Preserving MA Forests Mitigates Climate Change

- MA forests **sequester 14%** of the state's gross annual carbon emissions
- Average acre stores **85 tons carbon**
- Capacity **increases** over time as forests mature



# They also provide free ecosystem services

- Shade
- Windblock
- Shelter
- Sponge
- Carbon
- Filter

MA forests provide over **\$3.8 billion** each year in free ecosystem services



# Green Space = Resilience

The more **land we lose**  
to sprawling development

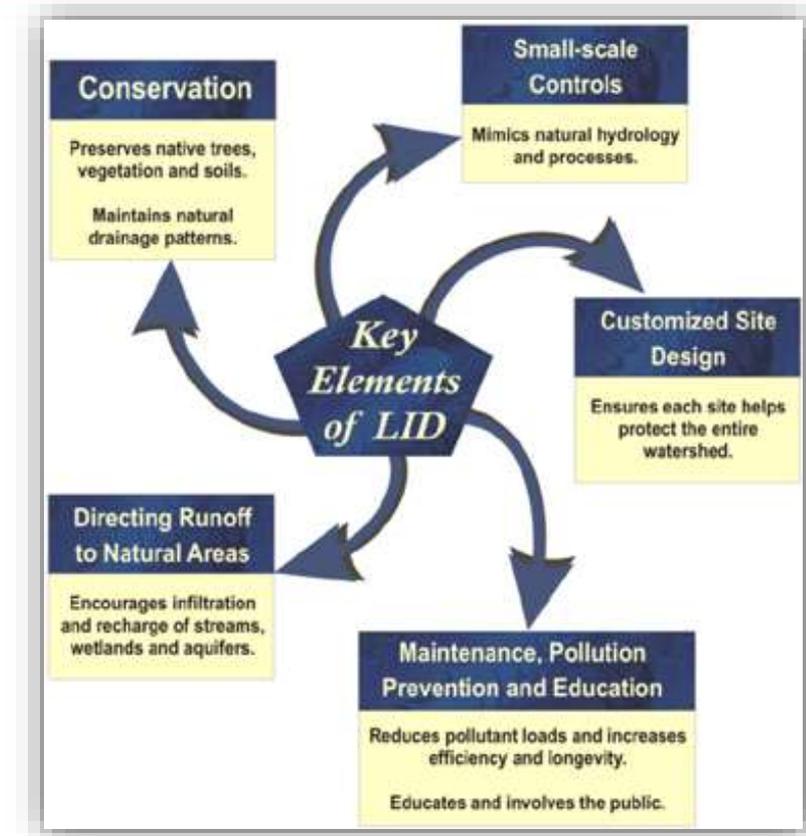


The more **resilience we lose**  
in our communities

# LID & GI

“ LID is an approach to land development (or re-development) that **works with nature...** LID employs principles such as **preserving and recreating natural landscape features** and minimizing effective imperviousness... ”

- EPA



Source: Whole Buildings Design Guide

# Techniques and 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 <sub>2</sub>	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

Source: Center for Neighborhood Technology's The Value of Green Infrastructure

# 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



conserve



restore



protect



save money

# 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

**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

© Environmental Services, City of Portland Oregon



# 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



# Sustainable Development = Cost Savings

- A 20-unit development with two-acre lots requires 40 acres to be cleared and graded.
- Conservation subdivisions that preserve 50% of land save \$200,000-300,000, while maintaining the same amount of development.



The more  
land you save,  
the more  
**money** you  
save.

# Climate change is multi-faceted



[massadapt.org](http://massadapt.org)

We need a **comprehensive climate resiliency plan**

# Take Home Messages

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

- Regional **development is sprawling** and issues are exacerbated by climate change
  - **Conserving** forests and floodplains is the first line of defense
    - LID & GI are **mimic nature** and benefit people and nature
      - Climate change is a complicated issue and requires a **comprehensive approach**

A scenic view of a lake framed by trees, with the text "Thank you!" overlaid in the center. The image shows a calm body of water in the middle ground, surrounded by lush green trees and foliage. In the background, a small white house is visible through the trees. The sky is blue with some light clouds. The text "Thank you!" is written in a large, white, sans-serif font, centered horizontally and vertically over the lake and trees.

**Thank you!**