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MACC webinar – February 13, 2019

Outline

Problem:

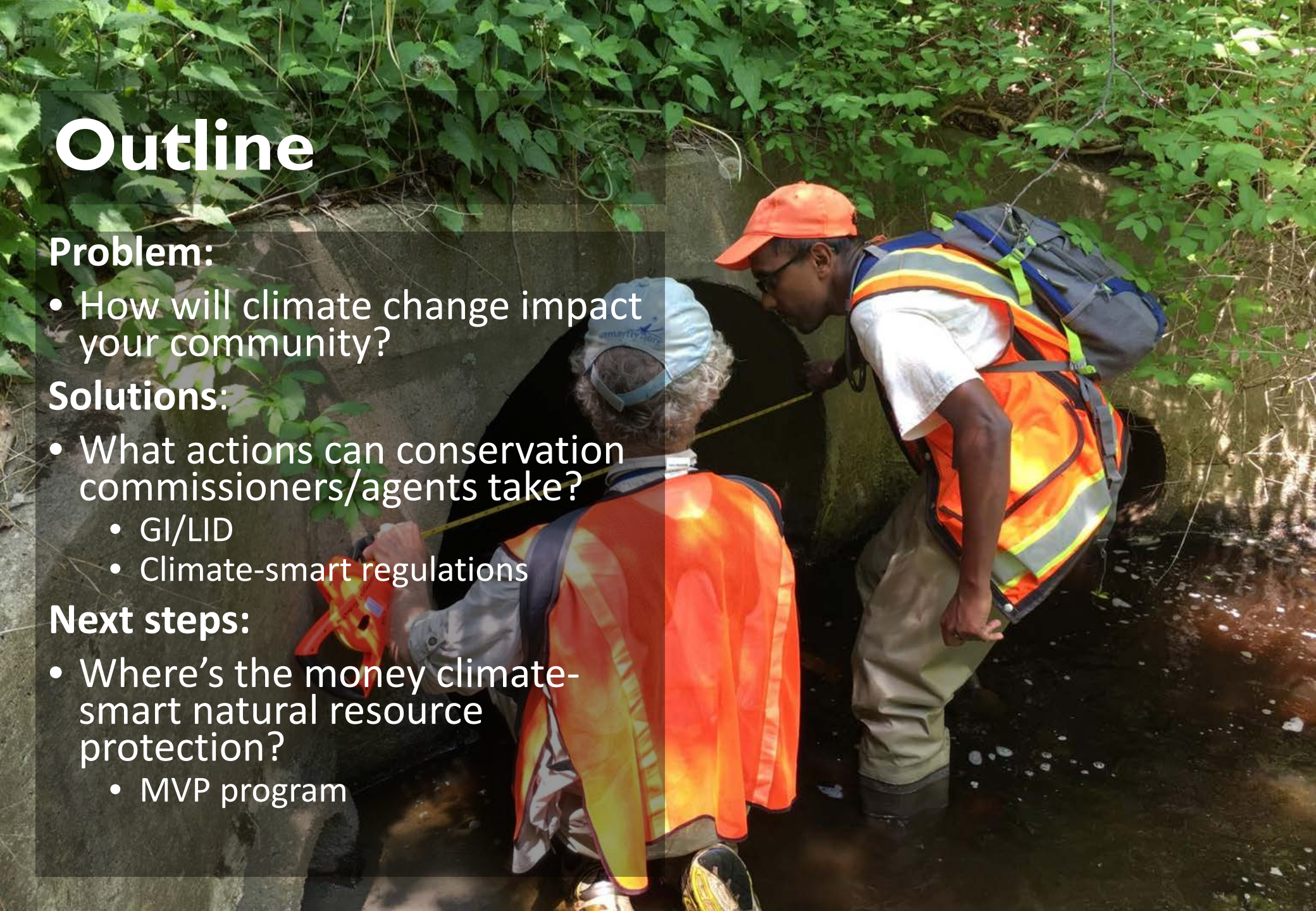
- How will climate change impact your community?

Solutions:

- What actions can conservation commissioners/agents take?
  - GI/LID
  - Climate-smart regulations

Next steps:

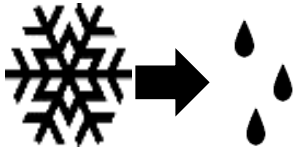
- Where's the money climate-smart natural resource protection?
  - MVP program



Key Observed Climate Changes MA

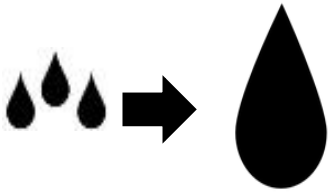
Temperature: 2.9°F Since 1895

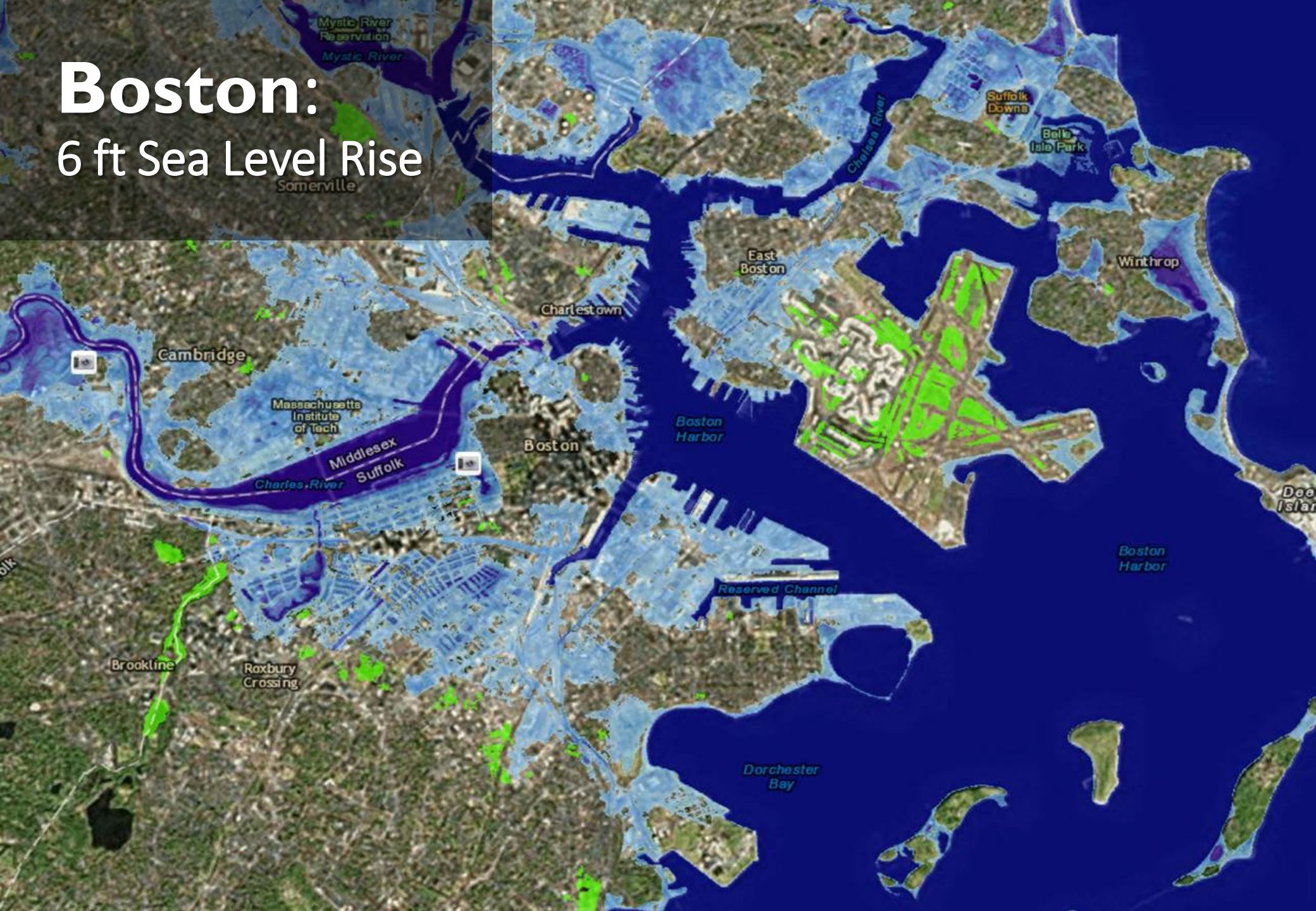
Growing Season: 11 Days Since 1950



Sea Level Rise: 11 inches Since 1922

Strong Storms: 55% Since 1958




Boston:
6 ft Sea Level Rise
Mystic River Reservation
Mystic River
Somerville
Chelsea River
Suffolk Downs
Belle Isle Park
East Boston
Winthrop
Charlestown
Cambridge
Massachusetts Institute of Tech
Middlesex
Suffolk
Charles River
Boston
Boston Harbor
Reserved Channel
Brookline
Roxbury Crossing
Dorchester Bay


Global Climate Change and Boston Harbor
By the end of the century, many of Boston's coastal landmarks could be at risk due to sea level rise.
Global climate change is warming our oceans and causing the sea to rise. If climate change continues unchecked, the water level right here in Boston Harbor could be 2 to 6 feet higher by 2100.
How the Oceans Are Changing
Taking Action
New England Aquarium
(Thanks for the irony, Secretary Beaton)

2070-2099
Higher "Business as Usual" Emissions

How Summer Temperatures Will Feel Depending on Future Greenhouse Gas Emissions

Future Precipitation:
Drier Drys and Wetter Wets

Worcester 2016

Worcester 2018

How Much More Precipitation?

Total annual precipitation has increased by:

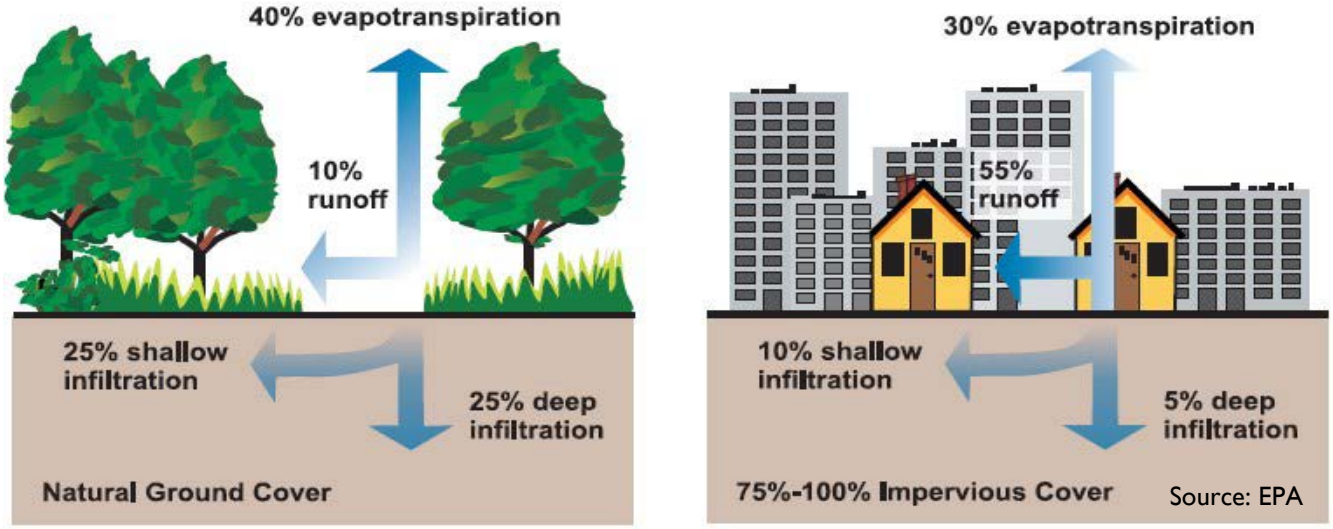
15%

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

Consider where that water goes



Source: EPA

Consider where that water goes

Climate change

Development

increased precipitation

increased temperature

impervious surfaces

stormwater & WQ issues

flooding & infrastructure damage

heat-related illnesses

more cooling shelters

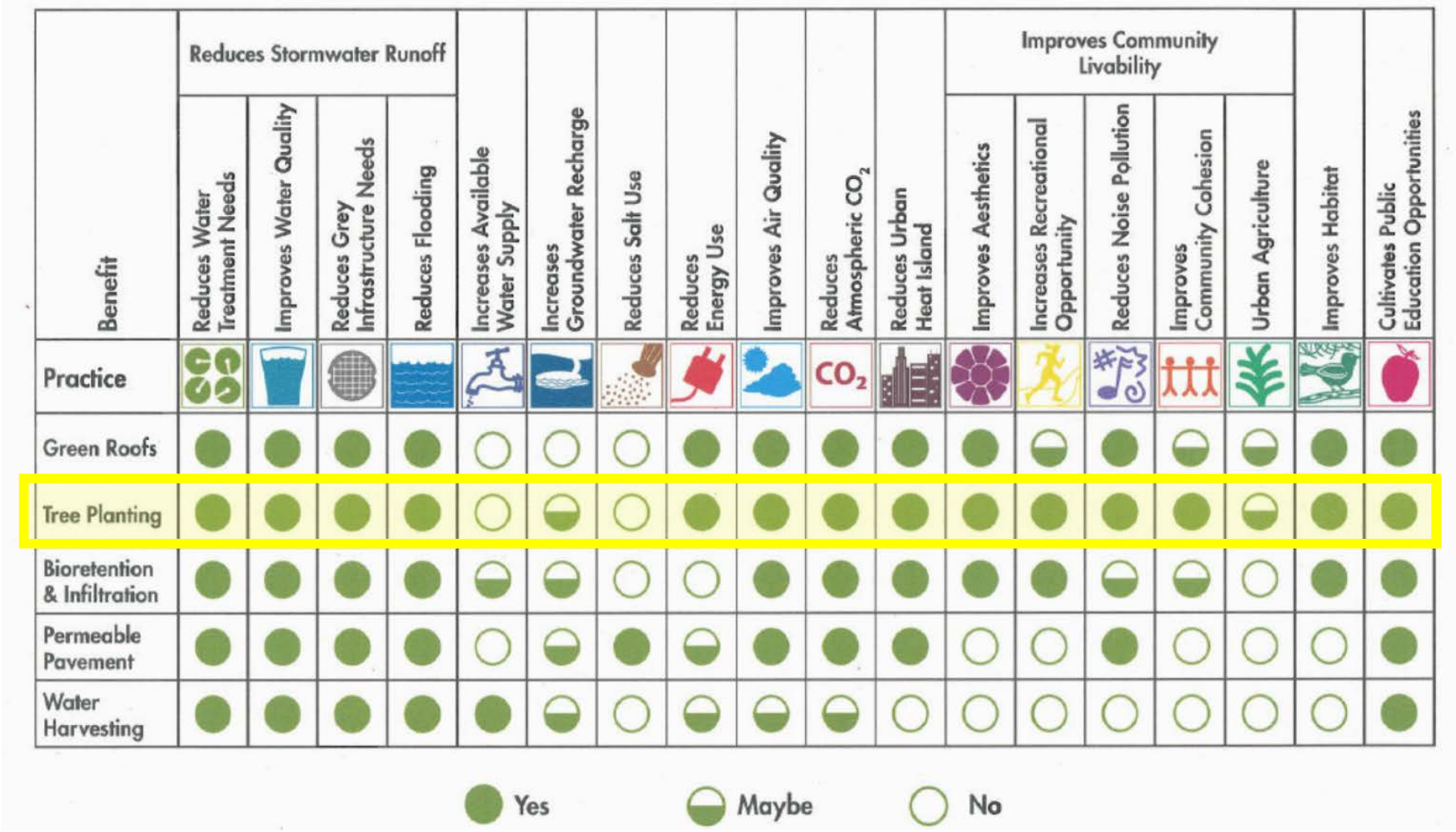

There are real solutions.
One of the best adaptation practices is preserving natural areas.

Nature-Based Solutions

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, zoning, regulations, and built projects can help communities reduce their exposure to these impacts, resulting in reduced costs, economic enhancement, and safer, more resilient communities.

Lots of solutions, lots of benefits



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

Free ecosystem services:

Free services provided by the natural landscape

Every $1 invested in land conservation offers 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

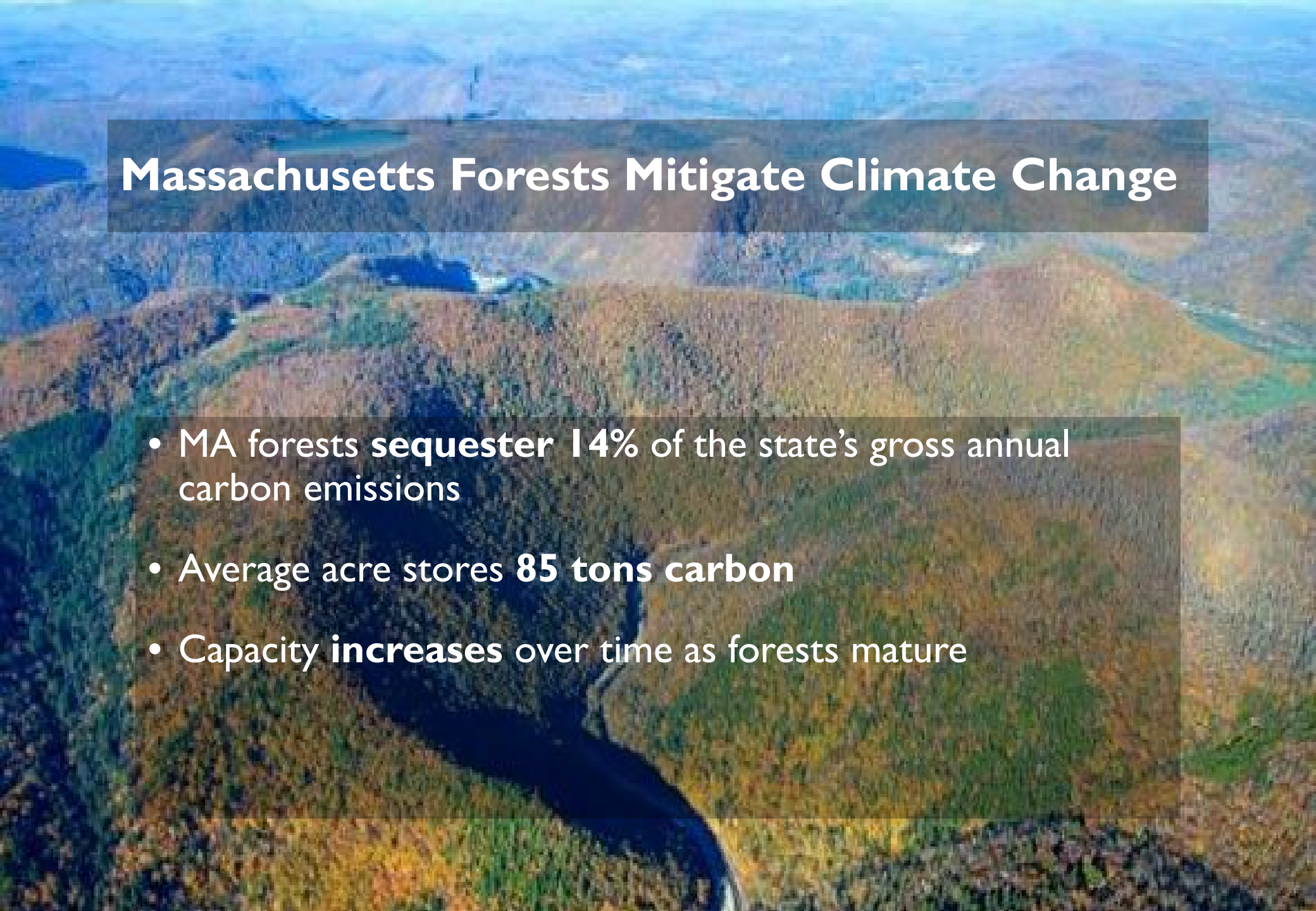
Nature based solutions at every scale

Rural, suburban, or urban

Conserve available open space providing ecosystem services

Integrate concepts into new development at neighborhood scales

Restore resilience in urban areas at site specific scale



Massachusetts Forests Mitigate 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

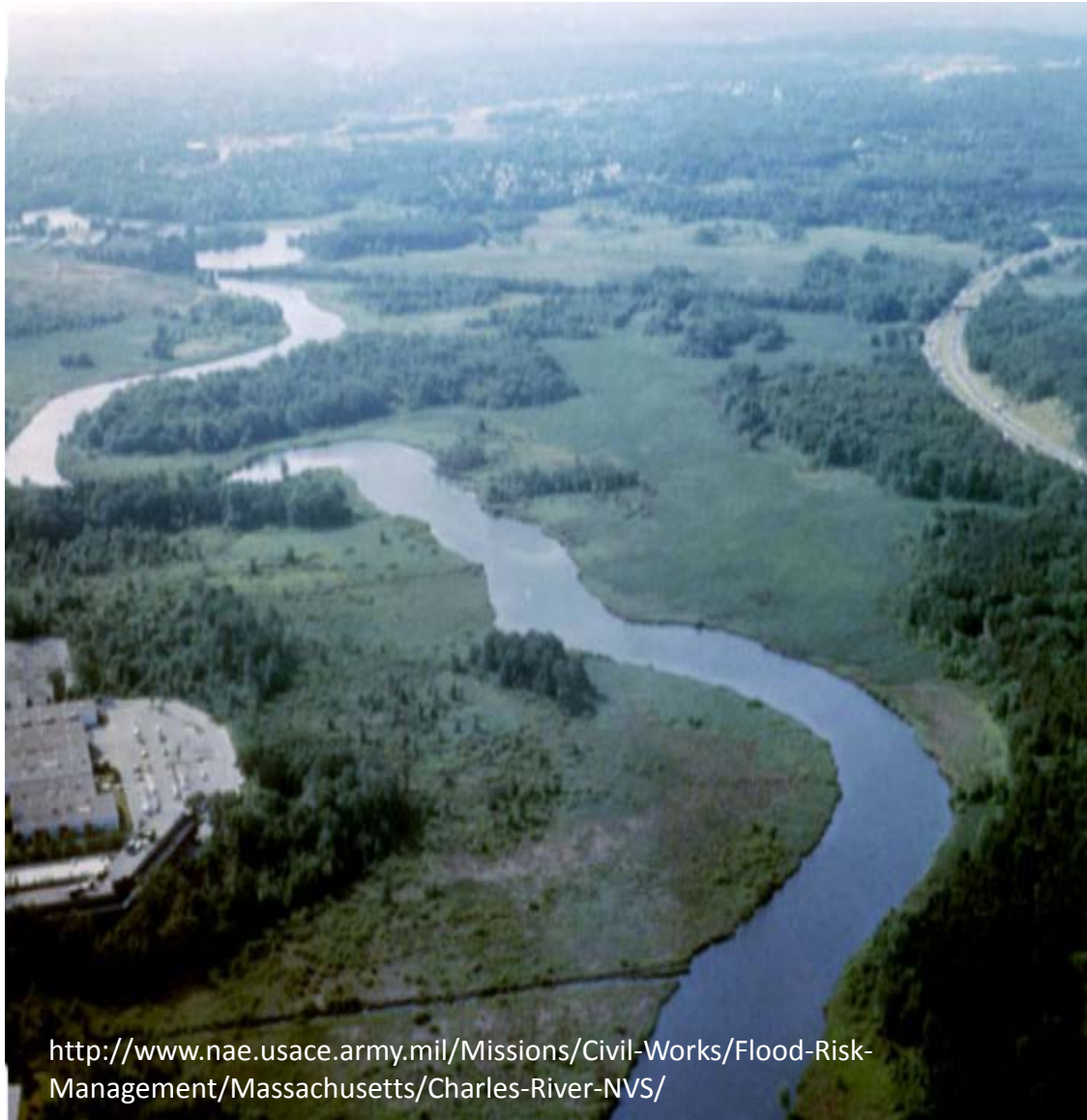
Cost Savings & Improved Safety:

Charles River Natural Valley Storage Area
US Army Corps of Engineers

- 8,095 Acres purchased or protected in the middle and upper Charles River watershed since 1977. Project Cost of $8,300,000

- From 1977 through September 2016, the project has provided $11,932,000 in flood protective services (not counting for inflation).

- Co-benefits include recreation and natural resource benefits



http://www.nae.usace.army.mil/Missions/Civil-Works/Flood-Risk-Management/Massachusetts/Charles-River-NVS/

Return on Investment
Studies 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%

www.nature.com/scientificreports

SCIENTIFIC REPORTS

OPEN

The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA

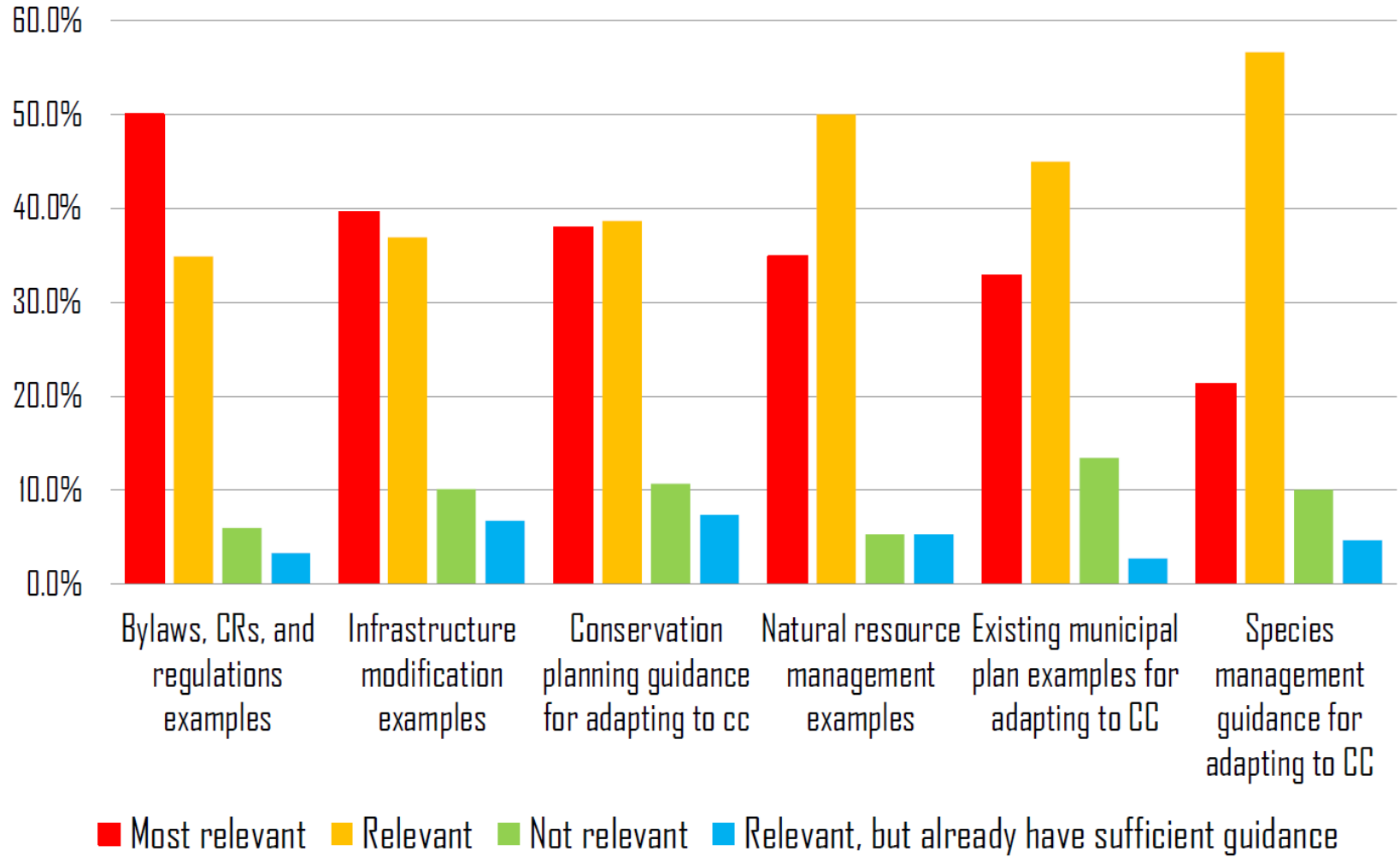
Received: 17 March 2017
Accepted: 1 August 2017
Published online: 31 August 2017

Siddharth Narayan[1], Michael W. Beck[1,2], Paul Wilson[3], Christopher J. Thomas[3], Alexandra Guerrero[3], Christine C. Shepard[4], Borja G. Reguero[1,2], Guillermo Franco[5], Jane Carter Ingram[6] & Dania Trespalacios[2]

https://www.nature.com/articles/s41598-017-09269-z

Identifying Barriers

From the Climate Action Tool survey, 2015



*Note! 70% of respondents were municipal professionals, but most already engaged in land conservation.

Factors	Conventional	Better	Best	Community's Zoning	Community's Subdivision Rules & Regulations	Community's Site Plan Review	Community's Stormwater/LID Bylaw/Regulations
GOAL 1: PROTECT NATURAL RESOURCES AND OPEN SPACE							
Soils managed for revegetation	Not addressed	Limitations on removal from site, and/or requirements for stabilization and revegetation	Prohibit removal of topsoil from site. Require rototilling and other prep of soils compacted during construction	*(Not applicable)*			
Limit clearing, lawn size, require retention or planting of native vegetation/naturalized areas	Not addressed or general qualitative statement not tied to other design standards	Encourage minimization of clearing/ grubbing	Require minimization of clearing/grubbing with specific standards				
Require native vegetation and trees	Require or recommend invasives	Not addressed, or mixture of required plantings of native and nonnative	Require at least 75% native plantings				
GOAL 2: PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL							
Lot size	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, allow flexibility	Clear standards that minimize and in some instances eliminate setbacks		*(Not applicable)*	*(Not applicable)*	*(Not applicable)*
Frontage	Required minimum frontage for each lot/unit	Minimize especially on curved streets and cul-de-sacs	No minimums 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 2-3 residential units	Allow for up to 4 residential units, preferrably constructed with permeable pavers or pavement				*(Not applicable)*

Boston Wetlands Protection Ordinance: climate focused

"These land resources are too valuable to lose to development–they're important not just for conservation, but to guard against severe flooding and heat that disproportionately harm our most vulnerable residents and communities. This is an issue of social and environmental justice."

– Boston City Councilor Michelle Wu October 26, 2018

Boston Wetlands Protection Ordinance: climate focused

- **Resource values protected**: "adaptation to climate change"
- **Alter**: "decreasing the capacity of wetlands to respond to the impacts of climate change"
- May require stormwater calcs based on **500 year flood**
- Defines/encourages **GI** and **Nature-Based Solutions**
- No permit for planting **natives**
- Protects Special Transitional Areas for **landscape migration**
- Commission may separately designate **areas of critical environmental concern**
- Requires integration of **climate resilience** into project

Write it down: Linking Local and Regional Green Infrastructure

- Ways to consider linking:
  - Comprehensive/Master Plans,
  - Cluster subdivision requirements,
  - Open space districts,
  - Transfer of development rights,
  - Water resource protection overlay districts,
  - Floodplain management,
  - Wetland protection districts and bylaws
  - Open space plans

Massachusetts State Hazard Mitigation and Climate Adaptation Plan

September 2018

Municipal Vulnerability Preparedness (MVP)

www.resilientma.org



State and local partnership to build resiliency to climate change

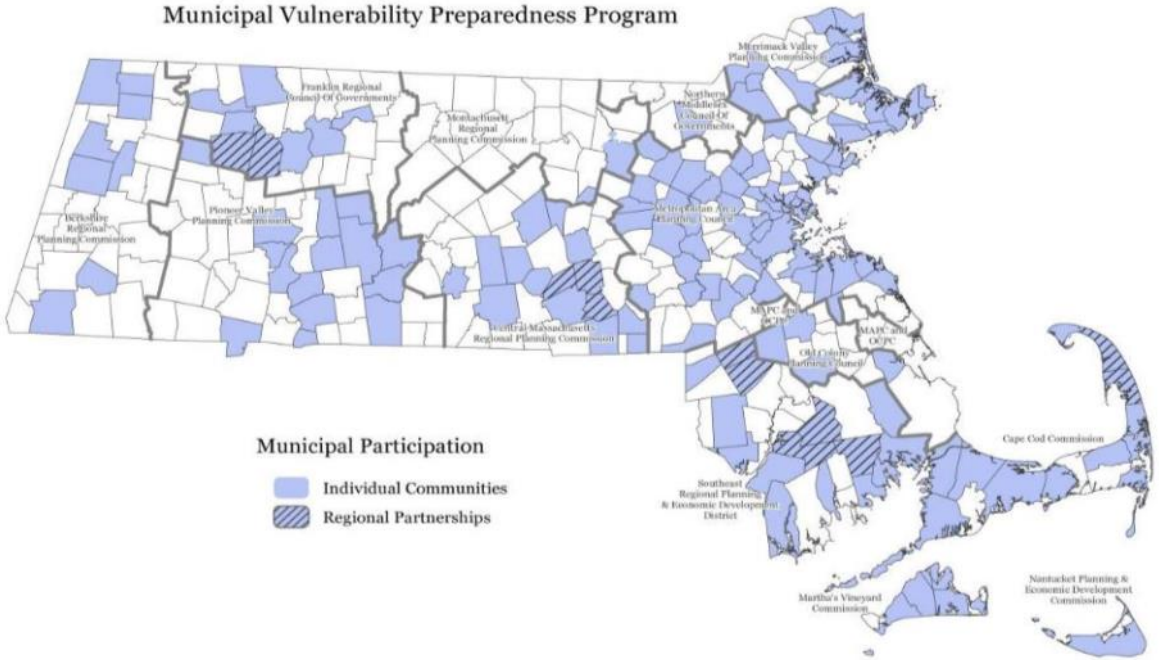
1. Engage Community
2. Identify CC impacts and hazards
3. Complete assessment of vulnerabilities & strengths
4. Develop and prioritize actions
5. Take Action

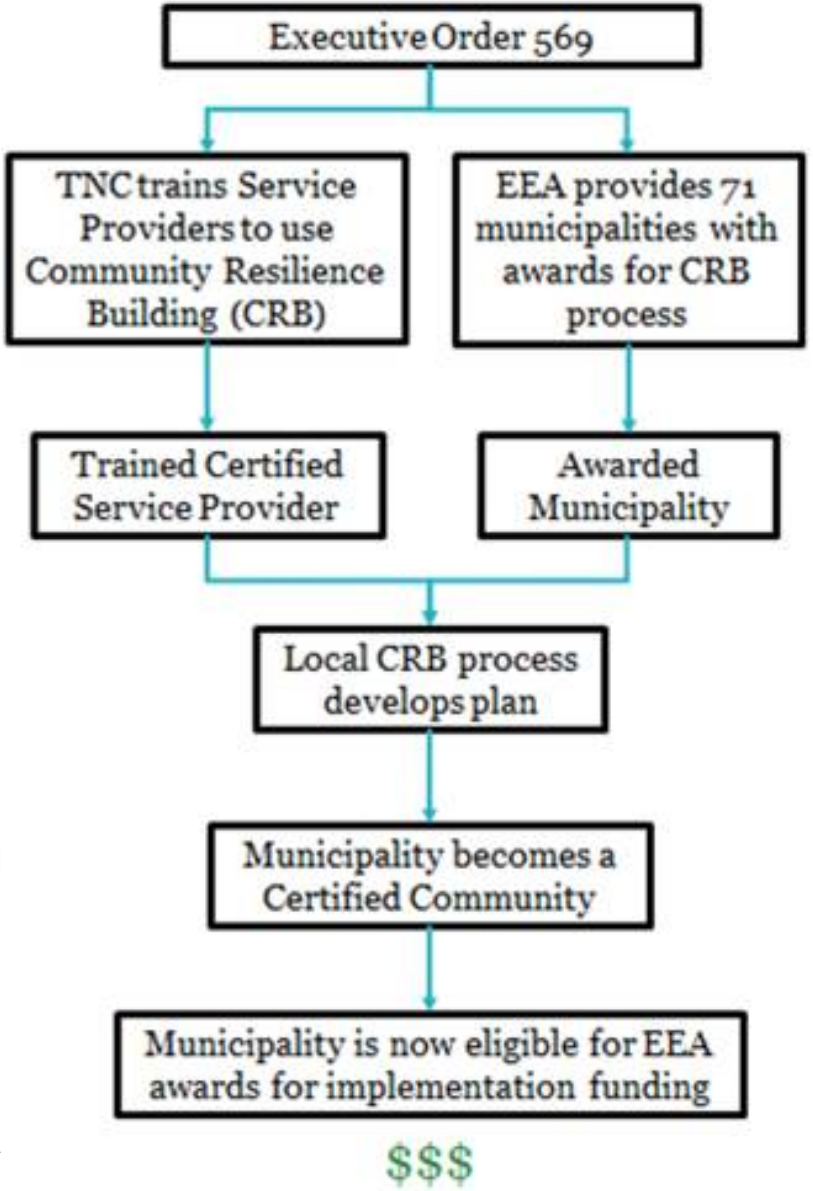
Baker Administration's Support

EO562 Language:

"…strategies that conserve and sustainably employ the natural resources of the Commonwealth to enhance climate adaptation, build resilience and mitigate climate change…"

Municipal Vulnerability Preparedness Process



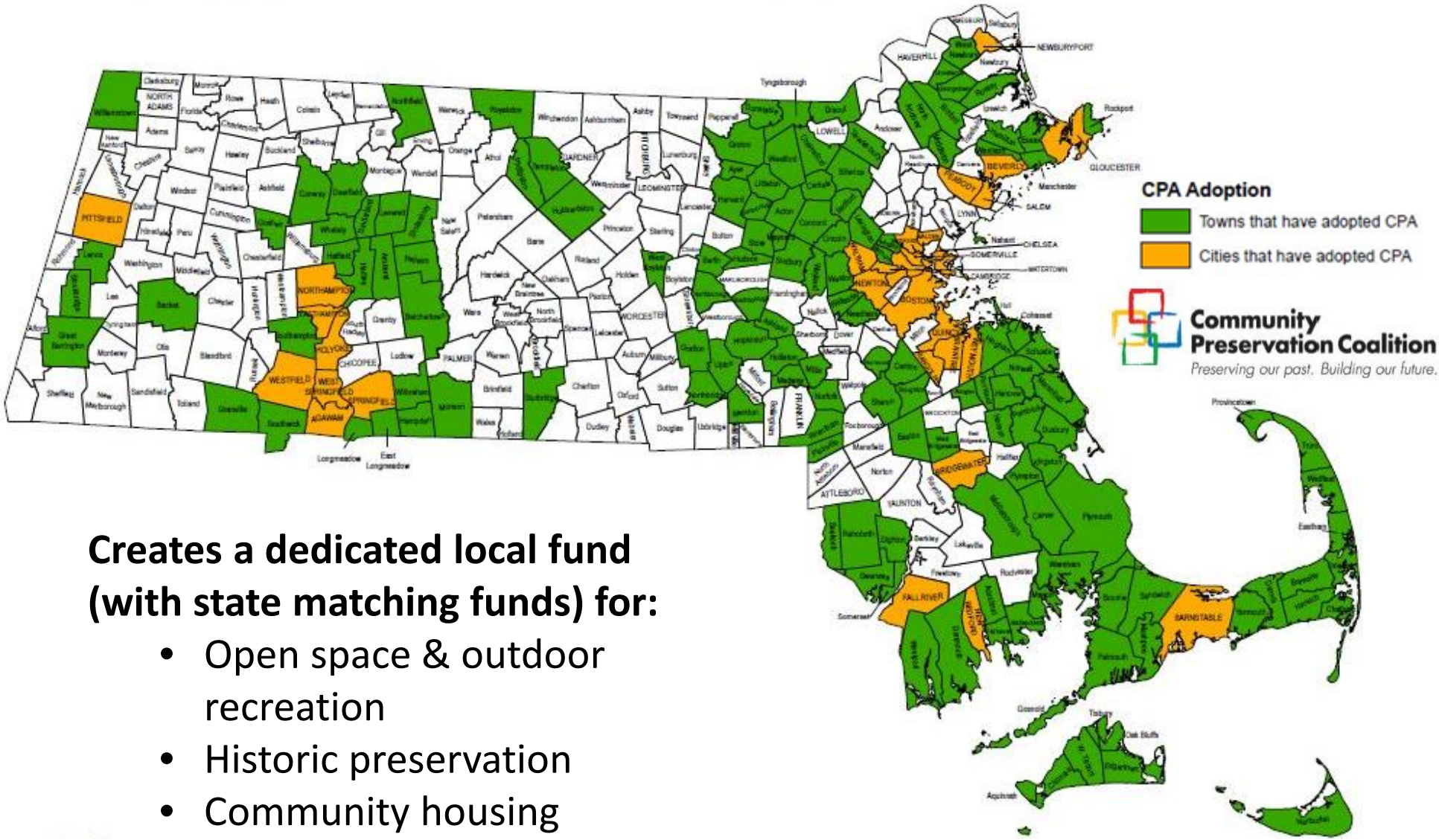


Funding

MVP Communities Receive Priority

- Clean Water State Revolving Fund Program (CWSRF)
- Office of Coastal Zone Management (CZM)
- Department of Agricultural Resources (MDAR)
- Executive Office of Energy and Environmental Affairs (EEA)
- Mass Department of Environmental Protection (DEP)
- Mass Environmental Trust (MET)

Community Preservation Act (CPA)



Creates a dedicated local fund (with state matching funds) for:

- Open space & outdoor recreation
- Historic preservation
- Community housing

Community Preservation Act (CPA)

by the numbers…

175 communities

30 cities

50% municipalities

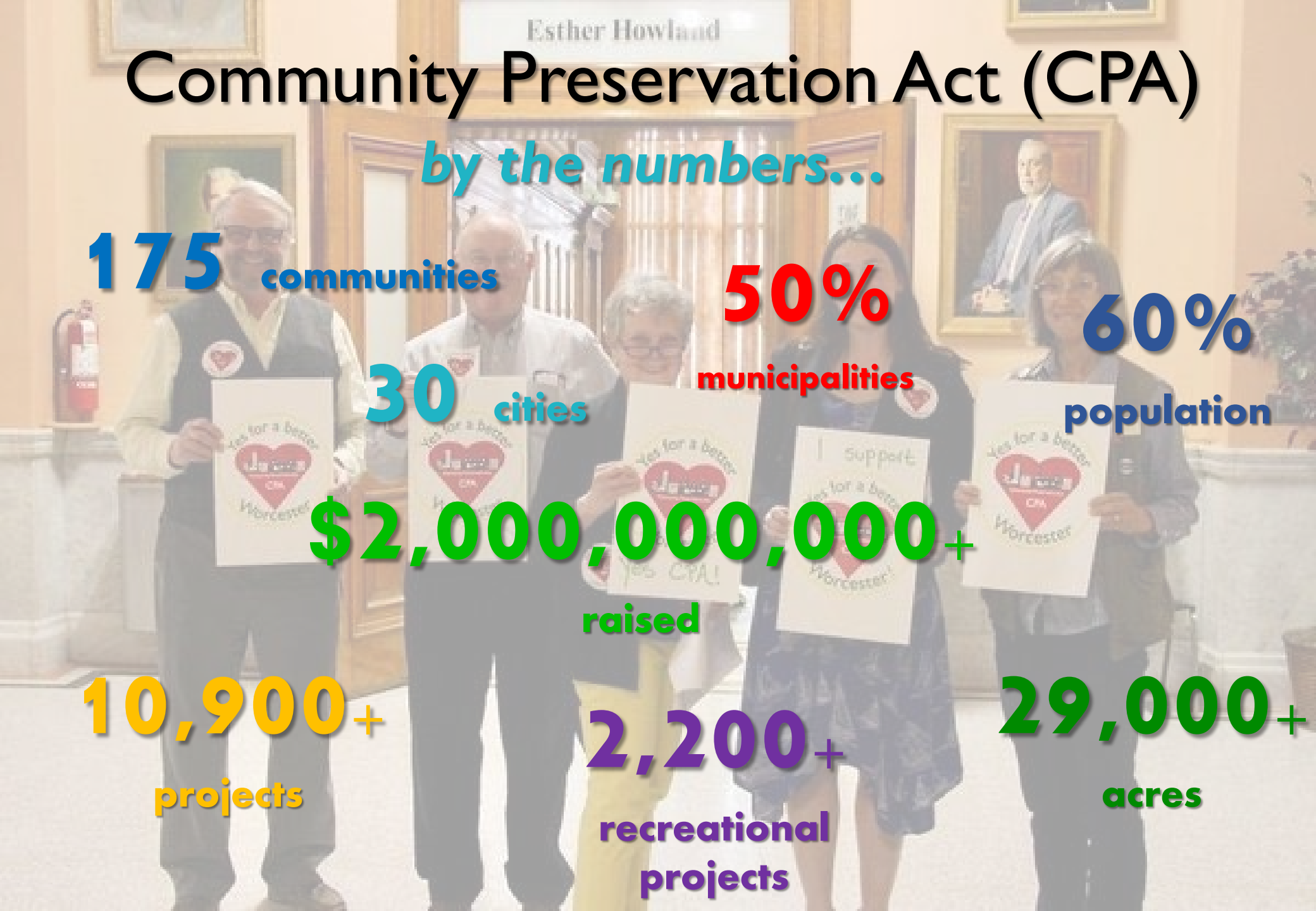
60% population

$2,000,000,000+ raised

10,900+ projects

2,200+ recreational projects

29,000+ acres



5 things conservationists can do

1. **Apply** to 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. **Work with** your planning board to 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

Ten things everyone can do to help build climate-resilient communities

1. Divert downspouts and adopt a stormdrain

2. Replace impervious areas or lawn with natives

3. Plant trees at home & in the city

4. Don't wash your car in the driveway & pick up pet waste

5. Reduce lawn watering, mowing, and fertilizing

6. Walk, bike, or use public transit

7. Eat less meat

8. Switch to renewable energy

9. Support conservation groups & open space

10. Talk about climate change & make it normal

Resources

- **MACC**: maccweb.org
- **Mass ECAN** (Ecosystem Climate Action Network): massecan.org
- **Shaping the Future of Your Community**: massaudubon.org/shapingthefuture
- **Resilient Taunton Watershed Network** (RTWN): srpedd.org/rtwn
- **Resilient MA**: resilientma.org
- **TNC Naturally Resilient Communities**: naturallyresilientcommunities.org

Thank you!

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