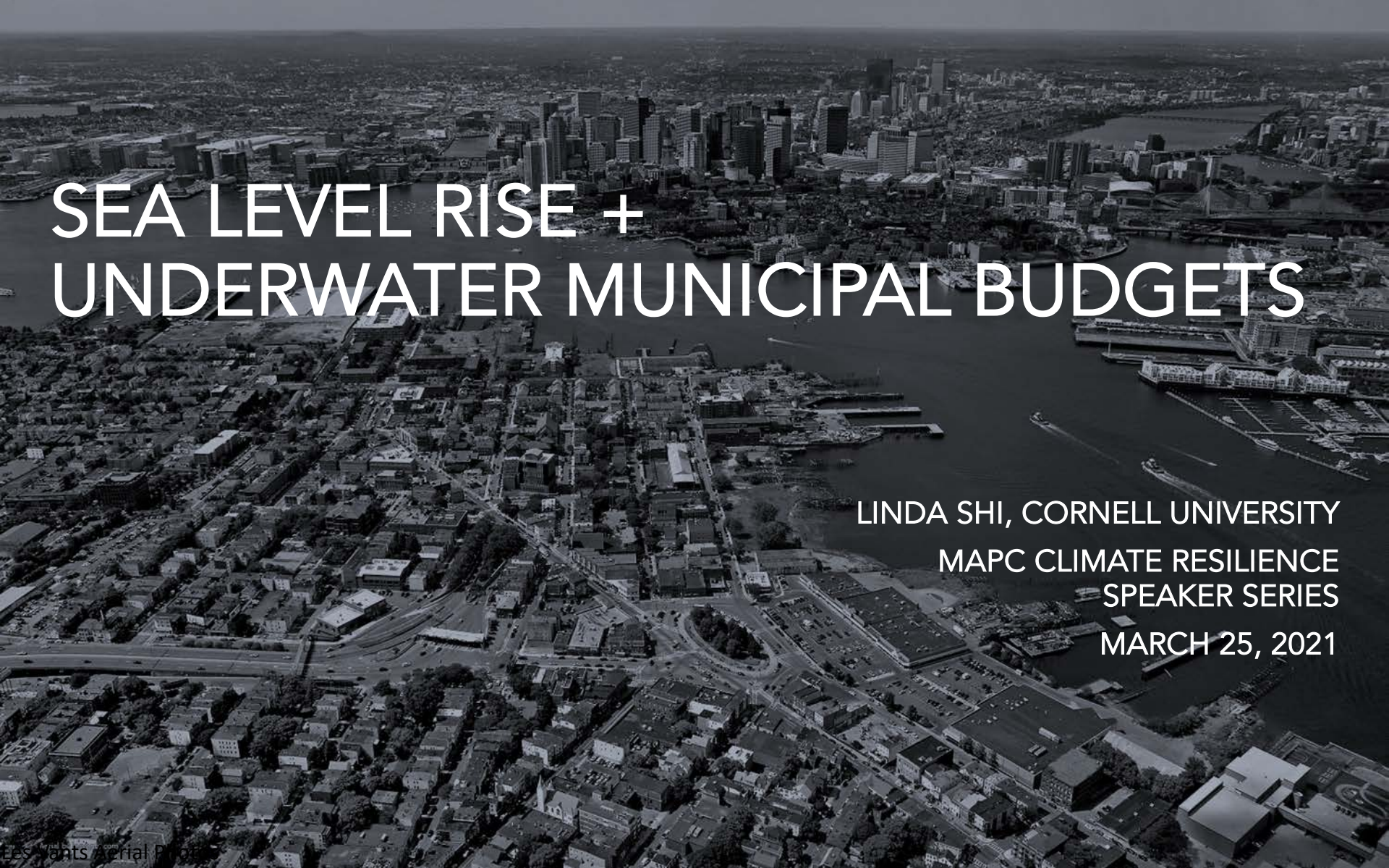


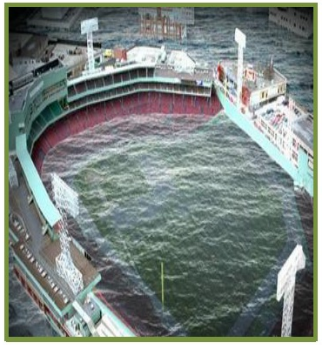
SEA LEVEL RISE + UNDERWATER MUNICIPAL BUDGETS

LINDA SHI, CORNELL UNIVERSITY

MAPC CLIMATE RESILIENCE SPEAKER SERIES

MARCH 25, 2021

Les Wants Aerial Photo



Metro Boston Regional Climate Change Adaptation Strategy Report

Funding provided by the Federal Sustainable Communities Program and the Barr Foundation

Prepared on June 30, 2014

By:

Metropolitan Area Planning Council
60 Temple Place
Boston, MA 02111
617.933.0700
www.mapc.org

With assistance from:
Tellus Institute
11 Arlington St.
Boston, MA 02116

MAPC
METROPOLITAN AREA PLANNING COUNCIL
50 YEARS
SMART GROWTH AND REGIONAL COLLABORATION

TELLUS INSTITUTE
for a Great Transition

Preparing for the Rising Tide in Boston's North End.

Lecture presented by
Julie Wormser, Executive Director of The Boston Harbor Association
Sponsored by the Friends of the North End Branch Library

Wednesday, September 16, 2015
6:30 – 8:00 pm

As sea levels rise and chronic flooding becomes the new normal, even master dike builders such as the Dutch are moving to more flexible, resilient solutions. The concept of "Living with Water" is the strategy of allowing defined areas to flood or contain water in order to prevent damage to other areas.

Julie Wormser, Executive Director of The Boston Harbor Association, will give a presentation on what Boston can expect from rising sea levels and what we can do short term and long term to decrease our risk of flood damage while maintaining our access to the ocean.

Boston Public Library

North End Branch of the Boston Public Library
25 Parmenter Street ~ 617.227.8135

The Boston Globe

OPINION

The fiscal challenges of climate change

Municipalities depend on the revenue of coastal development. That has to change.

By **Linda Shi** Updated March 5, 2020, 3:00 a.m.

29

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JOURNALS BOOKS MAGAZINE AUTHOR SERVICES USER SERV

Natural Hazards Review / Volume 21 Issue 3 - August 2020

Technical Papers

Downloaded 780 times

Floodplain Buyouts and Municipal Finance

Todd K. BenDor, Ph.D.; David Salvesen, Ph.D.; Christian Kamrath; and Brooke Ganser

Revenue Impacts

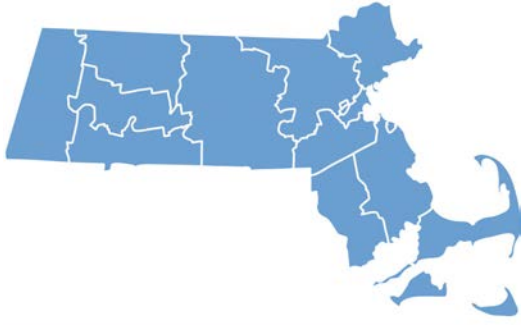
- Business disruption
- Economic impacts to climate dependent businesses (fisheries, logging/paper, recreation, tourism)
- Reduced development or business relocation
- Declining ability to pay
- Declining property value

Expenditure Impacts

- Social welfare, health, disaster preparedness & response
- Rising infrastructure maintenance & repair costs
- Rising capital improvement costs
- Rising costs of lending

Municipal property tax reliance

30%



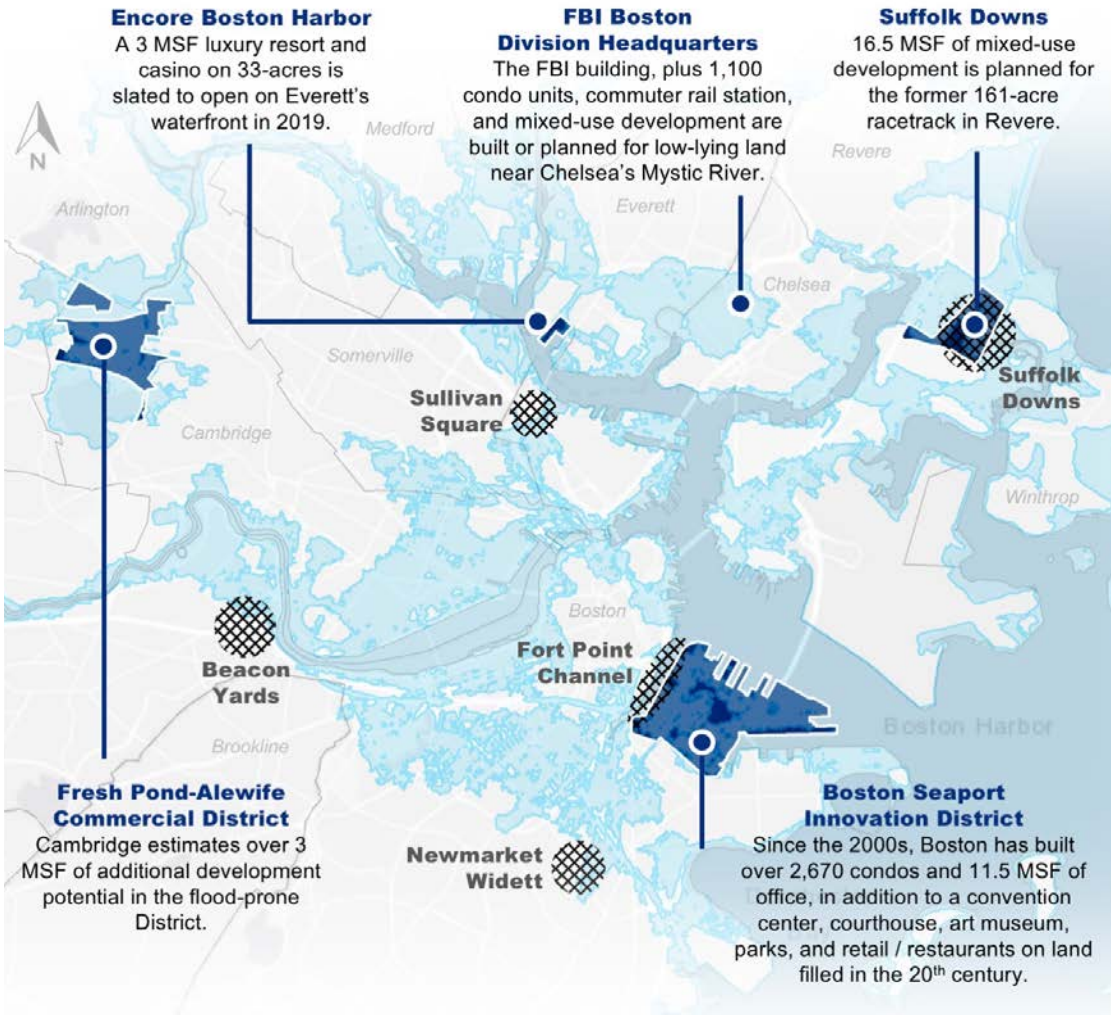
40%

60%

70-80%

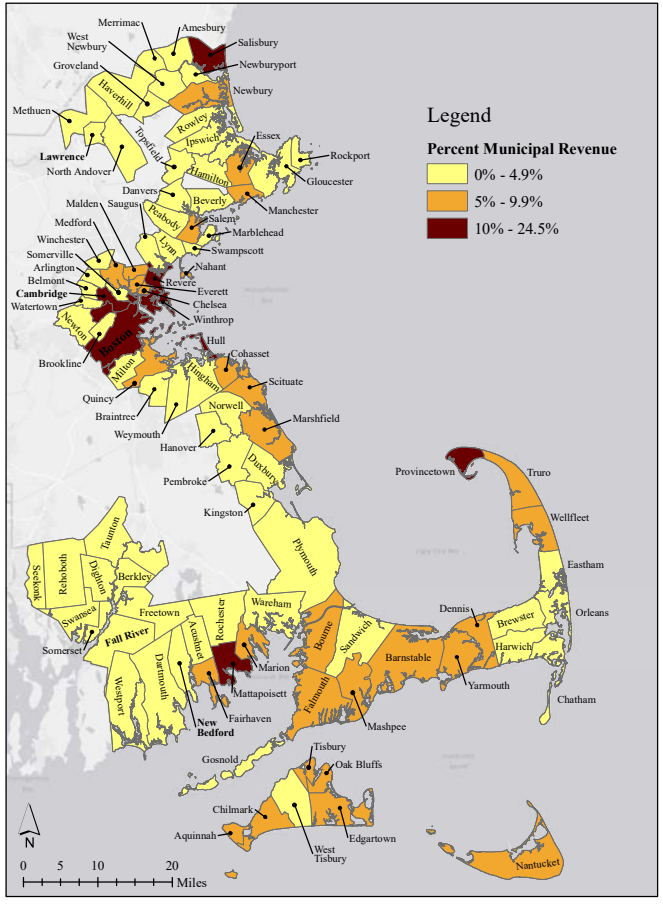
"Staying Afloat in 2100: Evaluating Fiscal and Land Use Options for Coastal Adaptation in Massachusetts."
Workshop report of Cornell University course, Governing Climate Change in Coastal Massachusetts.
APA National Student Project Award 2020, report available online.

6 feet of
sea level rise

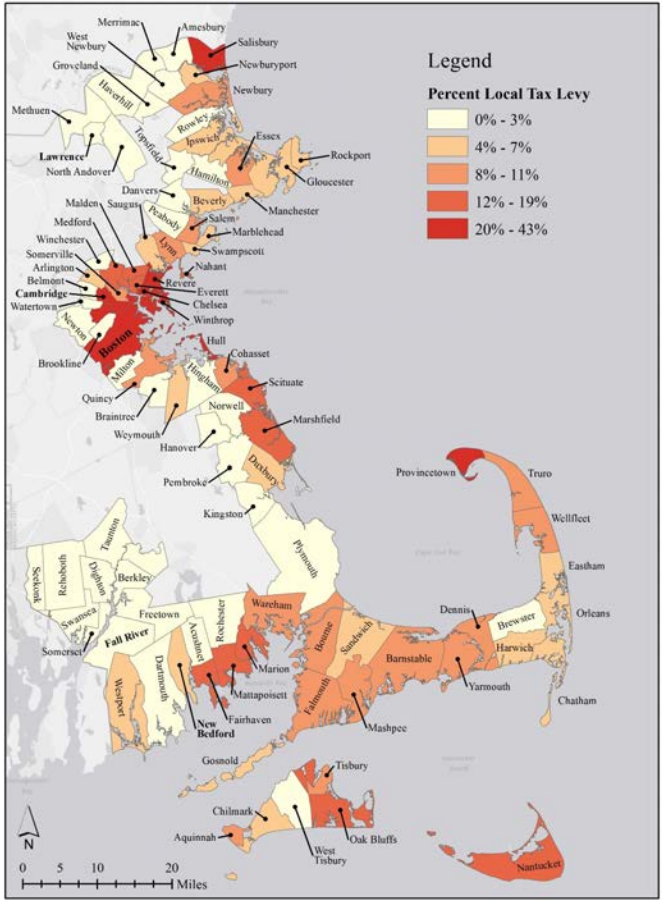


Shi, L., & Varuzzo, A. M. (2020). Surging seas, rising fiscal stress: Exploring municipal fiscal vulnerability to climate change. *Cities*, *100*, 102658. https://doi.org/10.1016/j.cities.2020.102658

Percent of current municipal total revenues jeopardized by 6ft of SLR



Percent of total municipal tax levy jeopardized at 6 feet of SLR



Shi & Varuzzo, 2020. Surging seas, rising fiscal stress: Exploring municipal fiscal vulnerability to climate change, *Cities (open access)*

Hunter's Point South Park,
Long Island City

The Monad Terrace, designed by Jean Nouvel to withstand a Category 5 hurricane, will be elevated 11.5 feet above sea level. *Source: JDS Development*

Real Estate

Are Miami Beach's Luxury Towers the Future of Climate Resilience?

In flood- and storm-prone Miami, buildings for the very rich might serve as a template for the rest of us.

By James Tarmy
December 20, 2017, 4:21 AM EST

Bloomberg

Miami Herald

ENVIRONMENT

Climate gentrification: Is sea rise turning Miami high ground into a hot commodity?

BY ALEX HARRIS

DECEMBER 18, 2018 07:00 AM,

UPDATED DECEMBER 19, 2018 11:54 AM

The Nation.

Politics World Climate Culture Shop

CLIMATE CHANGE RACISM AND DISCRIMINATION FEATURE OCTOBER 10, 2016, ISSUE

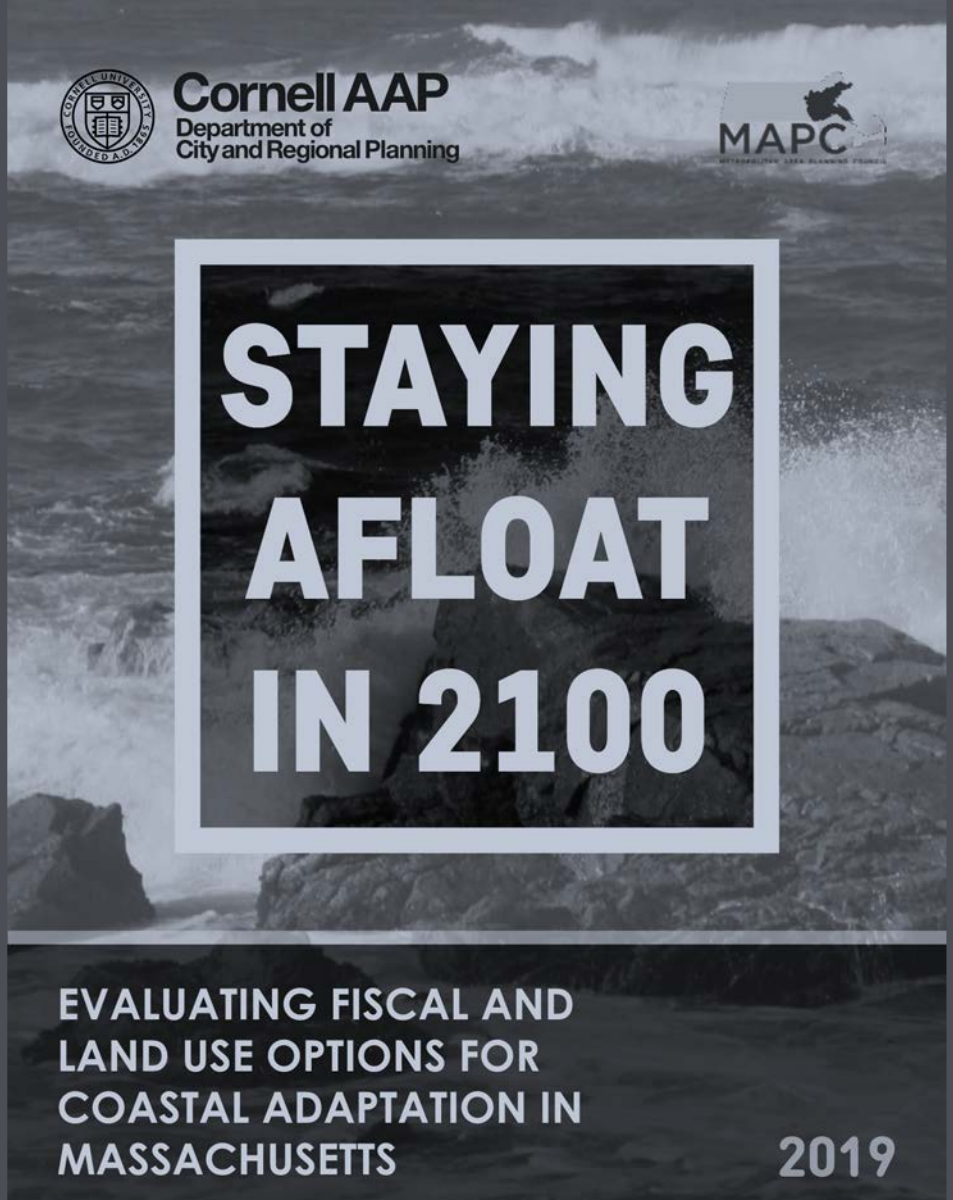
My Drowning City Is a Harbinger of Climate Slums to Come

Federal legislation is hastening the collapse of working class neighborhoods near water.

By Virginia Eubanks

AUGUST 29, 2016

The parking lot of the John P. Taylor Apartments, Troy, New York. *(Daniel P. Crawley)*



APA Student Project Award 2020

Available online

Hingham

Boston

Hull

Cohasset

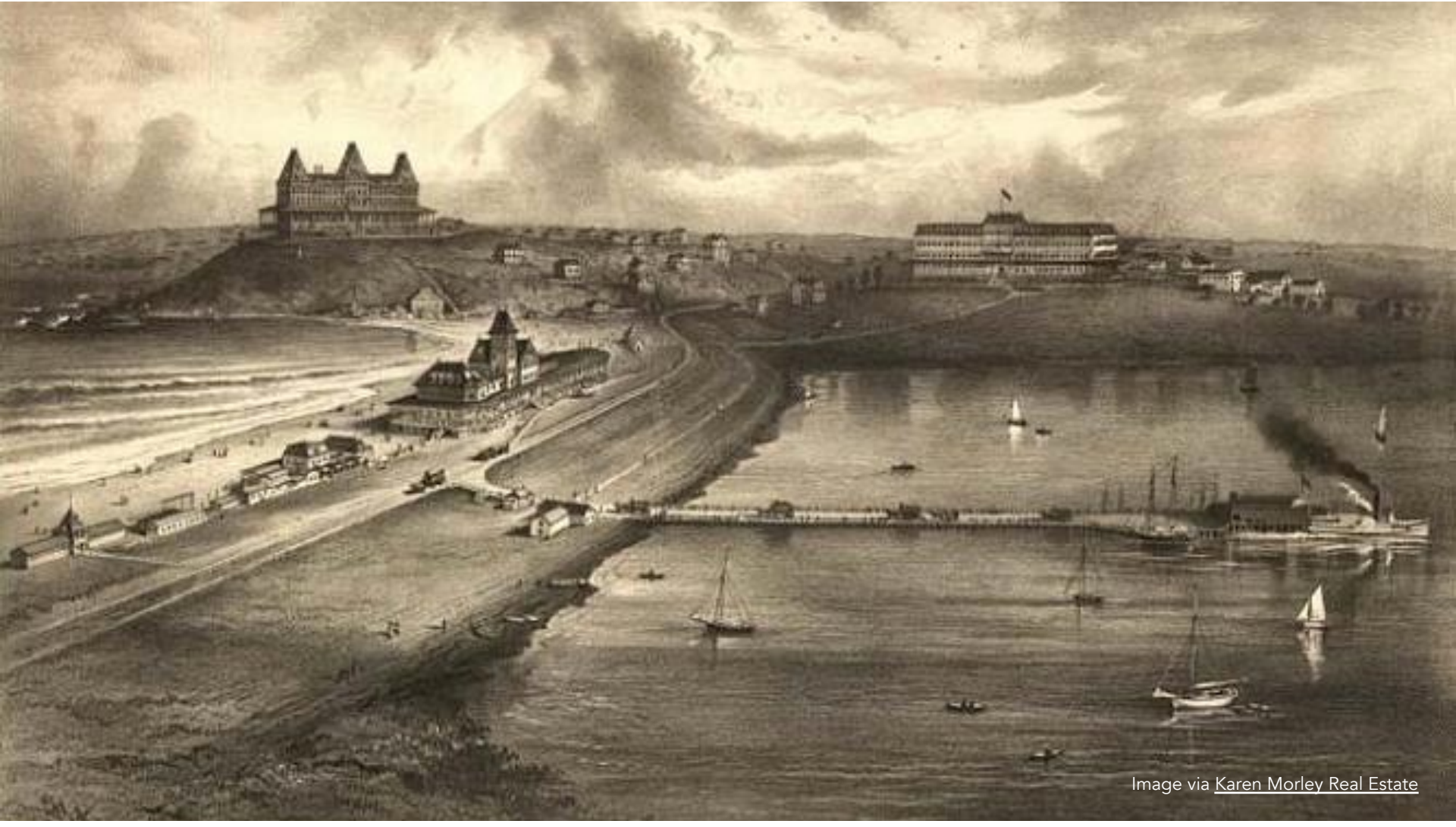
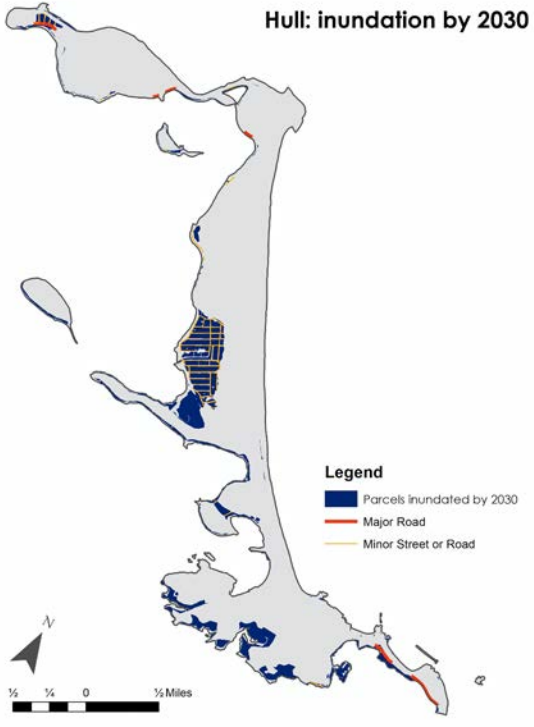


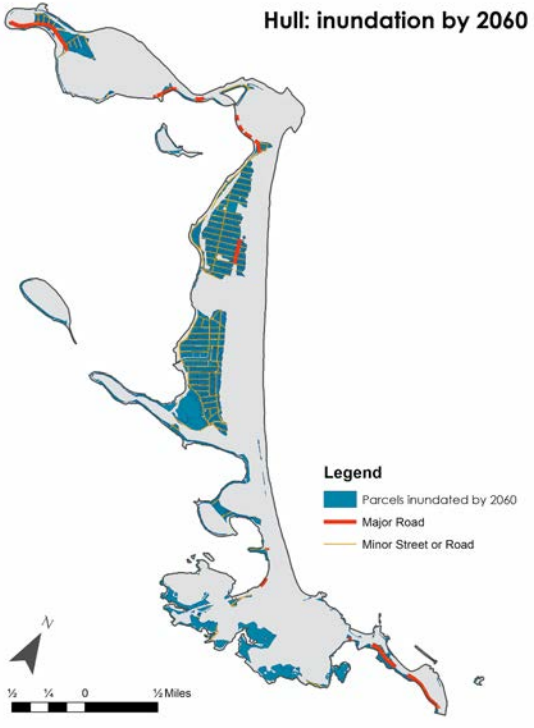
Image via Karen Morley Real Estate

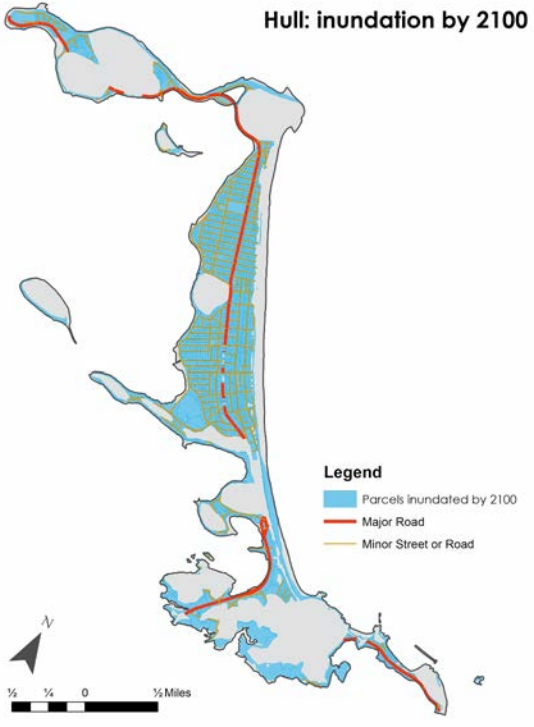
Image via Boston.com

2019: Local Values and Priorities

- Place to raise family and grow old
- High quality of services and schools
- Affordable housing
- Proximity to natural environment
- Strong sense of community


Hull: inundation by 2030
Legend
Parcels inundated by 2030
Major Road
Minor Street or Road
N
½ ¼ 0 ½ Miles


Hull: inundation by 2060
Legend
Parcels inundated by 2060
Major Road
Minor Street or Road
N
½ ¼ 0 ½ Miles


Hull: inundation by 2100
Legend
Parcels inundated by 2100
Major Road
Minor Street or Road
N
½ ¼ 0 ½ Miles

Credits: Linda Shi & class

Scenario 1: No anticipatory adaptation

Budget impacted due to SLR by 2100

Hull	Cohasset	Hingham
-30%	-5%	-2%

Own source revenues at risk

Hull	Cohasset	Hingham
-47%	-8%	-2%

Scenario 2: Mega Protect: Build a Harbor Barrier

FIGURE 1.1

Recommended Possible Harbor-wide Protection Schemes

Source: Climate Ready Boston, 2016

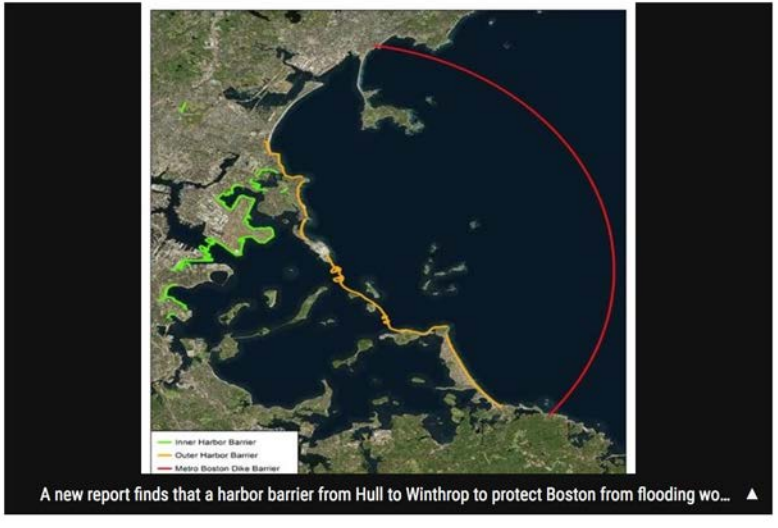
https://hull.wickedlocal.com/news/20180530/rep...

Report throws cold water on plan to build $11 billion Boston Harbor barrier

By Katie Lannan / State House News Service

Posted May 30, 2018 at 6:51 AM

Updated May 30, 2018 at 6:56 AM



A new report finds that a harbor barrier from Hull to Winthrop to protect Boston from flooding wo...

Scenario 3: Local Protect: Seawalls & Dunes

Photos: Linda Shi

Scenario 4: Micro Protect and Elevate

Image: R. Louden/NPS


Image: Patsy Lynch/FEMA


Image: Greg Goebel/Wikimedia Commons


Image: Ken Wells/USACE NY/Flickr

- Elevate homes
- Elevate roads
- Upgrade / wall off infrastructure & utilities
- Nourish beaches
- Build out vacant lots in non vulnerable areas

Scenario 5: Accommodate: Retrench & Densify

Spinnaker Island, Hull, MA

Retreat (buyouts?) from chronically flooded areas, then

A) Densify inland and upland parts of Hull or

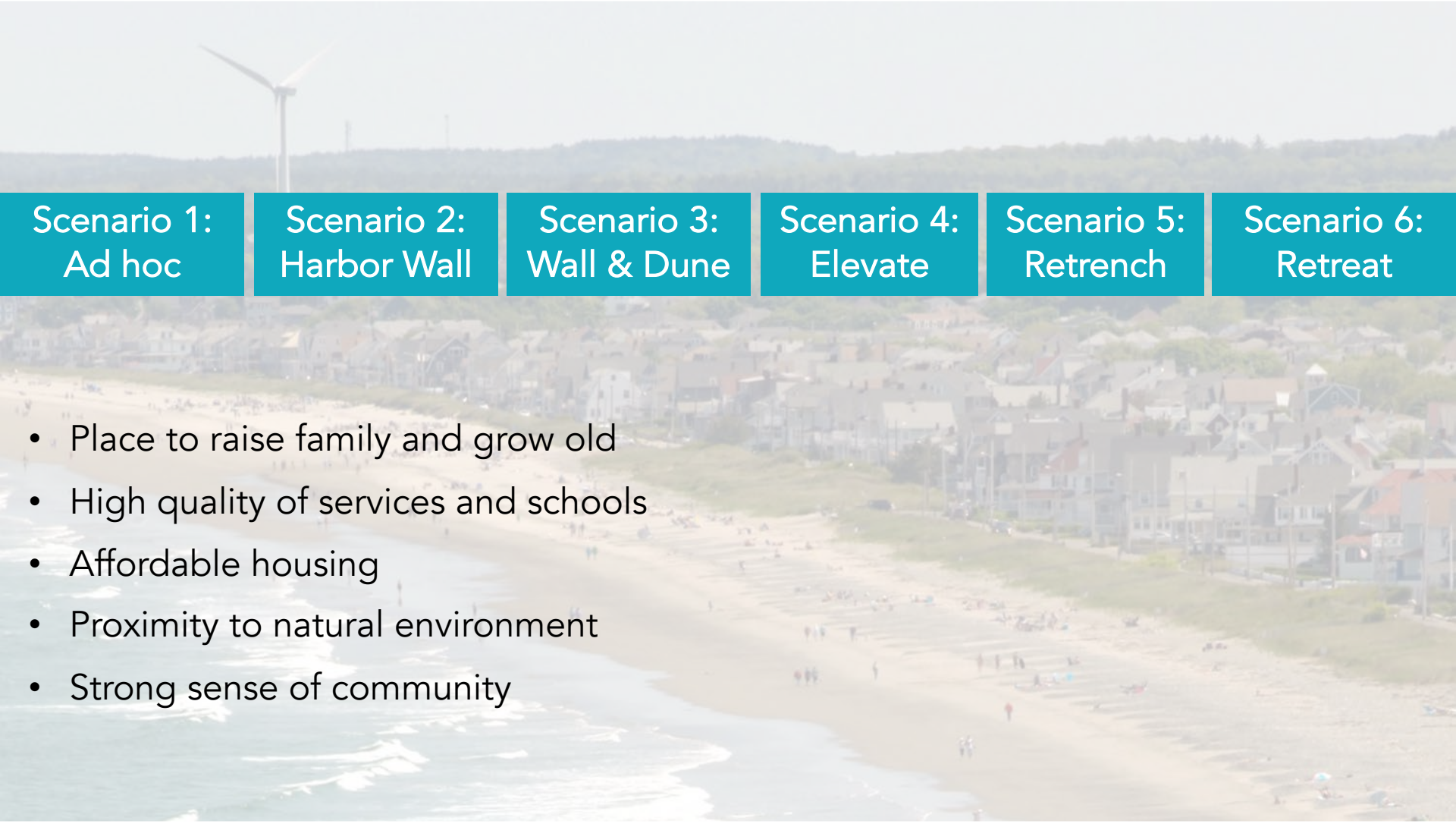
B) Move to nearby towns and build out vacant, non-vulnerable lots

Scenario 6: Retreat & Create Park

- Gradually ecologically restore buyout properties

- Resettle people collectively as communities within the sub-region as much as possible

- Add Hull to Boston Harbor Islands State and National Park



Scenario 1: Ad hoc	Scenario 2: Harbor Wall	Scenario 3: Wall & Dune	Scenario 4: Elevate	Scenario 5: Retrench	Scenario 6: Retreat

- Place to raise family and grow old
- High quality of services and schools
- Affordable housing
- Proximity to natural environment
- Strong sense of community

$10B

Scenario 1: Ad hoc	Scenario 2: Harbor Wall	Scenario 3: Wall & Dune	Scenario 4: Elevate	Scenario 5: Retrench	Scenario 6: Retreat

- Place to raise family and grow old → defers adaptation
- High quality of services and schools → preserves services
- Affordable housing → mixed?
- Proximity to natural environment → loss of environmental quality (walls are illegal)
- Strong sense of community → currently, community opposition

No funding?

$340-600M

Scenario 1: Ad hoc	Scenario 2: Harbor Wall	Scenario 3: Wall & Dune	Scenario 4: Elevate	Scenario 5: Retrench	Scenario 6: Retreat

- Place to raise family and grow old → costs + risks displace residents individually
- High quality of services and schools → declining services due to fiscal stress
- Affordable housing → increasingly unaffordable as only wealthy can afford to elevate
- Proximity to natural environment → privatization of waterfront, increasing risks
- Strong sense of community → loss of community

Is this how we want to spend our collective resources?

$800M-$2B

Scenario 1: Ad hoc	Scenario 2: Harbor Wall	Scenario 3: Wall & Dune	Scenario 4: Elevate	Scenario 5: Retrench	Scenario 6: Retreat

- Place to raise family and grow old → loss of current home and community
- High quality of services and schools → potential for improved services at scale?
- Affordable housing → threat of climate gentrification if not managed
- Proximity to natural environment → legacy of restored, public waterfront
- Strong sense of community → can collective resettlement preserve "community"?

Current policies and funds do not enable this approach

RISING AS A REGION TO CLIMATE CHANGE

TABLE 4

Functions of Various Types of Financial Mechanisms

	Type of Financial Mechanism					
Functions of Financial Mechanisms	**Bonds**	**Property Taxes**	**Resilience Fees**	**Risk-based Insurance**	**DIF/BID**	**PACE/ PAR**
Transfer financial risks	X			X		
Align incentives			X	X	X	
Stimulate private investment			X	X	X	X
Spread payments over time and many parties	X	X	X		X	
Capture value from parties who benefit		X	X		X	X
Capitalize future benefits	X					X
Provide loan collateral						X

DIF = District Improvement Financing. **BID** = Business Improvement District. **PACE** = Property Accessed Clean Energy. **PAR** = Property Assessed Resilience

Source: UMass Boston Financing Climate Resilience 2018

FUNDING AND FINANCING

Options and Considerations for Coastal Resilience Projects

Funding

- Tax proceeds
- Fees
- Grants
- Public-private partnership
- Crowdfunding platforms
- Voluntary surcharge

Financing

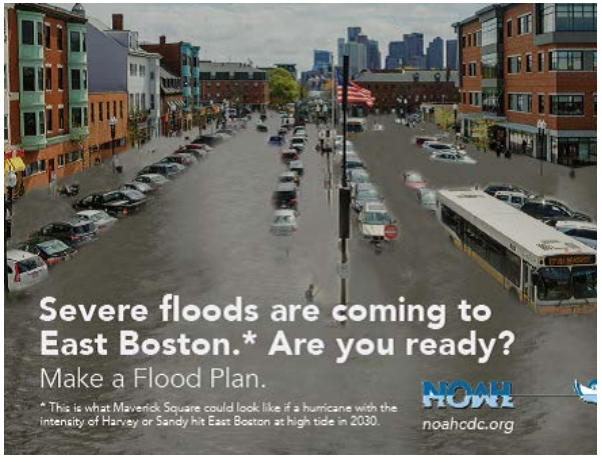
- Loans
- State revolving funds
- Bonds (traditional, Environmental impact bonds, Green bonds, Resilience bonds)
- Event-based insurance

https://coast.noaa.gov/data/digitalcoast/pdf/financing-resilience.pdf

Scenario 1 - Rich folks win!

- High-end waterfront
- “Resilient design”
- Gentrify neighborhoods behind
- Some affordable housing required but fewer units overall
- Protected for how long?

Scenario 2 - Poor folks



- Preserve affordable housing and existing residential fabric
- Less housing production overall
- Requires public investment
- Limited “returns” on tax roll
- Requires elected to prioritize progressivism and securing federal aid

- Questions aren’t - what do we do with the DPA? How to slow gentrification?
- They’re: how do we maximize number of people who can live in places that enable working class people to thrive and, yes, get rich under climate change? Who owns land and profits from it? Who controls decision-making?

Scenario 3 - Resident Ownership

- Helps finance development and coastal upgrading
- Contributes to pro-poor development
- City still gets taxes
- Coastal development still poses long-term risks
- Land lease - city / community retains long term land rights

Scenario 4: Land Readjustment or Transfer Development Rights

- Redevelop East Boston with existing residents (and renters) holding “shares” of land and housing
- Densify higher-elevations
- Self-financing model, wealth building
- Significant change to built environment

Scenario 5: Regional Housing, Regional Tax Sharing

- Regional tax / fee to support housing development
- Land value capture supports areas that need to shrink with grace
- Fund regional green infrastructure
- Mergers and consolidation in long term?

- Think about the region as an integrated whole
- Develop regional housing plan
- Marry design with land policy
- Empower marginalized groups as primary beneficiaries

THANK YOU

www.lindashi.net

lindashi@cornell.edu

@_lindashi (Twitter)