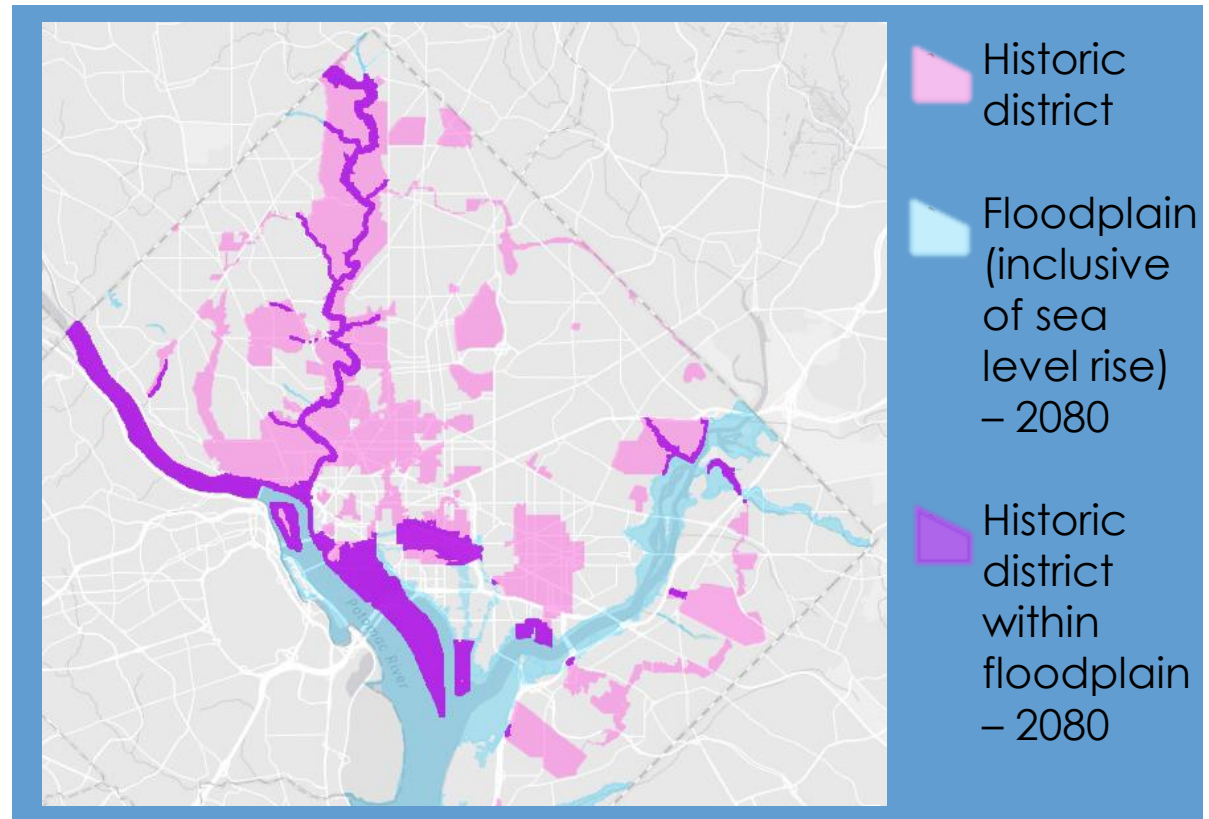


2017 Dick Wolf Lecture



HISTORIC DISTRICTS & CLIMATE CHANGE:

EXAMINING THE VULNERABILITY OF WASHINGTON D.C.'S HISTORIC DISTRICTS TO SEA LEVEL RISE

Kelsey Robertson | 24 March 2017



INTRODUCTION

- how we got here

THE PROBLEM

- climate change, the chesapeake bay, & historic districts
- mapping vulnerability

THE ANALYSIS

- case studies
- lessons learned

THE SOLUTION

- facilitating conditions
- path forward – **adaptive planning framework for historic districts**

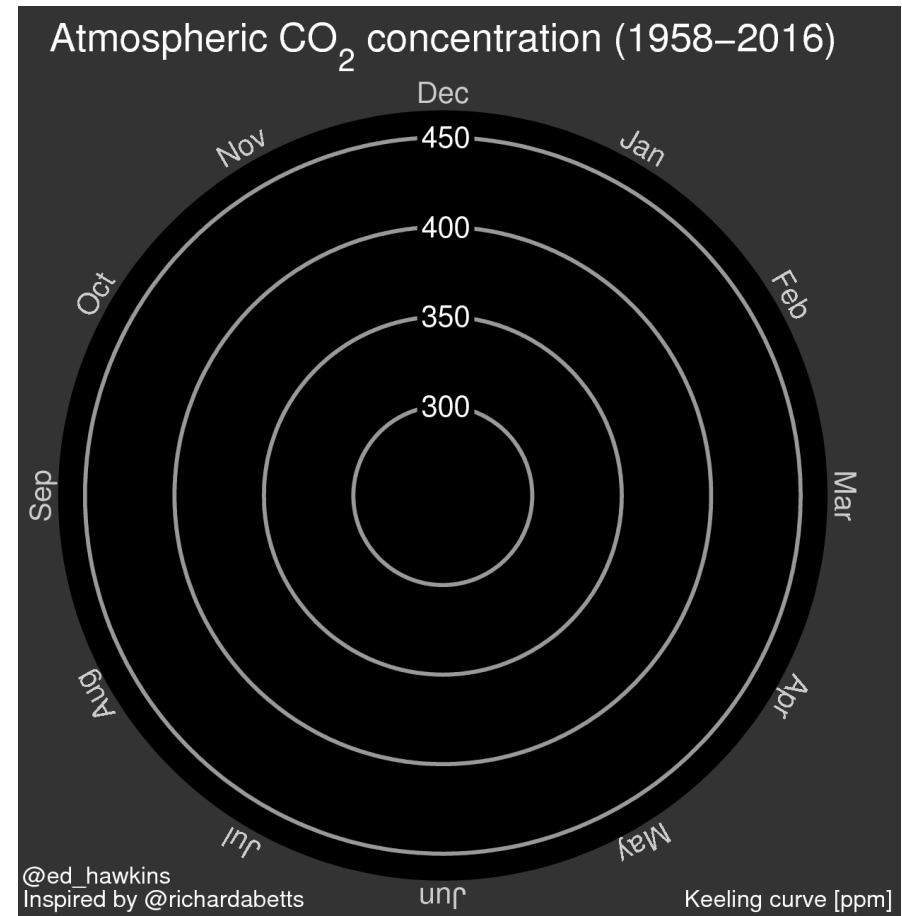
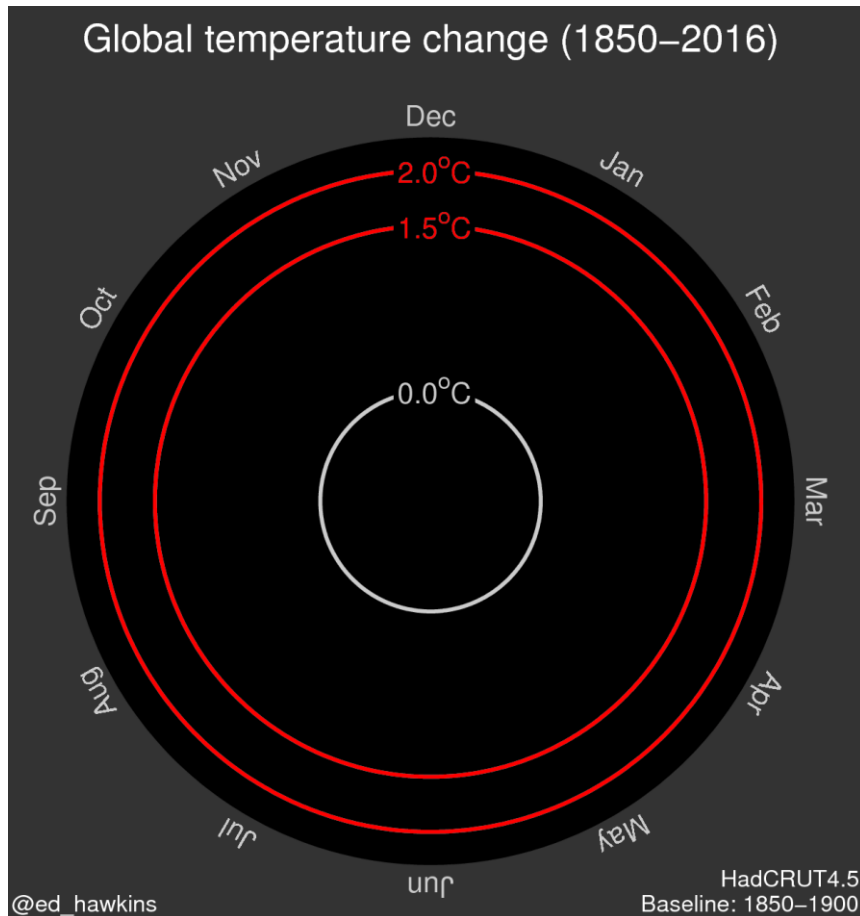
INTRODUCTION

Capstone project: *Resilient History: Protecting Chesapeake Bay Coastal Historic Districts From Rising Seas Through Adaptive Planning*

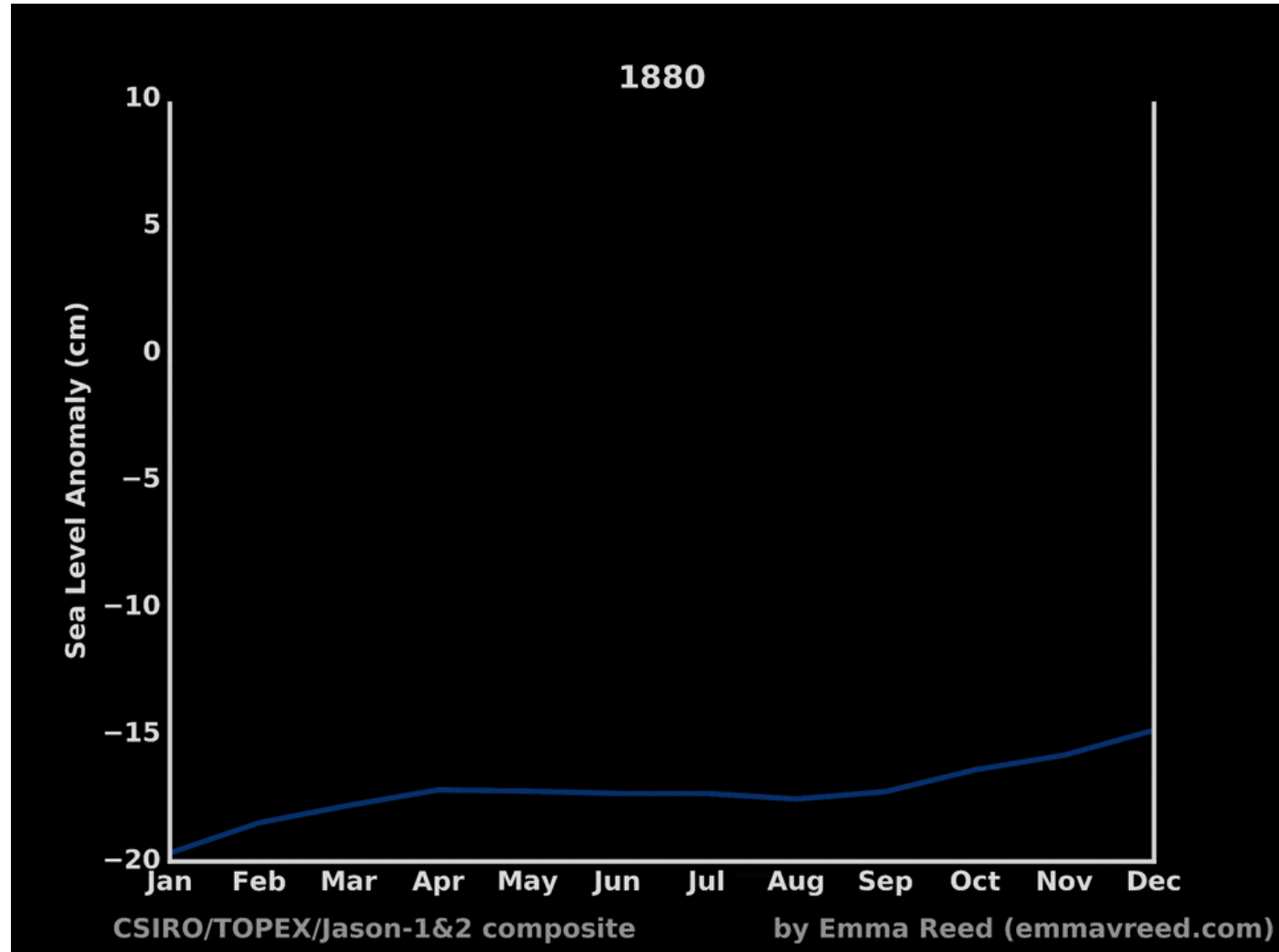
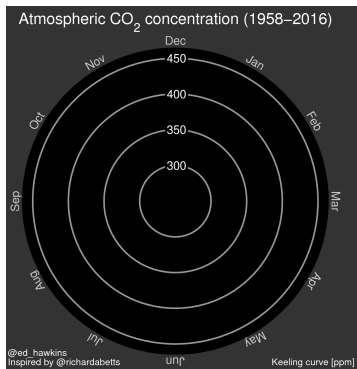
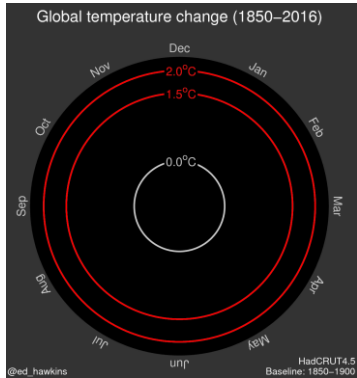


GEORGETOWN UNIVERSITY
School of Continuing Studies

CLIMATE CHANGE: RISING TEMPERATURES & SEAS

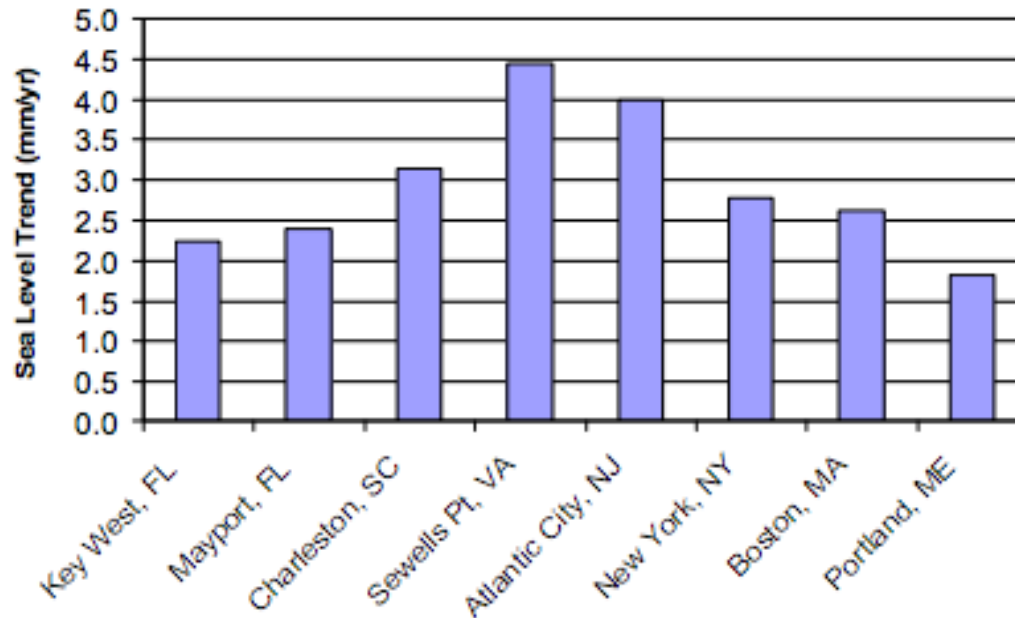


CLIMATE CHANGE: RISING TEMPERATURES & SEAS



source: Ed Hawkins, National Centre for Atmospheric Science

SEA LEVEL RISE & THE CHESAPEAKE BAY

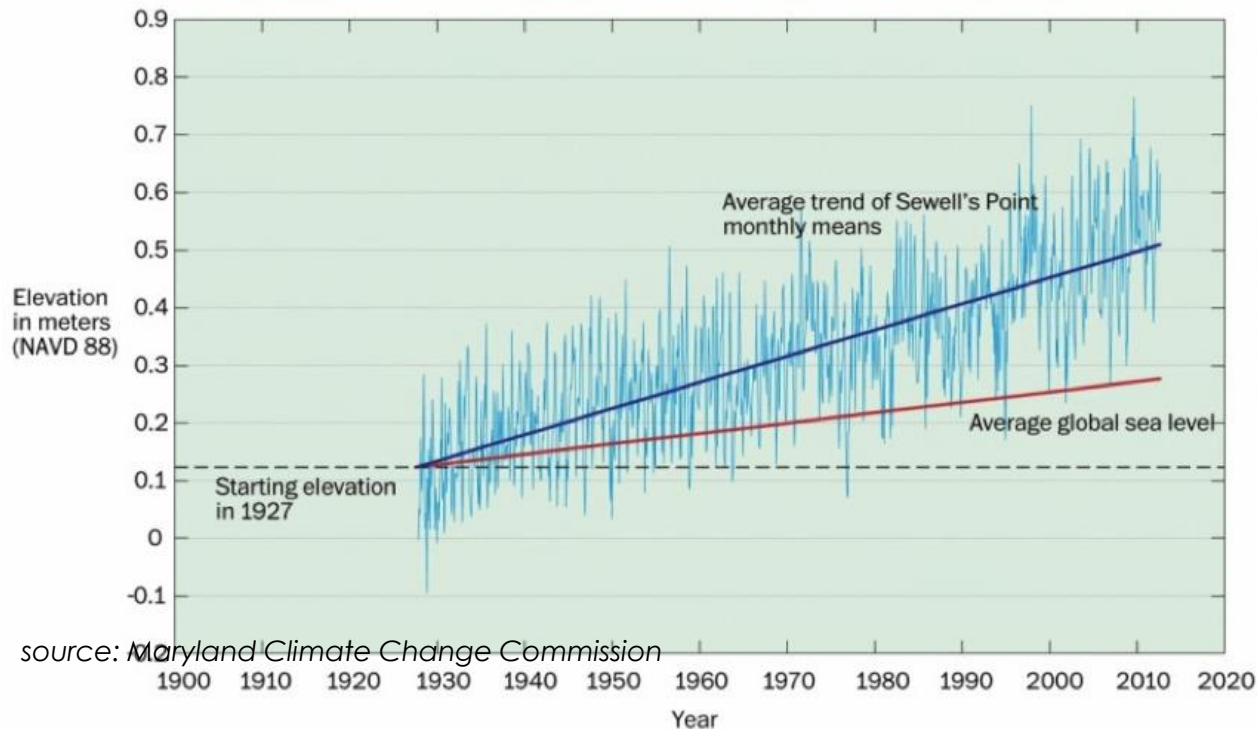


source: VIMS

- The Chesapeake Bay is exceptionally vulnerable to sea level rise due to compounding factors

SEA LEVEL RISE & THE CHESAPEAKE BAY

Sea levels are rising much faster in the Chesapeake region



source: Maryland Climate Change Commission

Figure 14. Monthly mean sea levels at Sewell's Point in Norfolk, Virginia, at National Oceanic and Atmospheric Administration station 8638610; the global average sea-level rise rate of 1.8 millimeters per year is also shown as a comparison (Bindoff and others, 2007, p. 410). Land subsidence contributes to the high rate of sea-level rise at Sewell's Point relative to the average global sea-level rise.

Adapted from: Jack Eggleston and Jason Pope, "Land Subsidence and Relative Sea-Level Rise in the Southern Chesapeake Bay Region" U.S. Geologic Survey Circular 1392.

- The Chesapeake Bay has a high rate of relative sea level rise – double the global average

SEA LEVEL RISE & THE CHESAPEAKE BAY



	Maryland							World-wide
Year	Amount of sea level rise (in feet)							(in feet)
	Ocean thermal expansion	Antarctica melting	Greenland melting	Other glaciers melting	Gulf Stream change	Sinking land	Total	Total
By 2050	0.3	0.3	0.1	0.2	0.3	0.2	1.4	0.9
By 2100	0.8	1.0	0.3	0.4	0.6	0.5	3.7	2.7

Note: Subtotals are rounded and so may not sum to total.

source: Maryland Climate Change Commission

- Maryland sea levels vs. global sea levels in 2050 & 2100

SEA LEVEL RISE & THE CHESAPEAKE BAY



- The water levels in the Potomac & Anacostia Rivers have risen 11 inches in the past century

HOLLAND ISLAND, MD

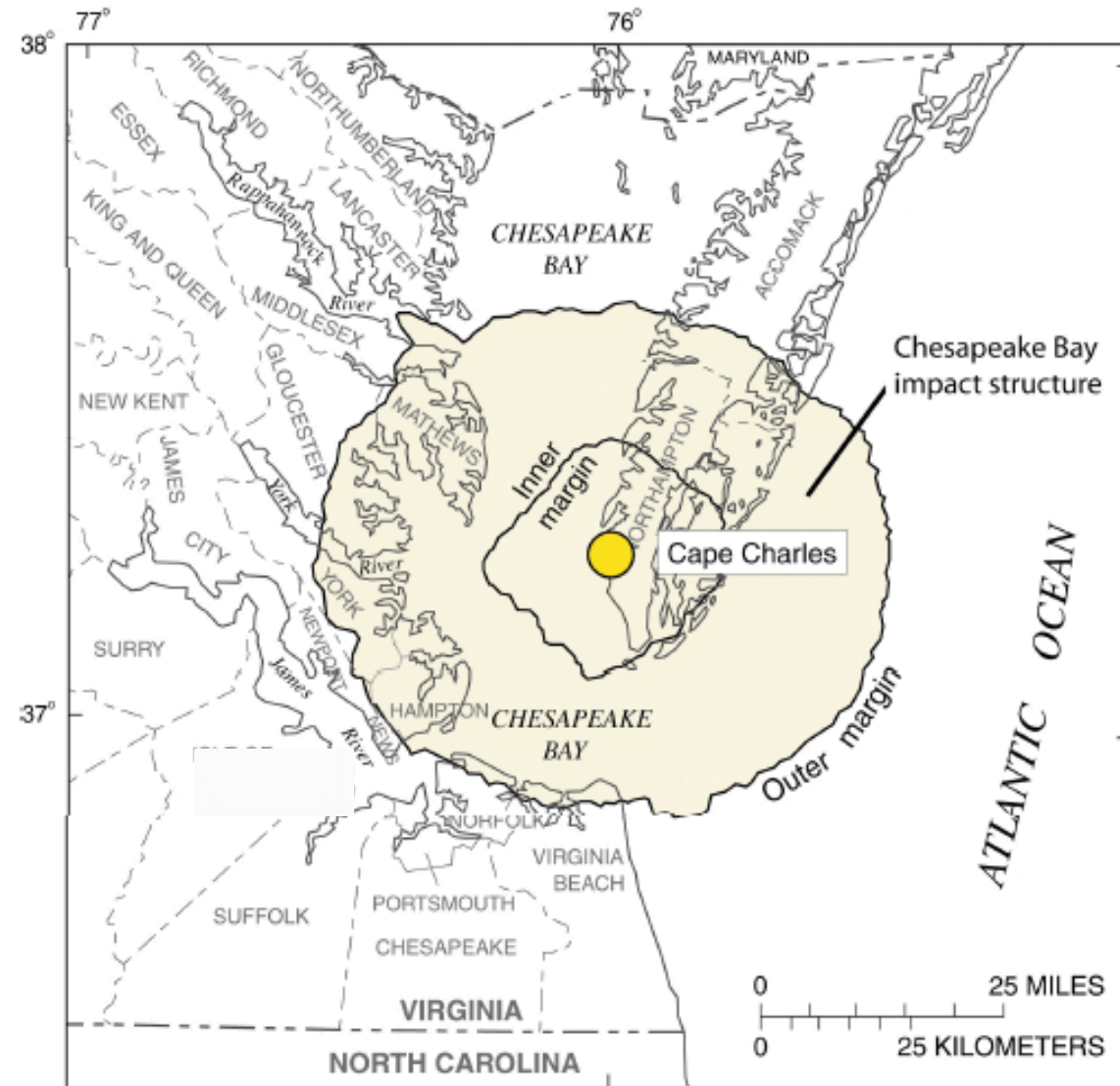


Holland Island in the late 1880s



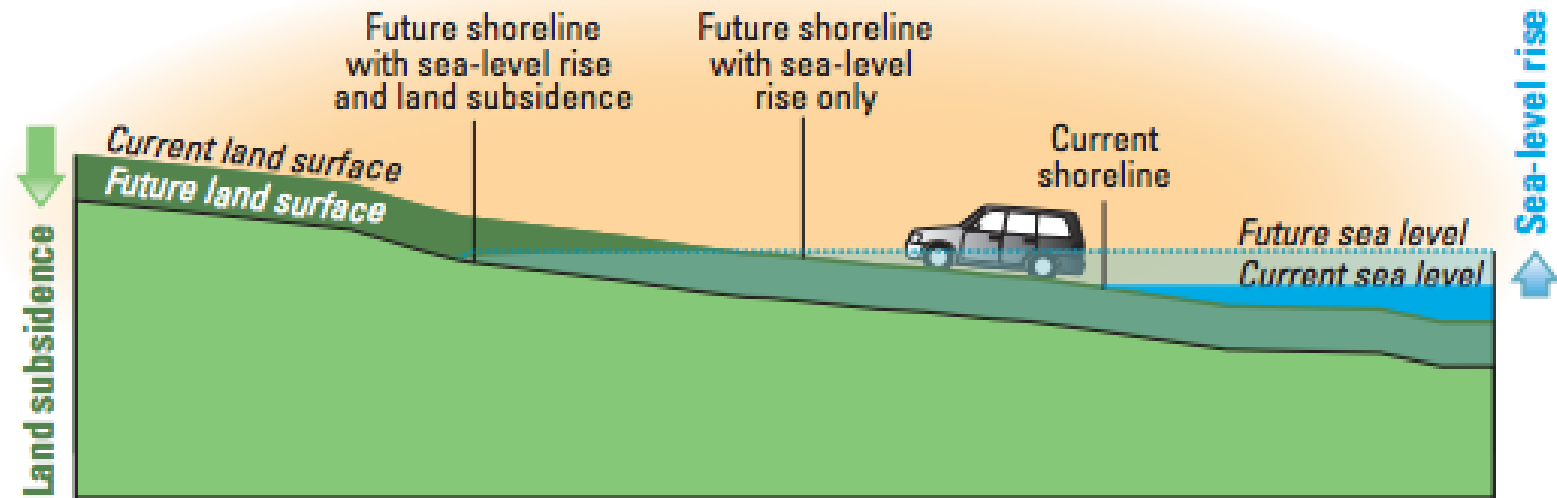
The last remaining structure succumbed to the Bay in October 2010

SEA LEVEL RISE & THE CHESAPEAKE BAY: LAND SUBSIDENCE

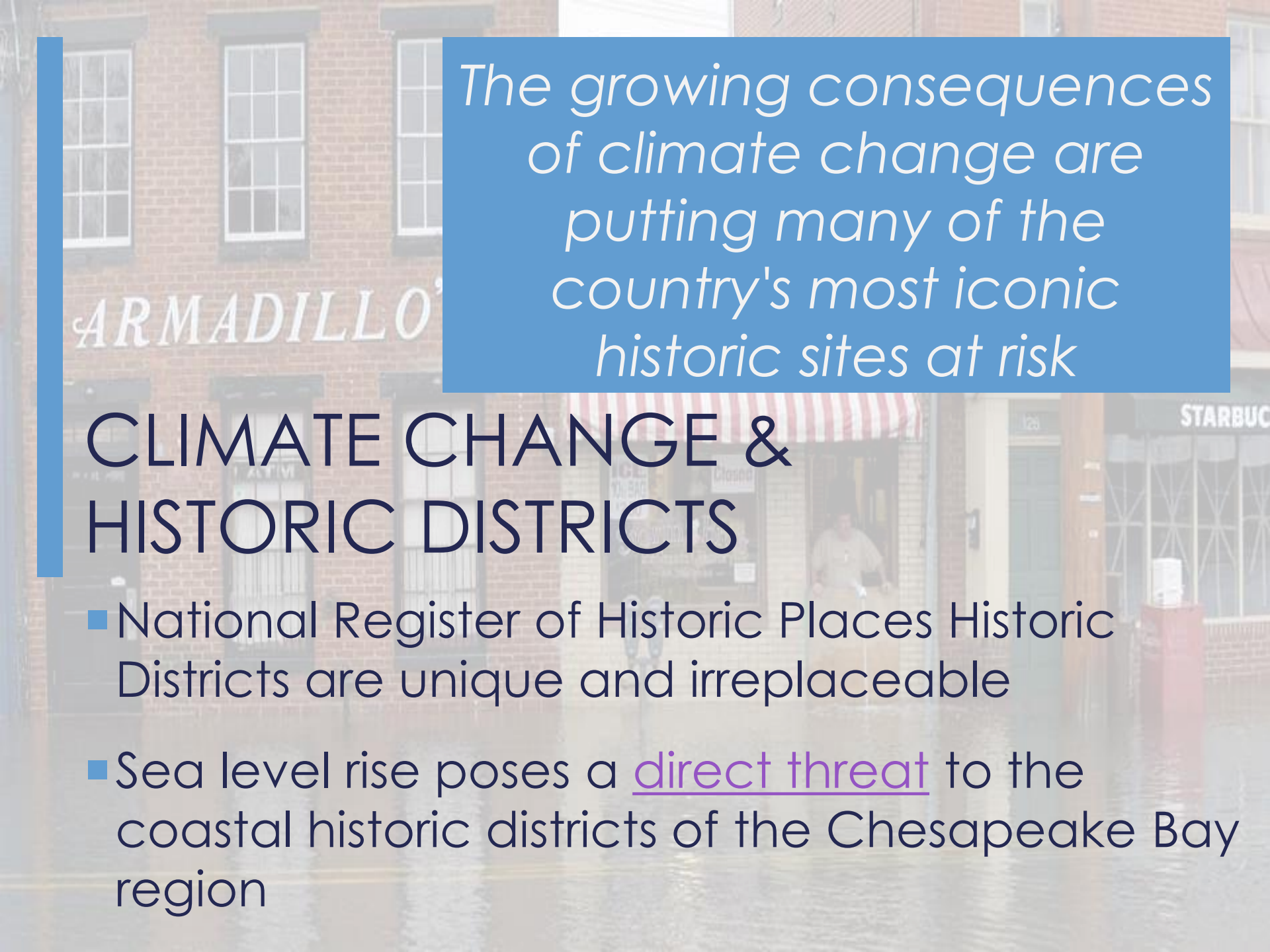


■ Land subsidence accounts for approximately half of the sea level rise in the region

SEA LEVEL RISE & THE CHESAPEAKE BAY: LAND SUBSIDENCE



Shoreline retreat caused by a combination of sea-level rise and land subsidence.



*The growing consequences
of climate change are
putting many of the
country's most iconic
historic sites at risk*

CLIMATE CHANGE & HISTORIC DISTRICTS

- National Register of Historic Places Historic Districts are unique and irreplaceable
- Sea level rise poses a direct threat to the coastal historic districts of the Chesapeake Bay region

PROTECT OUR HERITAGE!



Grim reality: difficult decisions regarding competing interests of historic preservation and climate adaptations

Mechanisms: climate adaptations

SOLUTION: planners must adapt

ADAPTATIONS



Beach Nourishment



Bulkheads/Seawalls



Canal Streets



Dikes



Dune Landscape



Fish Parks



Floating Buildings



Inland Shelters

Hard •

Soft •

Non-Structural •

ADAPTATION - HARD

- seawalls
- floodgates
- reservoirs



seawall, Galveston, TX

ADAPTATION - SOFT

- shoreline enhancement
- beach & dune replenishment
- wetlands restoration



beach replenishment, Long Beach Island, NJ

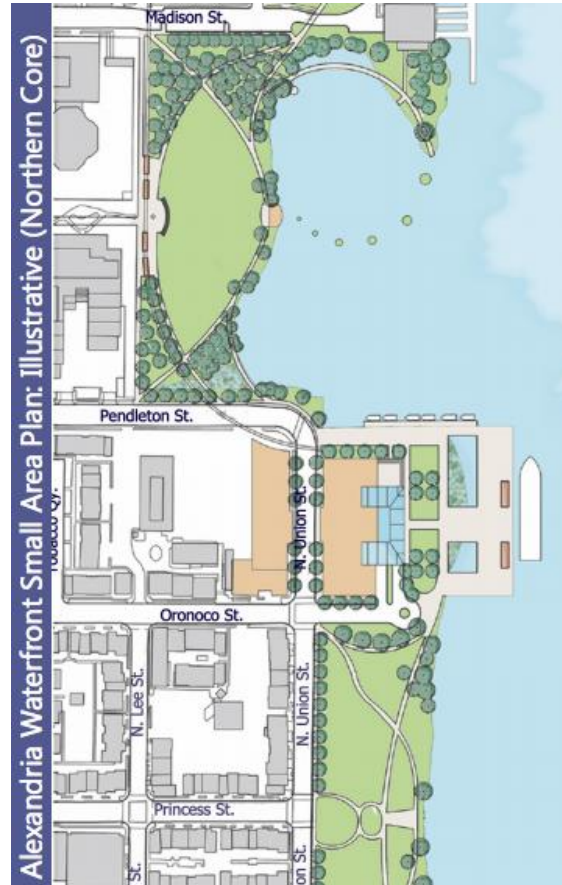
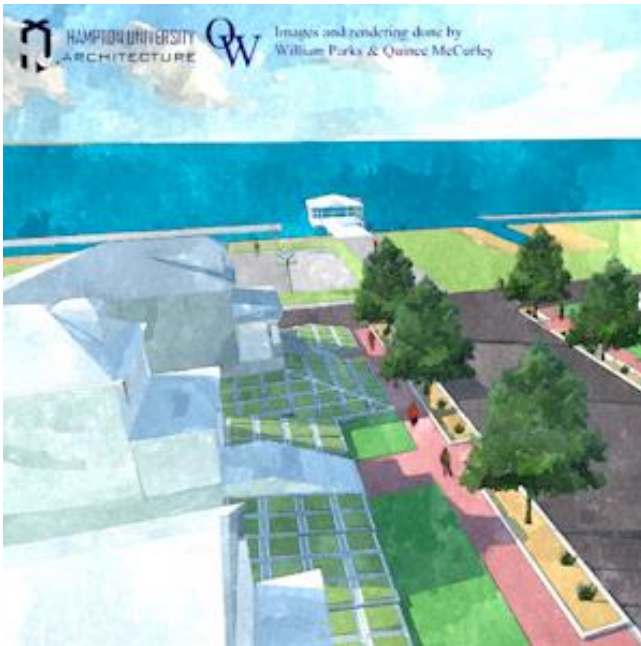
ADAPTATION – NON-STRUCTURAL & INDIVIDUAL

- zoning restrictions and building codes
- stormwater management
- elevating infrastructure & buildings



*historic home (c. 1750) elevated 4' 9",
Newport, RI*

CASE STUDIES



Norfolk, Virginia • Alexandria, Virginia • Annapolis, Maryland

LESSONS LEARNED

- impacts addressed after repetitive damage or disaster
- local data
- involvement of local preservation professionals correlates to extent integrity considered
- leadership of third-party participant

FACILITATING CONDITIONS



preservationists must be willing to accept that adaptations, and therefore some loss of integrity, will be necessary in the face of climate change

FACILITATING CONDITIONS

The background of the slide is a photograph of a row of historic, multi-story brick row houses. The houses have multiple windows with white frames and dark shutters. Some houses have dormer windows. The row houses are situated along a body of water, which is visible in the foreground. The sky is overcast with grey clouds.

urban planners must insist upon
preservationists' involvement in the
adaptation planning process

FACILITATING CONDITIONS



state and federal governments
remove barriers – offer technical &
financial support

FACILITATING CONDITIONS



local citizens, decision-makers,
preservationists, and planners must
be educated on sea level rise
science

FACILITATING CONDITIONS



**pre-emptive adaptation
planning at the local level
through a framework**

PATH FORWARD: RESILIENT HISTORY

- Local planning processes must evolve to include a **climate adaptation framework** that considers the impacts of climate change
- Utilize the framework in historic districts

GOAL: prolong the livelihood of National Register historic districts alongside rising seas.

The time to start is
now.

PATH FORWARD: WASHINGTON, D.C.

Existing Adaptations, Reports, & Plans

- Flood walls & levees
- Rockefeller Foundation 100 Resilient Cities
- *Vulnerability & Risk Assessment: Climate Change Adaptation Plan for the District of Columbia*



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VULNERABILITY & RISK ASSESSMENT

CLIMATE CHANGE ADAPTATION PLAN
FOR THE DISTRICT OF COLUMBIA

PATH FORWARD: WASHINGTON, D.C.

- Consider historic districts in adaptation planning •

