



# Climate Change and America's Infrastructure

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"We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations. Some may still deny the overwhelming judgment of science, but none can avoid the devastating impact of raging fires, and crippling drought, and more powerful storms." – Barack Obama, inaugural address, Jan. 21, 2013

“The world is now experiencing unprecedented challenges ... Climate change is fast happening, much, much faster than one would have expected ... Climate and ecosystems are under growing strain.” – Ban Ki-Moon, Associated Press interview prior to the World Economic Forum, Jan. 21, 2013

# Climate Change, Engineered Systems, and Society

- NSF Climate Change Education Partnership
- Led by National Academy of Engineering
- Partnership among the engineering profession, universities, and science museums
- Network and capacity-building award to lay the groundwork for future educational initiatives

# Key Points

1. **Vulnerable systems:** Most significant vulnerabilities to climate change involve engineered systems
2. **Changing design strategies:** Vulnerabilities arise as a result of implicit assumptions about weather and climate built into engineering system design – and the ways in which those systems are entangled in human affairs
3. **Uneven risks and injustice:** Both existing systems and adaptation policies will unevenly distribute benefits, costs, and risks across diverse groups in society
4. **Complex governance:** Governance of infrastructure adaptation will be complex, involving not simply policy and engineering leadership but significant public engagement:
  - to foster trust and credibility
  - to deliberate strategies of resilience
  - to address injustices



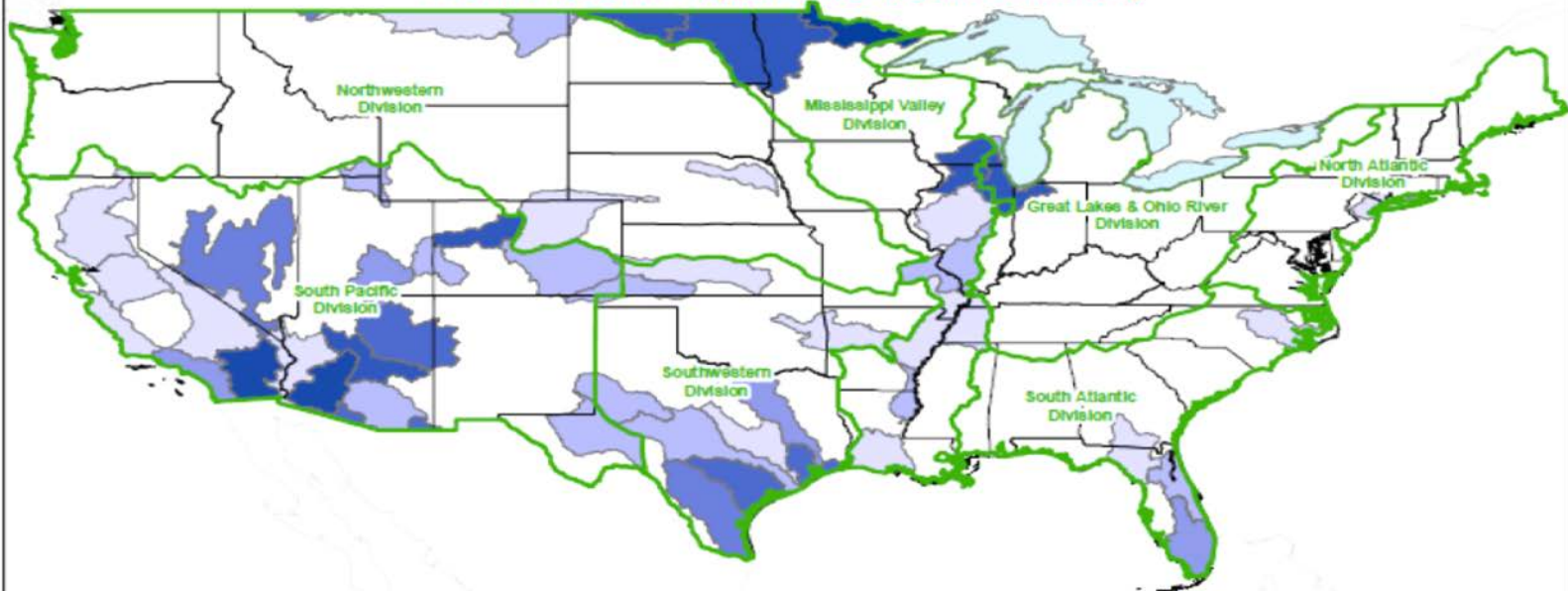


# Where are USACE Climate Vulnerabilities?

*Assessed with Nationally Consistent, HUC-4 Scale Indicators  
Along the Eight USACE Business Lines*

Highest 10% Indicator Values

Not For Use In Project-Level Decision-Making



Not For Use In Project-Level Decision-Making



US Army Corps  
of Engineers  
North Atlantic Division

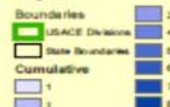
2040-2060  
Cumulative

0 95 190 300 Miles

1:24,285,000



#### Legend



Projection:  
NAD 83

Source:  
Data provided by the USACE Response  
to Climate Change Program Initial  
Nationwide Screening-Level Vulnerability  
Assessment to climate change, May 2011

Based on 4-Digit HUC, A18 Scenario, 10% Highest Q

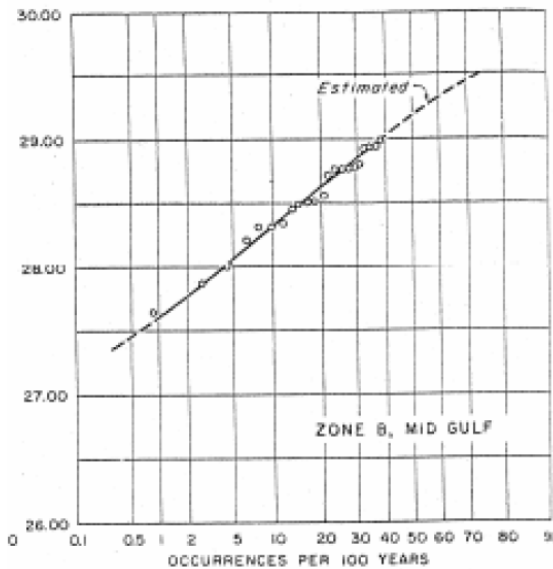
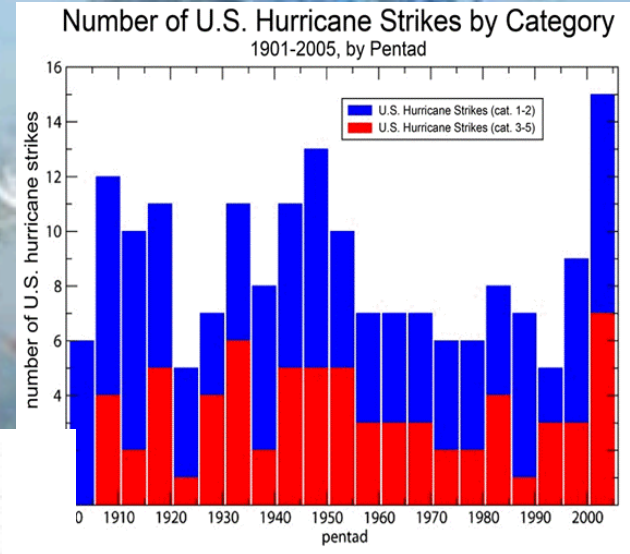
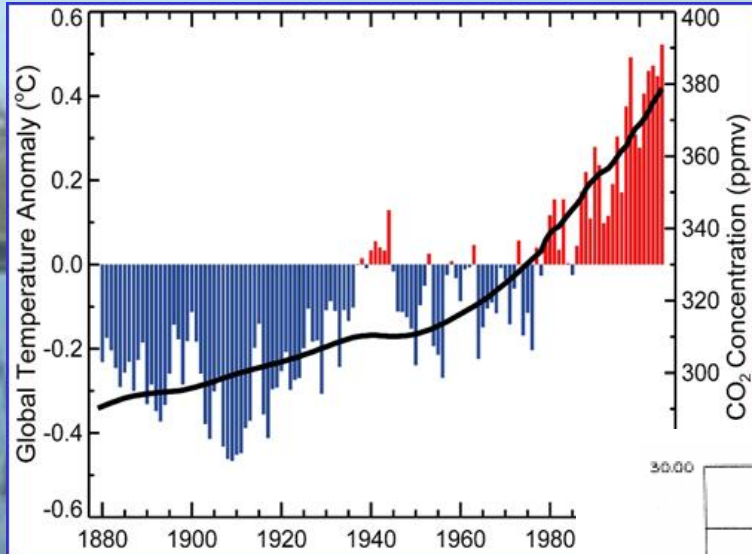
Nationwide Screening-Level  
Climate Change Vulnerability Assessment  
USACE Business Lines

Prepared by: Walker Keith  
Norfolk District  
Geospatial Services Section

Map File: HUCAssessment.mxd  
Map Date: 6 June 2011

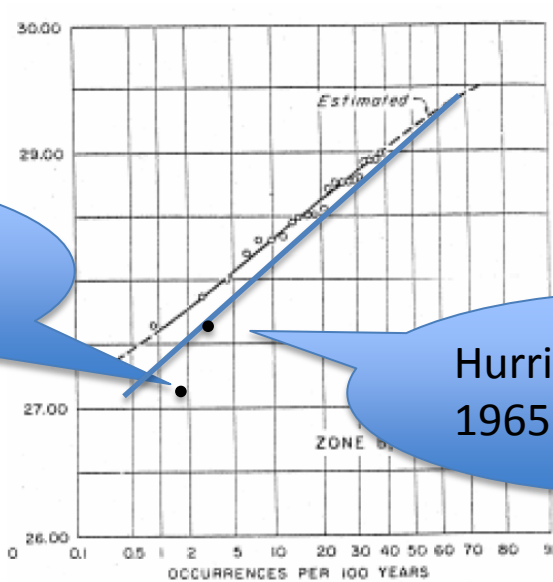
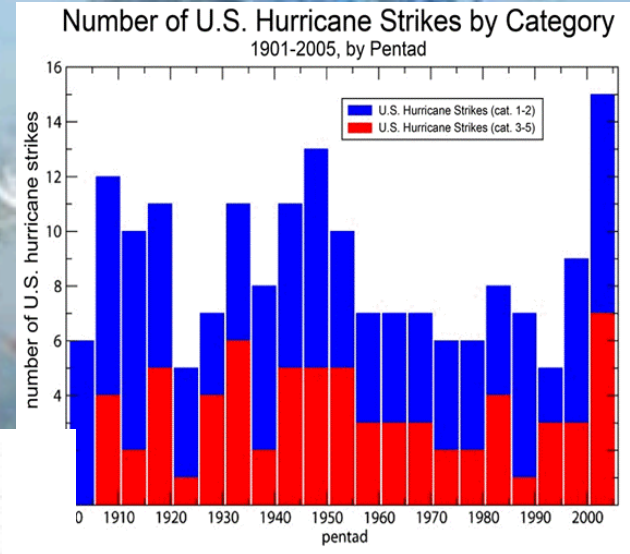
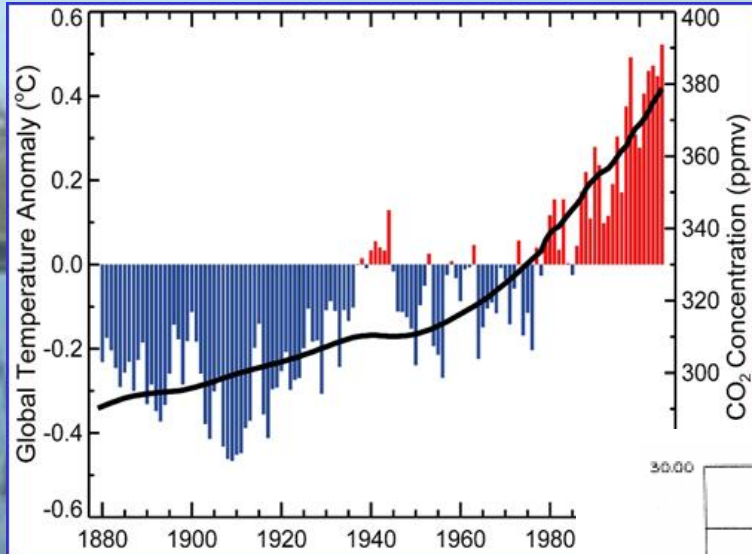


# Design for Non-Stationary Climatic Parameters





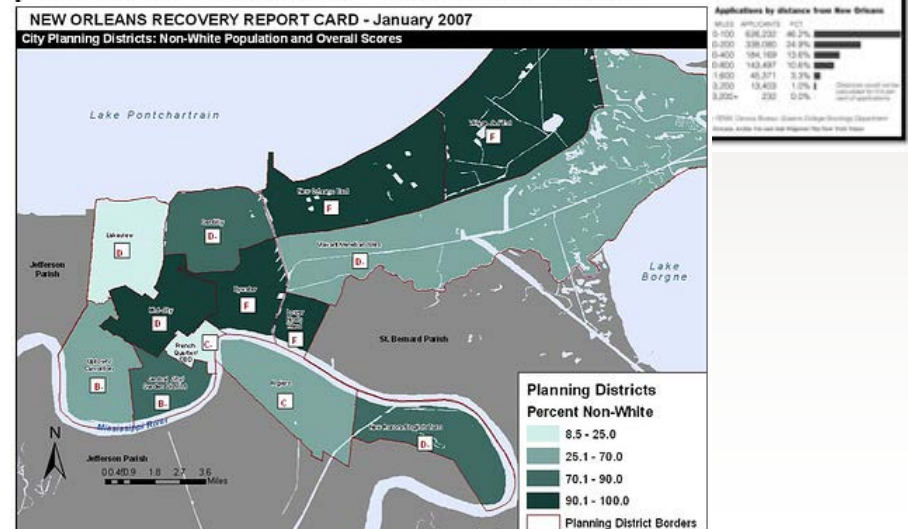
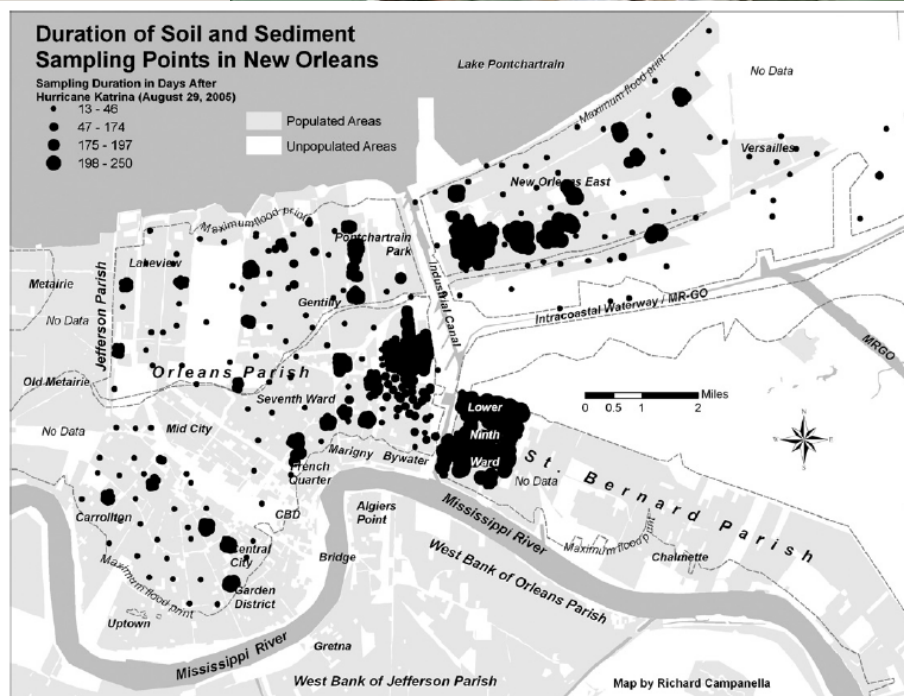
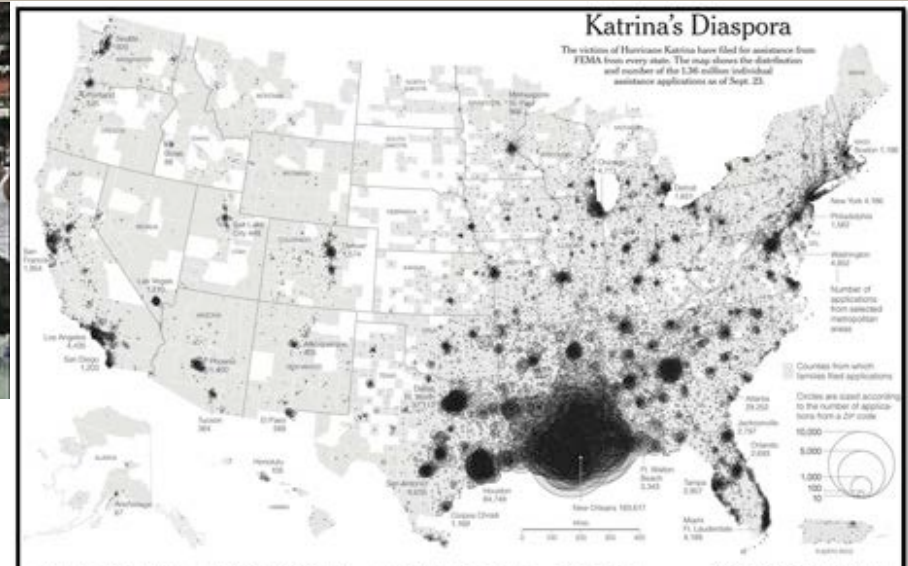
# Design for Non-Stationary Climatic Parameters



Hurricane Katrina,  
2005

Hurricane Betsy,  
1965

# Uneven Risks



# Complex Governance

- Infrastructures routinely cut across multiple jurisdictions and levels of governance (we have long observed the same of ecosystems)
- Vulnerability and resilience are functions of systems of systems
- Climate change engages deep political schisms in US society
- Technological innovation must be accompanied by social, institutional, financial, and governance innovation
- Social justice is integral to the problem and solution