Dan Burger
Founder, CRN Executive Committee
Charleston, SC

- “Lowcountry”
- Largest city in South Carolina
- Rapidly growing population
- Metro region is now home to almost 800,000
- Over 7.3M visitors each year
- Diversifying economy
- Major catastrophic events:
  - 1886 Earthquake
  - Hurricane Hugo 1989
- Cumulative impact of chronic disruptions
Focus: Upper Peninsula

[Images of maps including CDC Social Vulnerability Index and NOAA +5 Surge]
• Sea level increase of 1.07 feet over 100 years
• Increase appears to be accelerating over the last decade
• Data from National Ocean Service, Center for Operational Oceanographic Products and Services (CO-OPS)
### Charleston Harbor, SC Coastal Flood Events by Year (7.00 ft MLLW or higher)

#### Extreme Water Levels in Charleston Harbor

<table>
<thead>
<tr>
<th>Event and Date</th>
<th>Water Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane Hugo (4) / 09 Sept. 1989</td>
<td>12.52 ft MLLW</td>
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#### Event and Date

- **1980-1989**: 9.3 events per year
- **1990-1999**: 18.8 events per year
- **2000-2009**: 21.4 events per year
- **2010-2019**: 42.3 events per year

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**Extreme Water Levels in Charleston Harbor**

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- 42.3 events per year

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**1990-1999**

- 18.8 events per year

**1980-1989**

- 9.3 events per year
2019: 77 flood days / 89 flood events

Sweet et al. 2018

2040: 100-175 flood days per year (Intermediate, SLR of 0.9-1.3 ft)
In the News - Above the Fold

The sea level did, in fact, rise faster in the Southeast US
New York Times, 09 Aug 2017

Report: Charleston may flood almost every day at high tide by 2100
Post and Courier, 10 Aug. 2017

Downtown Charleston broke record for flooded days last year; Rain, floods continue to swamp Lowcountry
Post and Courier, 7 June 2017

Rising seas threaten nearly $1 trillion worth of US homes, most of them are moderately priced
CNBC, 18 October 2017

Charleston leaders take step forward to find regional solutions to flooding crisis
Post and Courier, 15 October 2018

Beaches erode as tides encroach on Charleston
The State, 11 September 2017

Charleston area cities confront flooding in different ways; that’s making it worse
Post and Courier, 30 October 2018

NOAA: Coastal communities saw record number of high tide flooding days last year
PR 06 June 2018

Charleston Preparing $100M Project to fight sea level rise
U.S. News and Word Report, 15 July 2017

Slow and Deadly: Hurricane Florence is a storm for the NC SC history books
Post and Courier, 30 September 2018

A tropical storm surge sends Charleston an urgent message: Here’s your future
Post and Courier, 17 September 2017

Charleston is now S.C.’s largest City
Post and Courier, 25 May 2017

High-tide flooding in the U.S. is twice what it was 30 years ago
CBS News, 06 June 2018
Climate Hazard Analysis

• Hot summers with little relief in temperatures
• Increased evaporation may affect water availability and precipitation intensity
• Increase in coastal flooding extent, frequency and duration in tidal conditions
• Increase in storm surge inundation

TTX Exercise

“Climate adaptation planning needs to be driven more consistently at the local level, where most of the impacts will occur.”

“Continued education and outreach efforts are needed to ensure uniform knowledge of how climate hazards impact critical infrastructure over the long term.”
Charleston Resilience Network

The Charleston Resilience Network (CRN) is a voluntary collaboration of public, private and non-profit sector stakeholder organizations within the Charleston, S.C. metropolitan area that have a collective interest in the resilience of communities, critical infrastructure and socio-economic continuity to episodic natural disasters and chronic coastal hazards.

The Charleston Resilience Network provides a forum to share science-based information, educate stakeholders and enhance long-term planning decisions that result in resilience.

Objectives:

• Enhance information sharing, identify information gaps
• Reduce barriers to consistent, high quality data
• Build relationships and trust across sectors and governments
• Align strategies and avoid duplication of effort
• Identify opportunities for collaborative action
Charleston Resilience Network

**Founding Organizations and Principals**

- City of Charleston
- Sea Grant S.C. Sea Grant Consortium
- College of Charleston
- Lowcountry Hazards Center
- Charleston County Council of Governments
- BCDCOG
- CISA
- Charleston Water System
- Charleston Metro Chamber of Commerce
- The Nature Conservancy
- North Charleston
- Dominion Energy
- NOAA
- US Army Corps of Engineers Charleston District
- Department of Homeland Security
- RO3

**Advisory**
Charleston Resilience Network

Resilience

Resilience is the capacity of individuals, communities, institutions, businesses, and systems within the Charleston region to survive, adapt and grow despite episodic natural disasters and chronic coastal hazards.

Resilience requires preparation and planning to absorb, recover and successfully adapt to adverse events and conditions.
Charleston Resilience Network

- NOAA Coastal Resilience Grant
- National Institute for Hometown Security Contract
- Knowledge Exchange/Knowledge Transfer
- Collaborations with other national and regional consortiums
- Relationship Builder and Match-Maker
- Convener and Consensus Builder
Learning to Live with Water

Photos: Jared Bramblett
City of Charleston

- Flooding and Sea Level Rise Strategy
  - Preservation through adaptation
  - Low Battery
  - Stormwater Drainage
  - Structured Buy-Outs
  - Green Infrastructure
    - Charleston Rainproof
  - Dutch Dialogue Recommendations

https://www.charleston-sc.gov/Resilience
Flooding threatens the preservation of Charleston and the livability of the community.
Lessons Learned

• Flooding does not respect jurisdictional boundaries
• Disruptions do not respect jurisdictional boundaries
• Diverse communities have varying physical, social and economic risk profiles and risk profiles change over time
• Large scale structural interventions are only part of the resilience equation
• Cumulative impact of chronic disruptions can exceed those of an acute major event
Lessons Learned

• Resilience is derived from robust systems and social cohesion; Relationships matter

• Good science doesn’t immediately result in better decisions; effective communication is critical

• Limited resources (including time) requires that we act strategically, collaboratively and efficiently

• Stakeholder and practitioner fatigue is real

Photo: Jared Bramblett
Inflection Point
Charleston Resilience Network 2.0

• Partnership with College of Charleston, Riley Center for Livable Communities
• Identify structure and mechanisms for enhanced involvement and coordination of federal, state and local governments, private sector and NGOs
• Accelerate the development of intervention strategies and integrated approaches across geopolitical jurisdictions and professional disciplines
• Provide a forum to share science-based information, align strategies and collaborate across organizations and sectors
• Engage, benchmark and learn from other regions
• Provide opportunities for continued learning among practitioners, decision-makers and community leaders
A Proposed Framework for a Resilient Region

Equity, Inclusion & Livability

Infra-structure

Political

Natural

Social

Financial

Human & Cultural

Learn more and Connect
CharlestonResilience.Net