

Ad Hoc Expert Meeting on

**Climate Change Adaptation for
International Transport:
Preparing for the Future**

16 to 17 April 2019

**Stimulating Transformational Thinking for
Long-Term Climate Resilience for Maritime
Systems**

Presentation by

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*Stimulating Transformational Thinking for Long-Term Climate
Resilience for Maritime Systems*

Long term resilience planning and investment requires decision makers to recognize and overcome numerous barriers, such as misaligned incentives and lack of leadership. This talk sets the context for this challenge to help stakeholders to engage with these complex issues.



UNCTAD Ad Hoc Expert Meeting on Climate Change Adaptation
for International Transport: Preparing for the Future
16-17 April, 2019

Climate change challenges



Hurricane Sandy photos courtesy Mary Lee Clanton, Port of NY/NJ

Doing 100 years of work in 5 to 10 years



Sea levels to rise 0.5 to 1.9 meters by 2100

1-in-3 year storm event of 2100

Increased precipitation



(Bender et al. 2010; Grinstead et al. 2013; Rahmstorf 2010; Emanuel 2013; IPCC 2012; Tebaldi et al. 2012)



Cascading Consequences



Photograph CIP_11

1) Direct damages

(e.g., structures, equipment, freight, land, etc.)



2) Indirect costs

(e.g., lost wages, business interruptions, cleanup costs)

Rotten Meat From Katrina Still in Gulfport Neighborhood

"It's nine months now. They say, 'Well, you ought to be used to it by now.' You ain't gonna get used to that smell. My gook," said resident Gary Tatum.

The meat had been stored at the Port of Gulfport. Katrina washed it in to yards covering an eight block span. The meat in the yards has been picked up, but the meat in hard-to-see areas has rot.

3) Intangible consequences

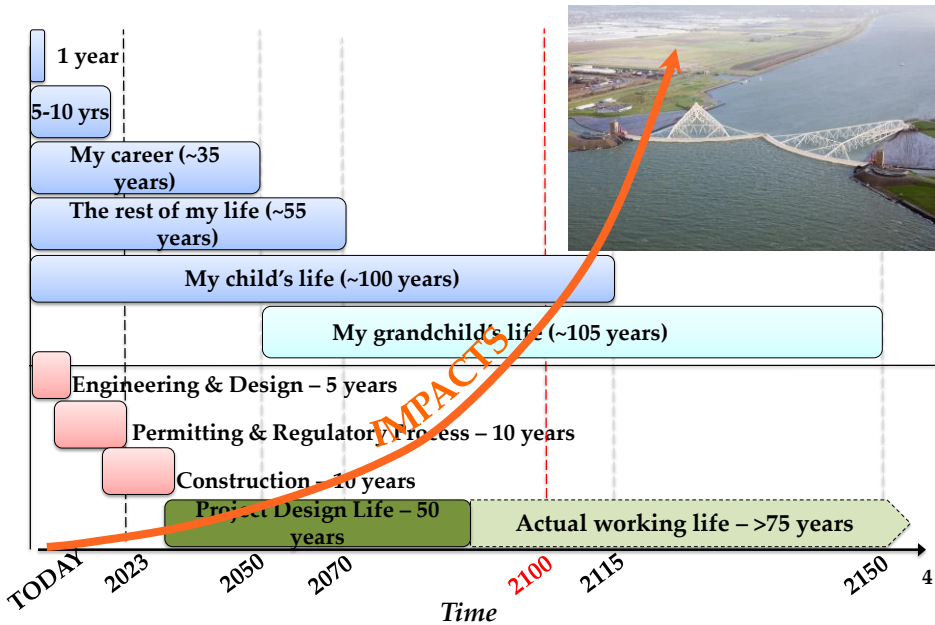
(e.g., quality of life, environmental damages, loss of essential services)

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Fundamental shift... questions of intergenerational justice



Key barriers preventing port decision makers from investing in transformational risk mitigation?

Suggestions from research...



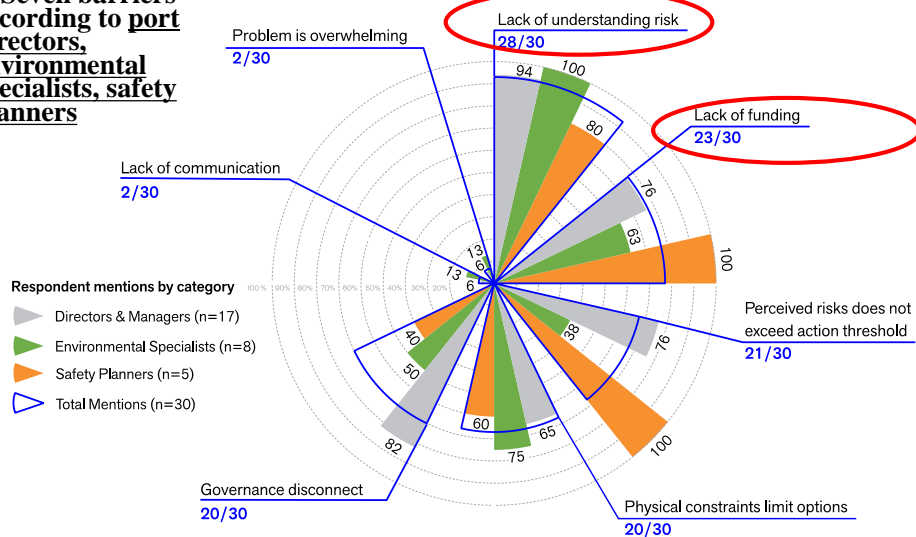
1. Characterizing barriers to adaptation – Example from 15 **port authorities**
2. Infrastructure **engineers** need better guidance
3. Lack of leadership a key barrier for complex **stakeholder systems**

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1. Seven barriers according to port directors, environmental specialists, safety planners



Interviews with 30 port staff from 15 North Atlantic seaports

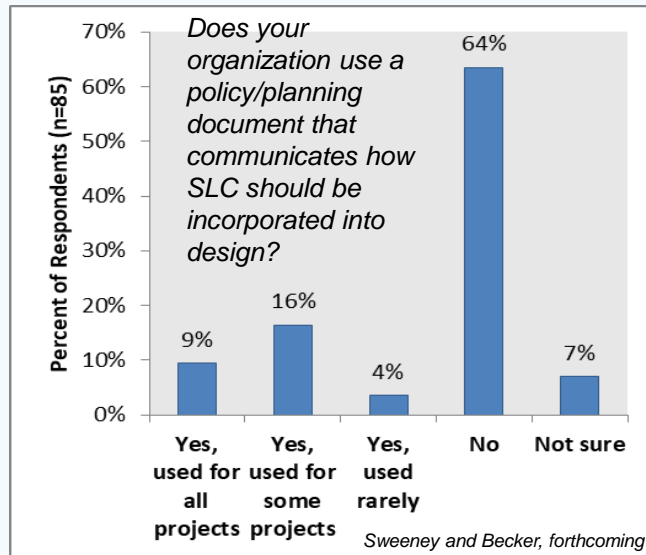
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2. Infrastructure engineers' barriers to incorporating SLC into design

Survey of N. American maritime infrastructure engineers

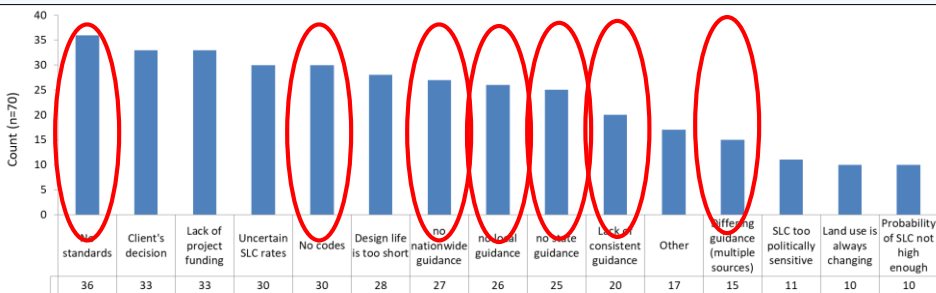


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Sweeney and Becker, 2019



Survey Question: In cases where SLC is not incorporated into the design of port infrastructure projects, what are the potential reasons why? (Check all that apply)



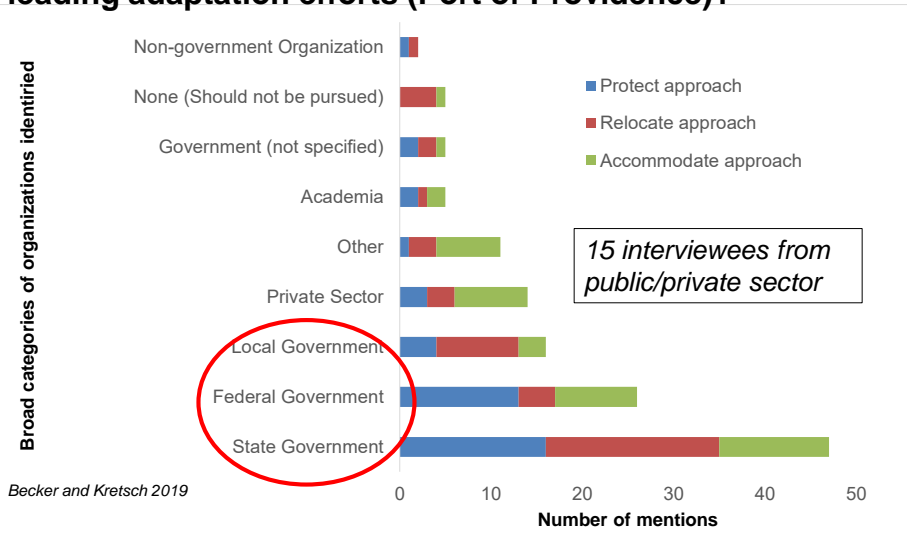
"The cost differential cannot be justified, especially when it is not a regulatory compliance issue."

"I hope from this survey, codes and standards will be prepared [that] designers will follow." Sweeney and Becker, forthcoming

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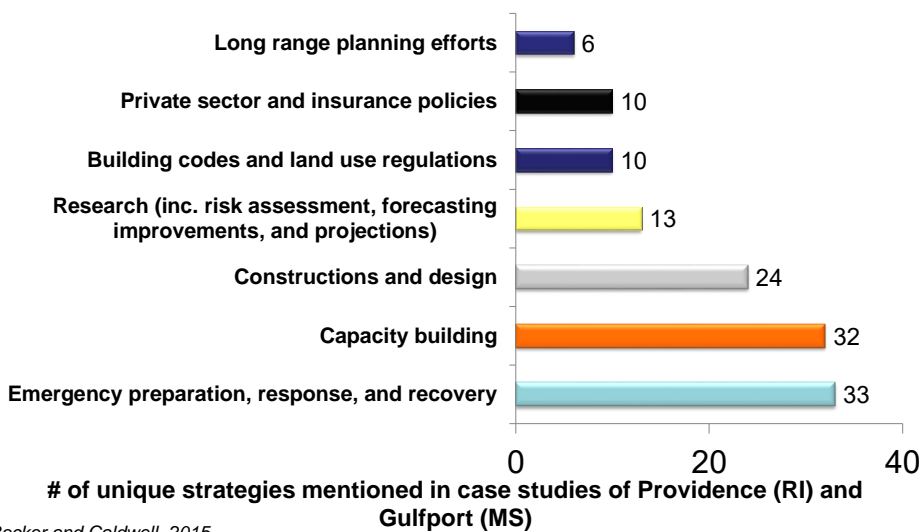
3. What stakeholder organizations are responsible for leading adaptation efforts (Port of Providence)?



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The good news: There are > 128 port resilience strategies



Our Charge: Propose steps to solve a wicked problem

- *Complex issue that defies complete definition*
- *No formal solutions*
- *Any resolution generates further issues*
- *Solutions are neither good nor bad, but the best that can be done at the time.*

Uncertain rates of change
Feedback loops
Misaligned (dis)incentives
Unclear funding streams
Complex adaptation options

Befuddled
Decision makers

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(Rittel and Webber 1973; Brown et al. 2010)

(Ward 2001; Bryson 2004; Few, Brown, and Tompkins 2007; Chapin et al. 2010; Tompkins, Few, and Brown 2008)

Major takeaways

1. Port practitioners need to better understand risks
2. Infrastructure engineers need guidance
3. Stakeholders need to be deeply engaged so as to generate political (gov't) support

And all of this needs money!

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Proposed policy solutions

- Develop flexible sea level rise regulatory guidance documents for infrastructure engineers
- Direct funding to support stakeholder engagement in long-term resilience planning
- Develop credentialed training programs for climate change assessment for infrastructure practitioners

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Research Team

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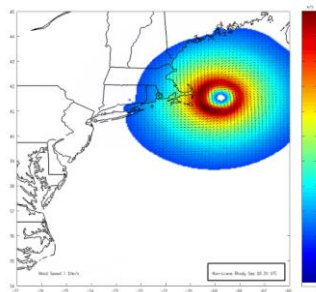


Extra slides below....



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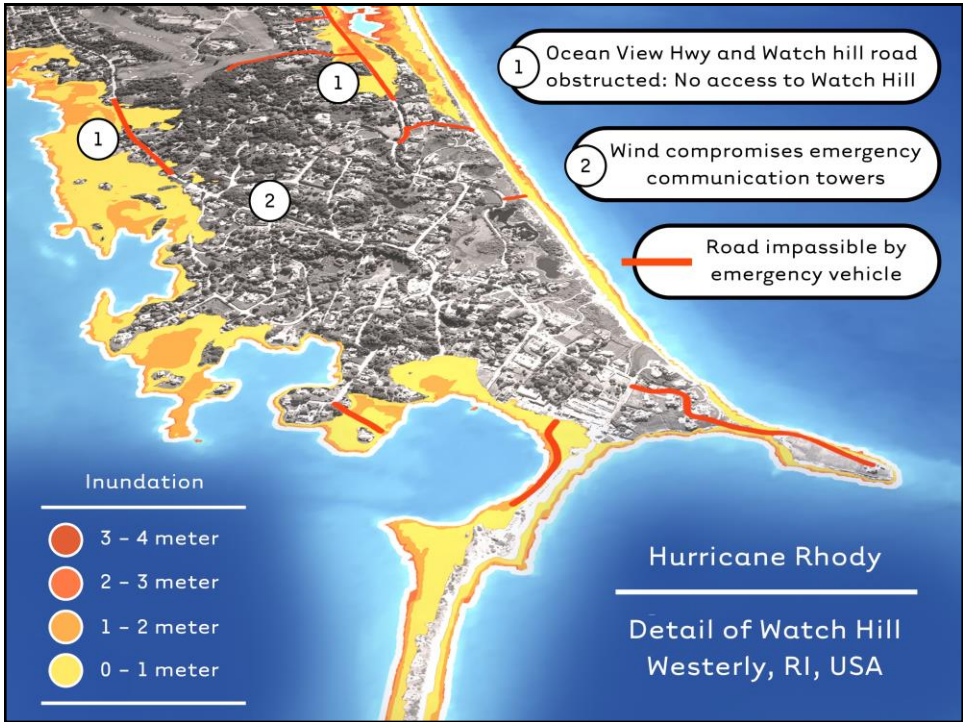
2. Disaster Consequence Thresholds



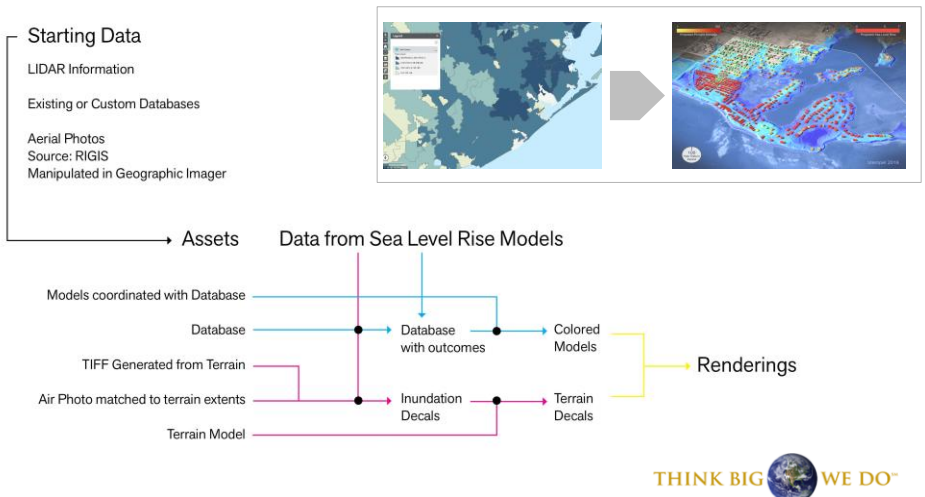
Time incremented consequences as storm unfolds



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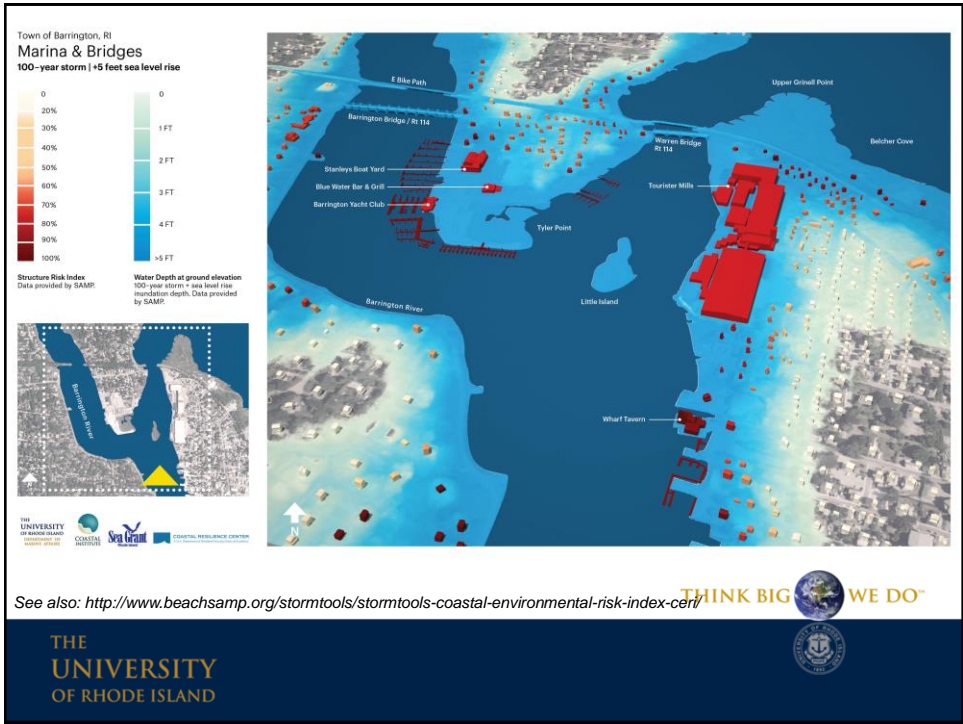
3. Parametric 3D Disaster Visualizations



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Deeper understanding of complexity of risk



Stronger sense of responsibility



Higher likelihood of action



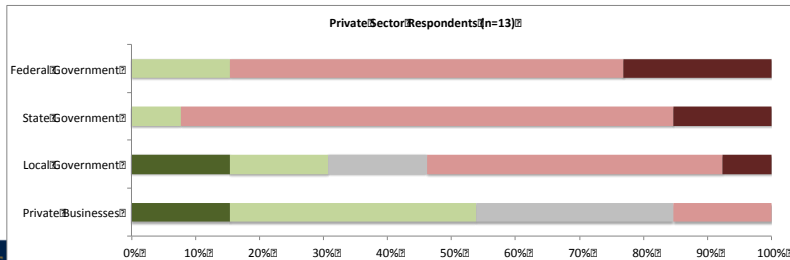
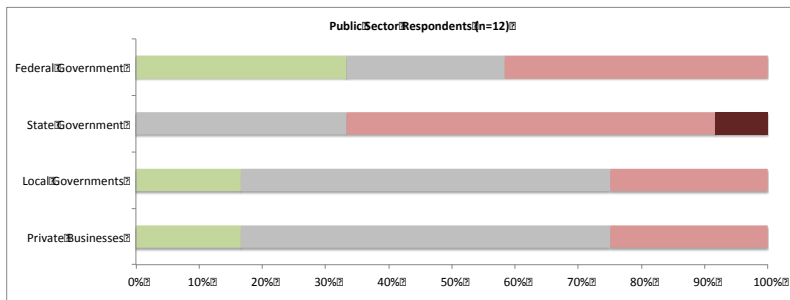
Increased resilience for social, economic, environmental systems

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Who should pay for resilience?



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Not responsible at all | Less responsible than other parties | Just as responsible as other parties | More responsible than other parties | Entirely responsible

Survey finding 1: Stakeholders see a collaborative effort as responsible to implement resilience strategies and believe planning should begin now

Survey Finding 2 – No clear specific leader and 25 actors identified (majority government)

Survey Finding 3 – Private and public stakeholders disagreed on who should pay for resilience

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Interviews of 7 key “leaders”

Interview Finding 1 – Identified leaders agreed that they have some leadership responsibilities, but quite limited

Interview finding 2 - Actors face three key barriers that affect their leadership ability

- 1) Lack of expertise
- 2) Lack of jurisdiction/mandate
- 3) Lack of resources.

Interview Finding 3 - Interviewees see facilitated “pre-planning exercises” as motivation and a chance to

clarify roles
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