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Decision-makers Barriers to Climate and Extreme Weather Adaptation for Seaports

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American Association of Port Authorities
Energy and Environment Seminar
September 12th 2018, in Jersey City, NJ

Critical

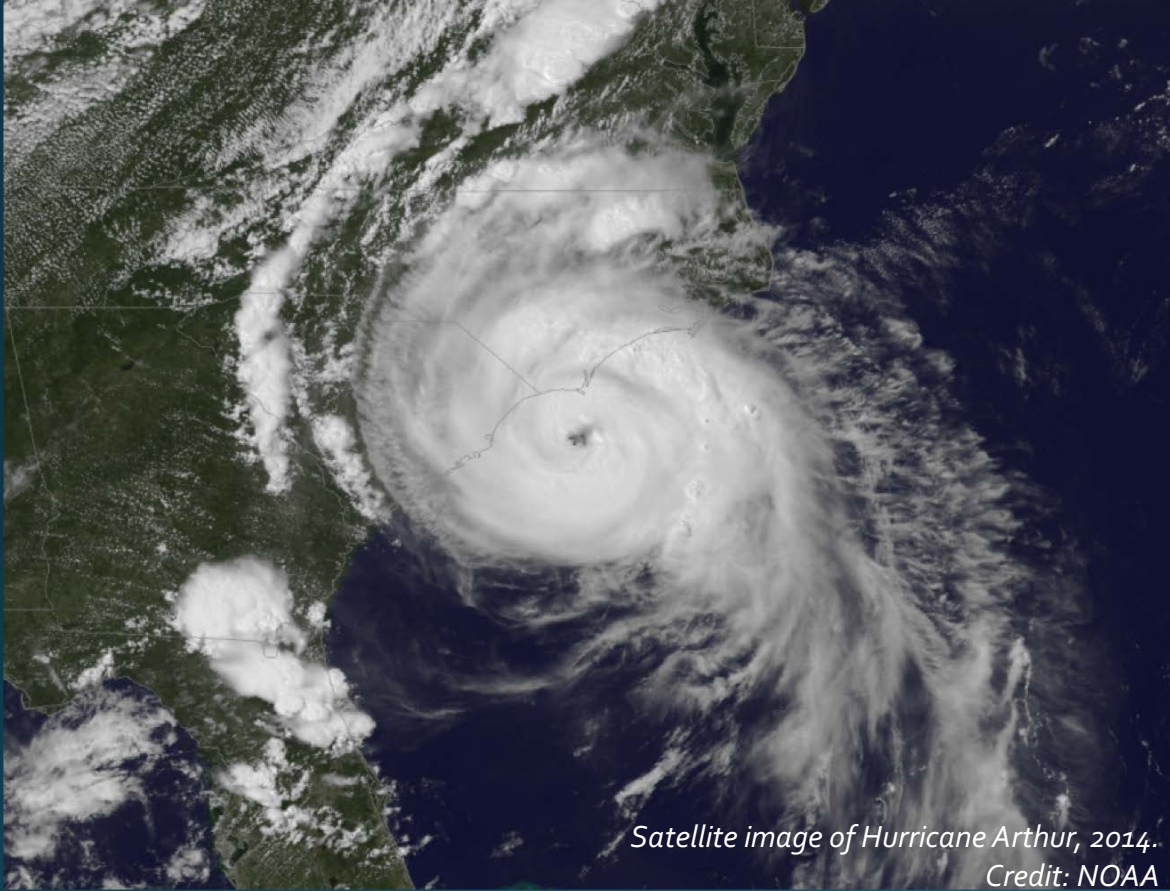
> 99% of the volume of overseas trade enters or leaves the U.S. by ship (MARAD 2016)

Exposed

Constrained



[illegible]



Satellite image of Hurricane Arthur, 2014.
Credit: NOAA

Heavy rains, storms, sea level rise, and extreme heat cause damage to critical coastal infrastructure upon which coastal communities depend. *Melillo et al. 2014*

Marine Affairs Coastal Resilience Lab

<https://web.uri.edu/abecker/>

2016-2018 study



Phase 1: Expert Evaluation of Candidate Indicators of Seaport Vulnerabilities to Climate & Extreme Weather Impacts

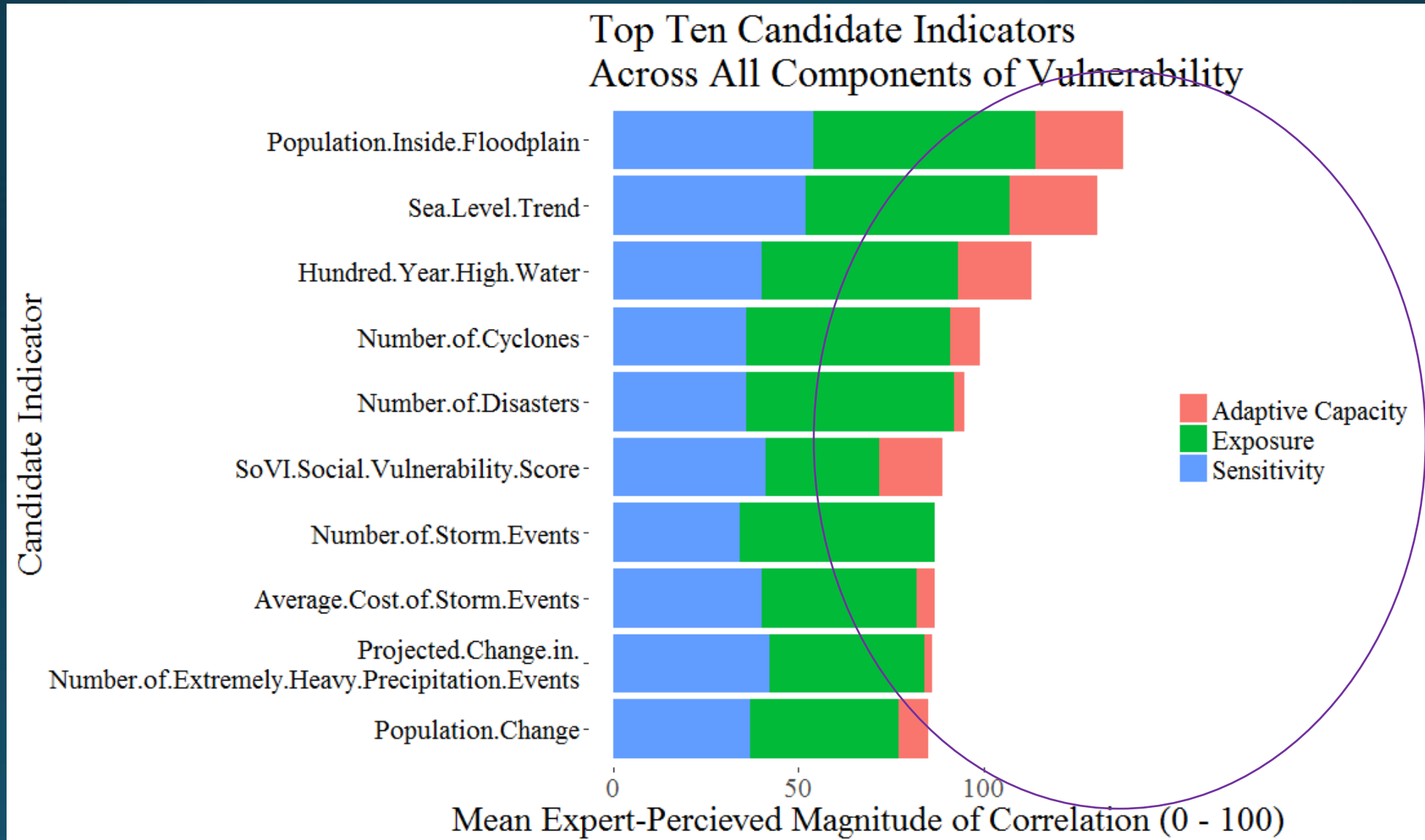
GOAL

To measure port-expert perceptions of the suitability of available data to serve as indicators of seaport vulnerabilities to climate and extreme weather impacts

Definitions of the Vulnerability Components

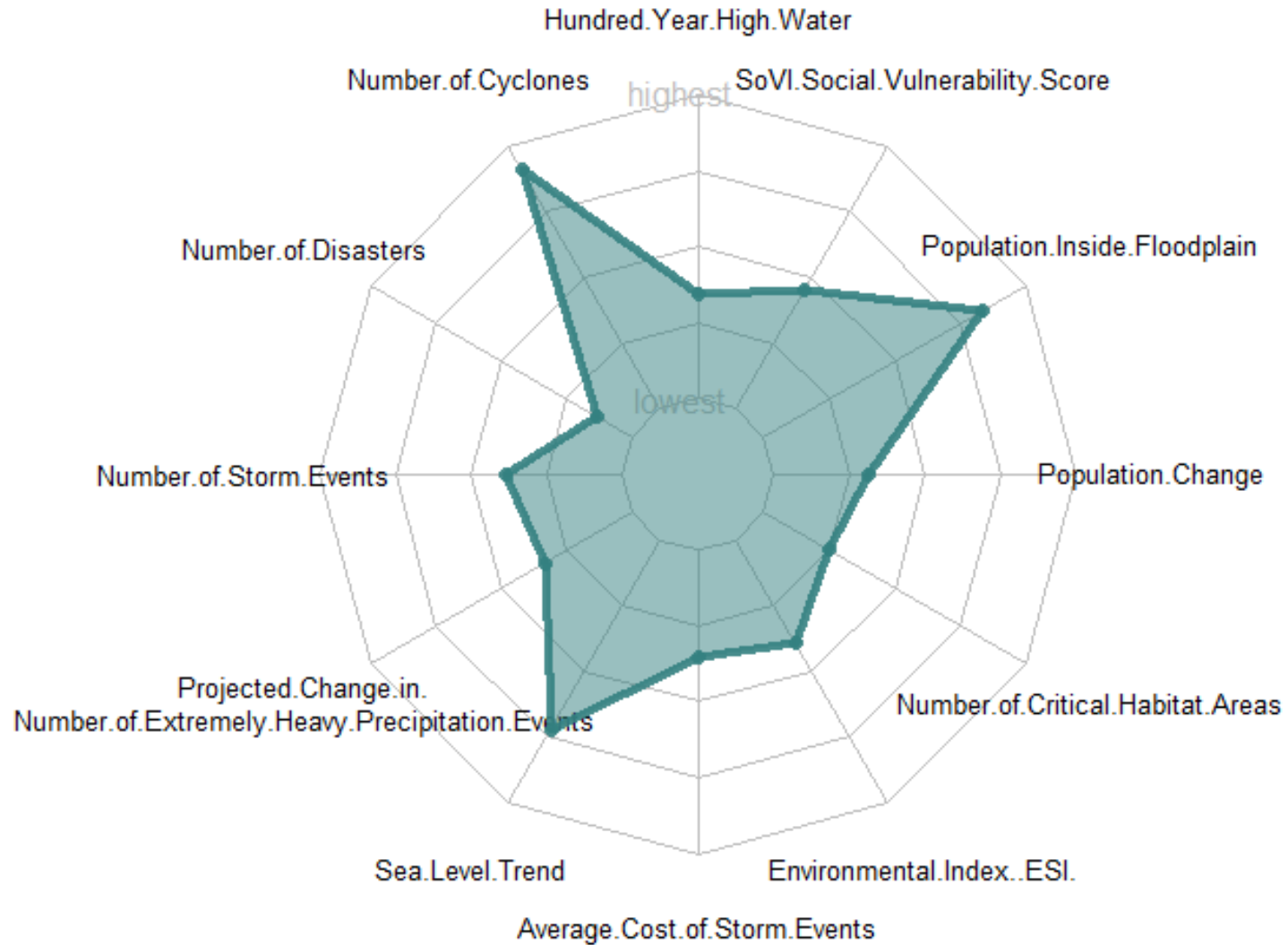
- **Exposure:** The **presence of** people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets **in places and settings that could be adversely affected** (IPCC 2014)
- **Sensitivity:** The **degree** to which a system is affected, either adversely or beneficially, by climate-related stimuli (IPCC 2001)
- **Adaptive Capacity:** The **ability** of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or **to respond** to consequences (IPCC 2014)

Vulnerability Indicator Evaluation: Results



Results: Sample Port A

Exposure indicators



Sensitivity indicators

> 128 port resilience strategies





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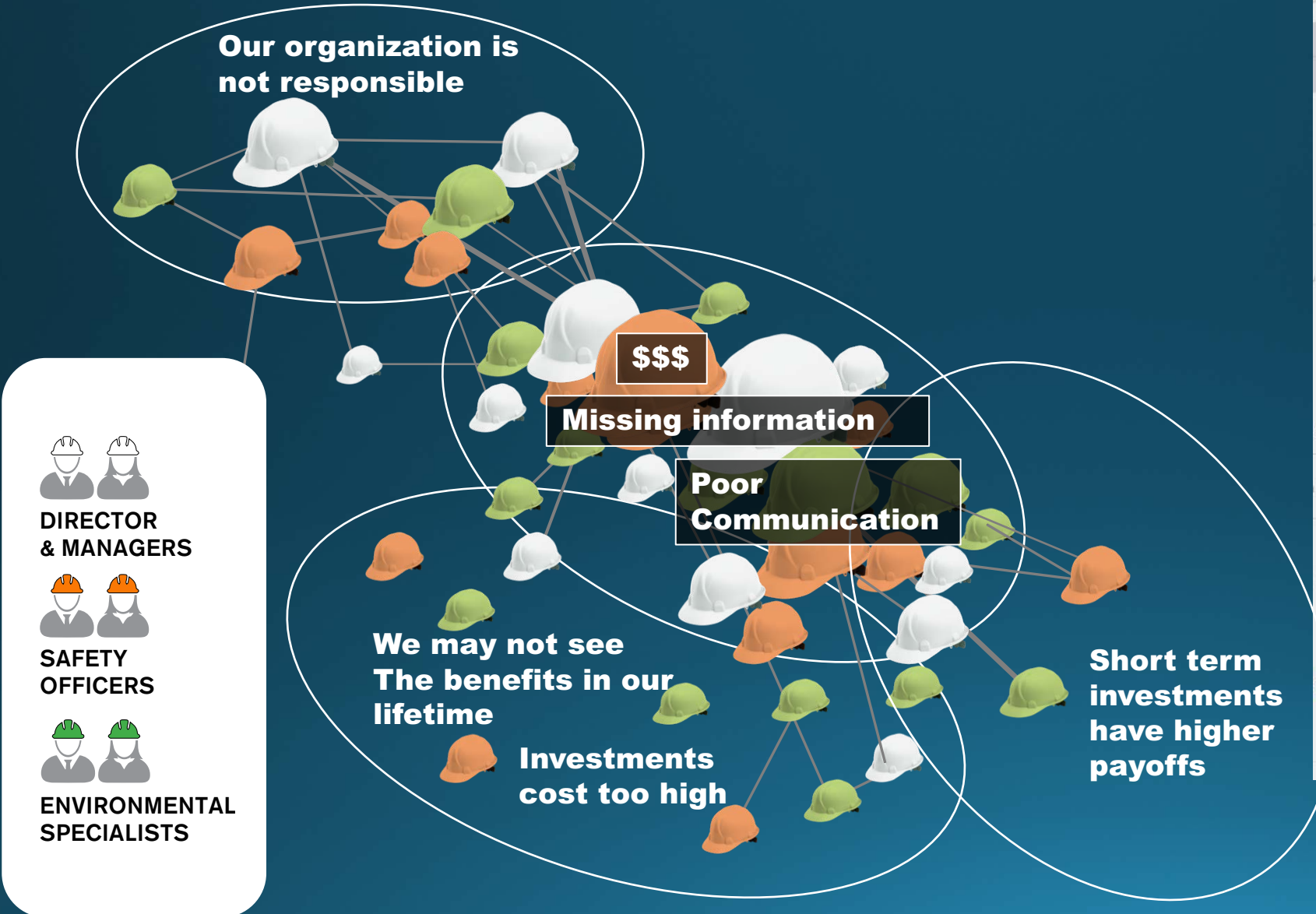
Study Phase 2

Decision-makers Barriers to Climate and Extreme Weather Adaptation for Seaports

“Barriers are factors and conditions that impede, prevent or delay processes for the development and implementation of climate change adaptation strategies.”

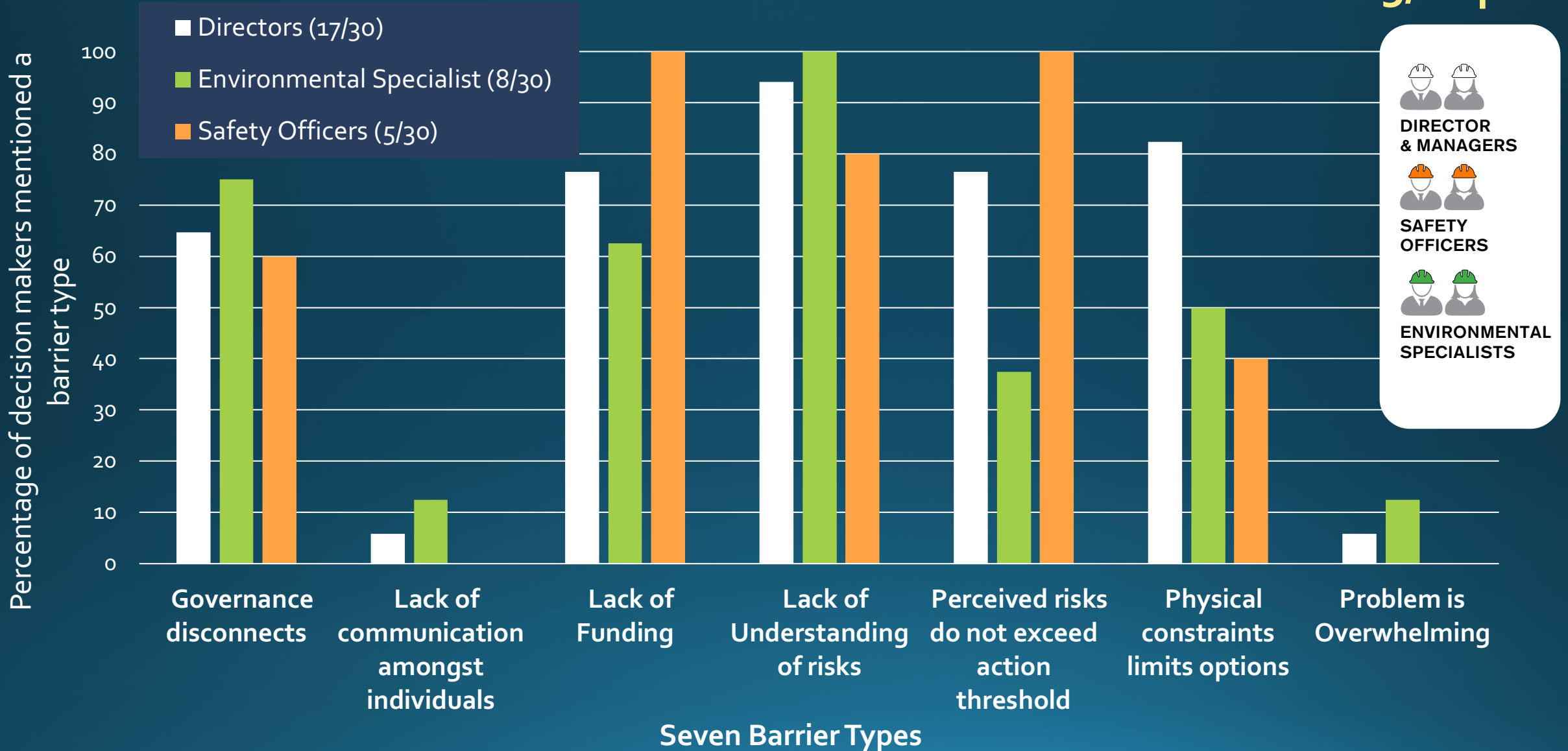
Biesbroek et al 2011

What barriers prevent different port decision makers from making resilience investments?



Preliminary Results: Barriers to Adaptation

15/22 ports



Governance Disconnect

"We are a bi-state agency. For the last 7- 8 years, we had one side of the (half) of the agency where we couldn't say the words : global warming or climate change, where the other half bought in."

(Safety Officer)

Physical Constraints Limits Options

"The infrastructure is only a certain height, so how do you change that at this point?"

(Port director)

Lack of Funding

"Money! I think that is the magical answer to everything, if we had the money, or if we had the money allocated appropriately."

(Safety Officer)

Lack of Understanding of the Risks

"We need more information to run risk models..."

"Because of hurricane Isabel we are learning from what happened to us [then] and using that [to better understand potential] storm surge."

(Environmental Manager)

Lack of Communication amongst Individuals

"Communication and coordination can become a barrier from time to time. I think that over the last three or four years since the port has merged these operating arms together. I think things are improving in regards to communication. But that can definitely be an issue from time to time.."

(Environmental Manager)

Perceived Risks does not Exceed Action Level

"I think we are pretty much centered on the design standard for a category three storm - which in this area is very likely event. So as far as taking action for an extreme weather event ... for something such as SLR or anything, that really hasn't been done."

(Safety Officer)

Problem is Overwhelming

"...you can't control mother nature, the severity of it."

(Port director)



JOC.COM
Impacts of hurricane Sandy Tidal surge wave
Terminals in Port Elizabeth, N.J. 2012

Preliminary Results: Strategies to Overcome Barriers to Adaptation

Barriers

- 1 – Governance Disconnect
- 2 – Physical Constraints Limits Options
- 3 – Lack of Funding
- 4 – Lack of understanding of the risks
- 5 – Lack of communication amongst individuals
- 6 – Perceived risks does not Exceed action level
- 7 – Problem is Overwhelming

Actors



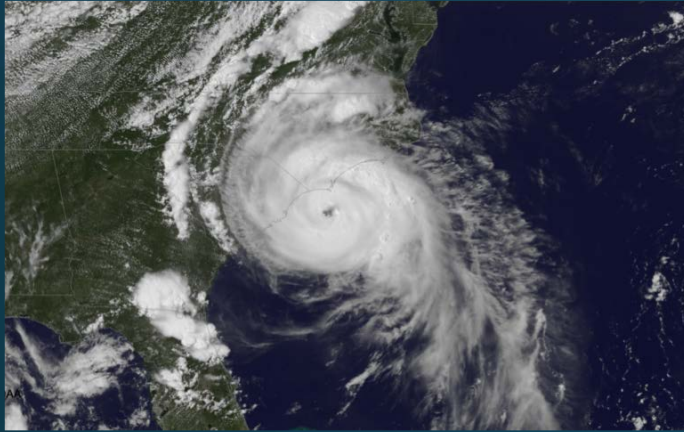
Strategies

- 1 - Conduct Risk Assessments
- 2 - Foster Collaborations
- 3 - Make Regulatory Changes to Encourage Resilience
- 4 - Provide Financial Incentives

Preliminary Results: Strategies to Overcome Barriers to Adaptation

- We are implementing best management practices and procedures
- We have recently done a pier rehabilitation project
- We have raised the pier (1.5 feet) above the FEMA required standard
- We conducted flood mitigation projects in 2017 (\$ 3.2 million investment)
- We are putting in place a Risk Assessment of Critical Infrastructure + strategies document (on going)

Next Steps



- Share the findings from this study.
- Identify **capacity-building interventions** tailored to the needs of different decision makers
 - Build on these preliminary results and expand study to **other decision maker barriers** (e.g., planners, emergency response managers)
- Develop tools to help all decision makers understand the risks and consequences of storms, flooding, and sea level change:

Thank You!

For more information web.uri.edu/abecker

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