

# Hurricane consequences in the face of climate change: Case studies of two seaport clusters, Gulfport (MS) and Providence (RI)



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Roger Williams University Nov. 14-15, 2012

## **8/28/2005 Hurricane Katrina hits Port of Gulfport**

*~\$80B damage to region*

*\$51m direct damage to Port of Gulfport*

*Port revenues decreased by 70%*

*~28' of storm surge at the Port of Gulfport*

## **2006 Port receives \$600m in HUD funding to rebuild**

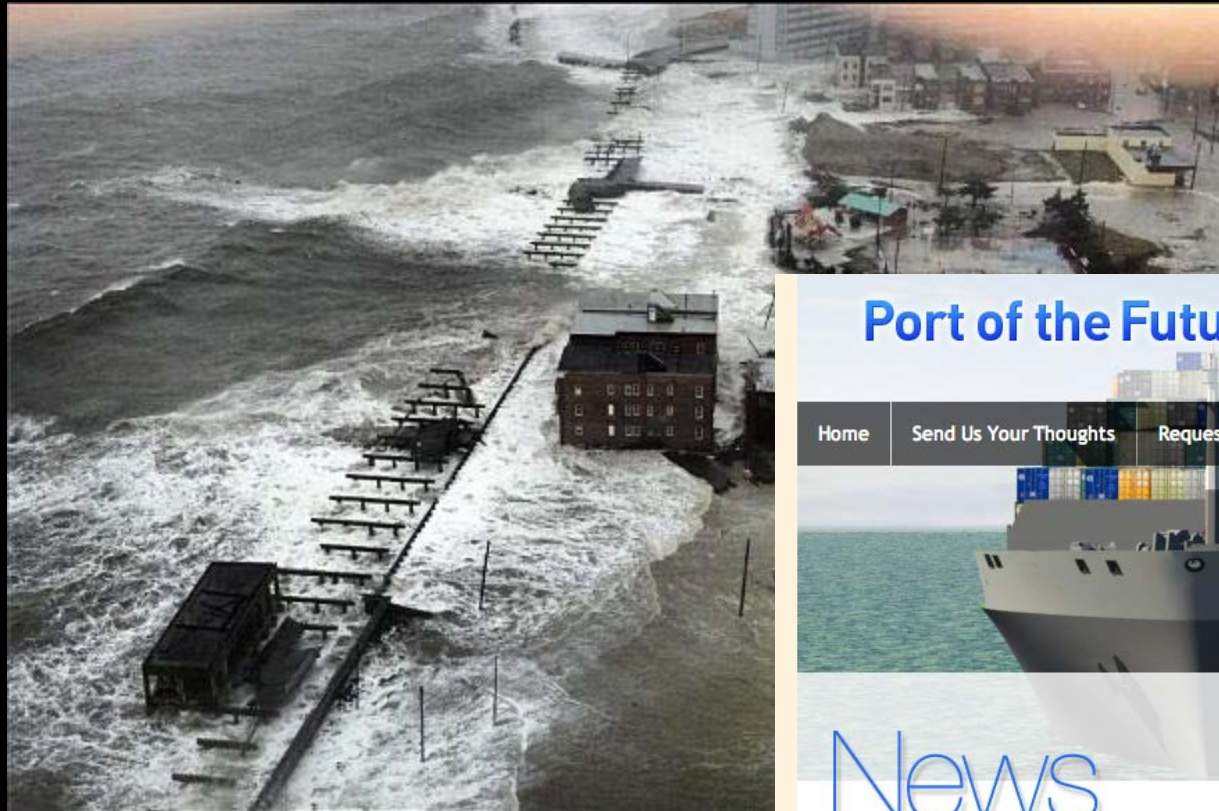
## **2007 Gulfport elects to raise its elevation to 25'**

*Get port out of floodplain*

*Increase competitiveness of port*

*\$140 million for elevation component*





Oct. 29, 2012  
 “Super storm” Sandy

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## News

### Port of Gulfport Board: No Need to Raise Port Elevation to 25 Feet

Tuesday, October 30, 2012

*Mississippi Business Journal* - Business Blog

By MJB News Staff

An eagerness to shorten the time frame for upgrading the Port of Gulfport led port commissioners Tuesday to scale back plans to elevate the West Pier to 25 feet as part of a \$500 million-plus restoration and expansion of Mississippi's main seaport.

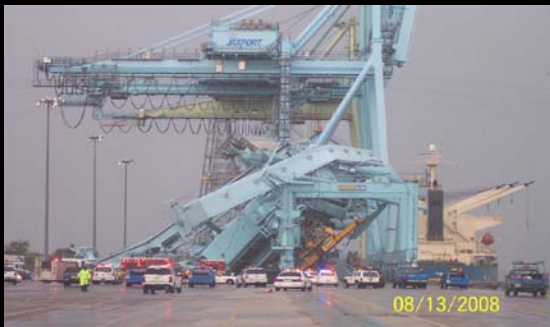
### News Headlines

- [OPINION - Frances Fredericks: A Vision for a 'Right-Size' Port](#)
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- [Gulfport Port Commission Takes No Action On Elevation Question](#)
- [Sun Herald Editorial: Time to Cut](#)



# Outline

- A framework for a sector-scale adaptation process
- Storm consequences Gulfport and Providence
- Interviews vs. planning documents in Gulfport
- Lessons learned
- Next steps

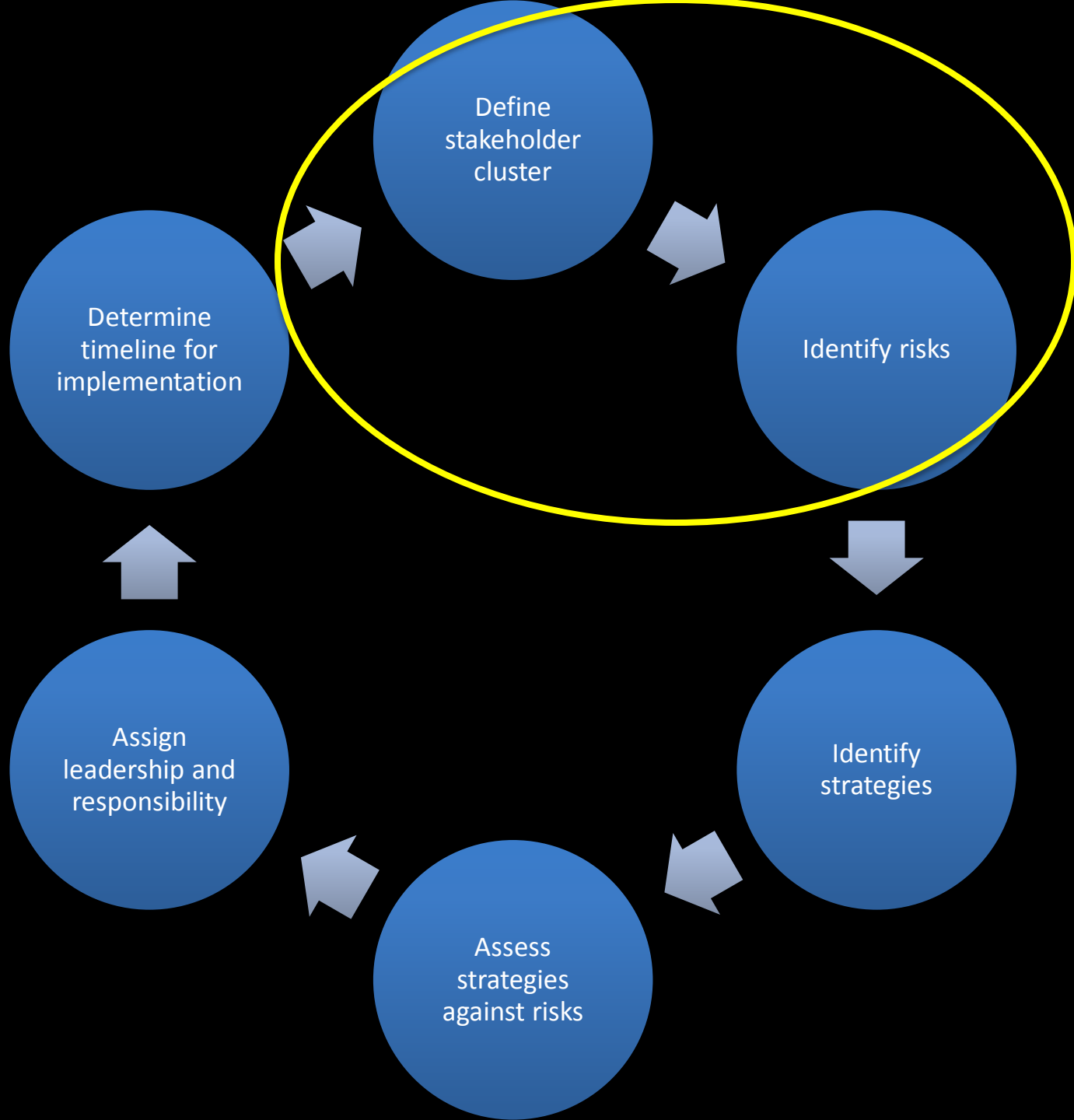


[http://www.cargolaw.com/2008nightmare\\_jaxcrane.html](http://www.cargolaw.com/2008nightmare_jaxcrane.html)

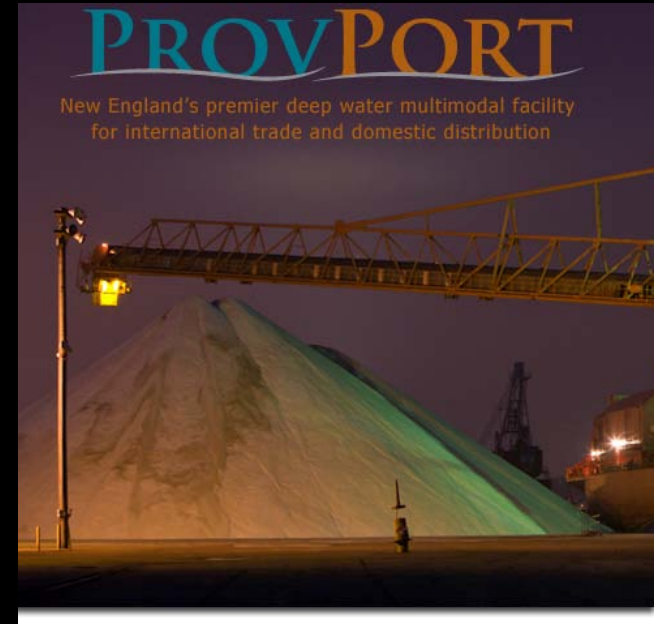
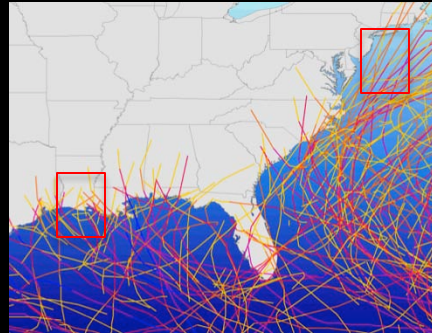
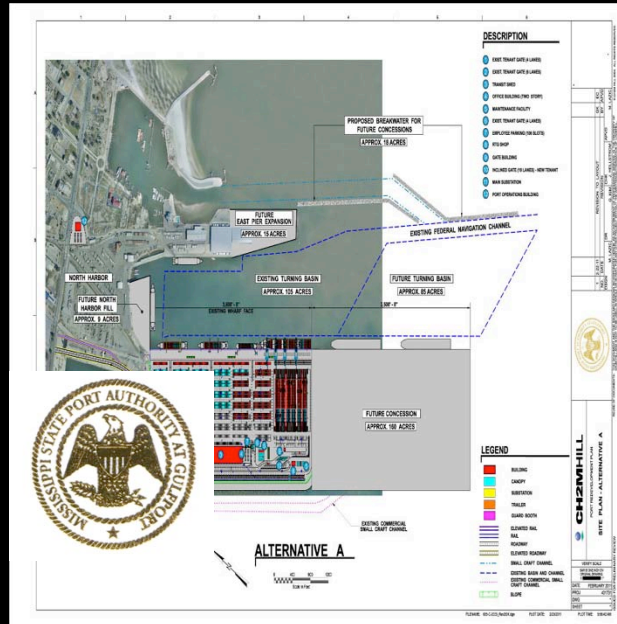


Photograph: Guy  
Reynolds/Dallas Morning  
News/AP





# Gulfport and Providence



- Two highly-vulnerable US ports
  - Gulfport (Mississippi) and Providence (Rhode Island)
- Interviews of 57 key stakeholders
- Reviewed planning and policy documents



An aerial view of the Port of Gulfport, Mississippi, overlaid with a simulated hurricane surge. The image shows various buildings and infrastructure, with labels for different organizations. The surge is represented by a light blue overlay on the land. The labels are: Dept. of Transportation (green), Tenants (yellow), USCG (orange), US Army Corps (orange), City of Gulfport (pink), Port Authority (yellow), Insurers (yellow), Environmental Agency (green), Emergency Management Agency (green), and Nonprofits/academia (green).

Dept. of Transportation

Tenants

USCG

US Army Corps

City of Gulfport

Port Authority

Insurers

Environmental Agency

Emergency Management Agency

Nonprofits/academia

# What organizations make up the “port cluster”?

Image © 2012 TerraMetrics

Port of Gulfport in Cat 4 simulated hurricane  
(Surge layer provided by Applied Science Associates)

Google earth  
7

1989

lat 30.362794° lon -89.102700° elev 0 ft

Eye alt 1787 ft





City of Providence  
(Dept. of Planning)

URI Coastal Resources Center

Save the Bay

RI CRMC

RI DOT

RI Economic Development Corporation

Moran Shipping Agents

Waterson Terminal Services

Promet Marine Services

Univar

Insurance company

RI DEM

Providence Fire Dept.

Brown University

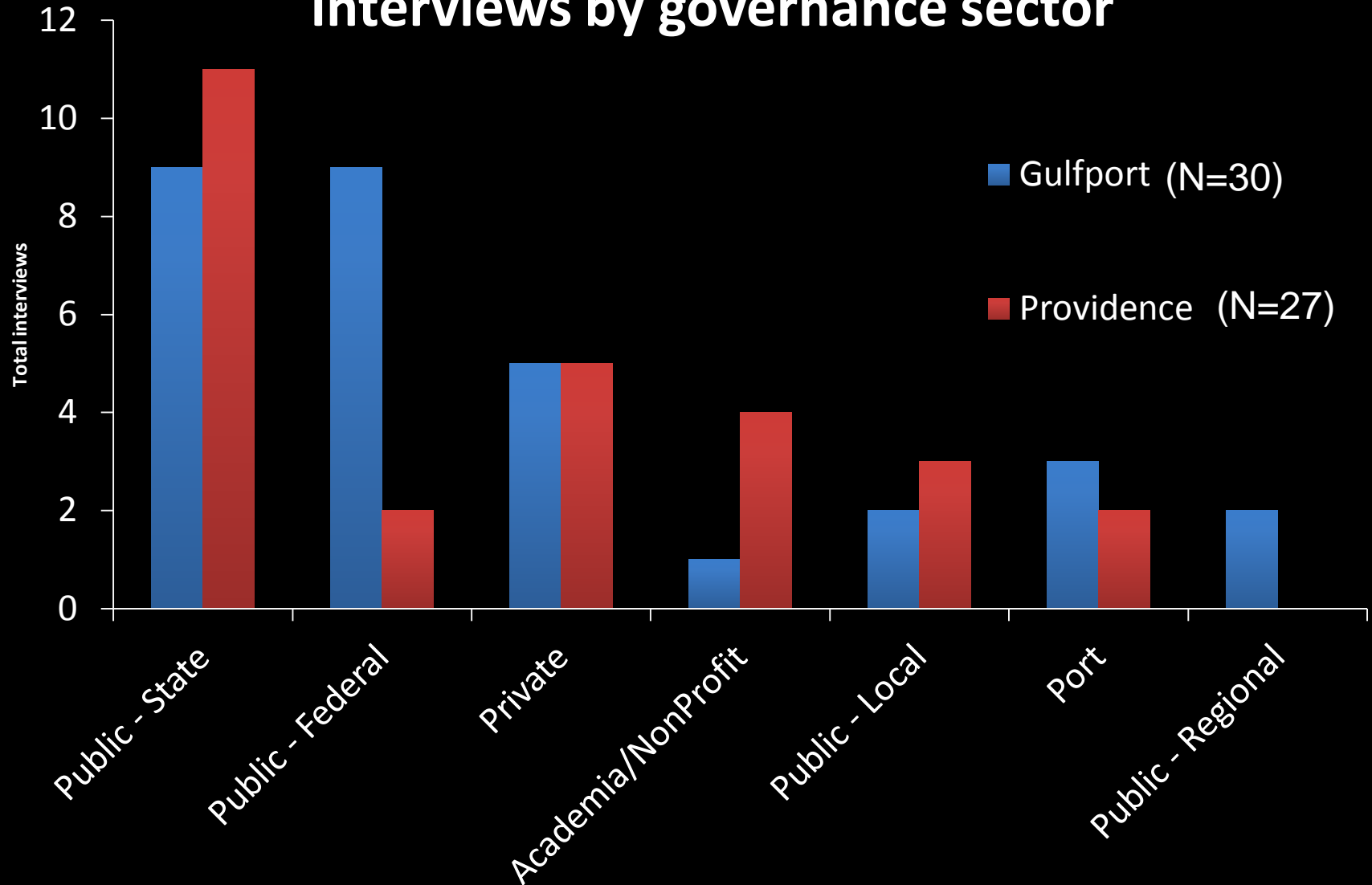
USCG

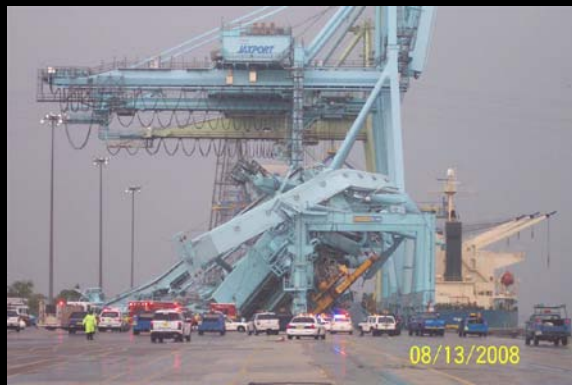
URI Dept. of Ocean Engineering

Port of Providence in Cat 3 simulated hurricane  
(Surge layer provided by Applied Science Associates)



# Interviews by governance sector





[http://www.cargolaw.com/2008nightmare\\_jaxcrane.html](http://www.cargolaw.com/2008nightmare_jaxcrane.html)



“What would be the consequences of this major hurricane hitting the port?”

Direct damage to port (DD)  
Delays in commerce (IC)

■ Providence ■ Gulfport

Local and regional consequence (IntC)

*The big fear that I have is that the port plays such a key role in our energy security; someone that is involved in energy security planning in the government should have another plan on what would happen if we couldn't bring in gasoline for cars and home heating oil and jet fuel. There was a fire at the Motiva dock four or five years ago, and that was one terminal not the whole port, and there was no gasoline in shell stations and in many stations in southeastern Massachusetts and Rhode Island and Connecticut just because Motiva was shut down. Gas prices doubled.*

*as flattened. There was  
e. Our berth collapsed .  
eks later, the channel  
[and] later they finally  
hip in, but it was of  
icted to daylight only, a  
vigational aids had  
ed down. The  
re was completely gone.*

Labor and employment  
consequences

Local and regional economy  
consequences

Disruptions of normality

Disaster response difficulties  
due to port damage

Debris

Business operational burdens

Disruptions of critical services

Difficulties in planning and  
development (GPT)

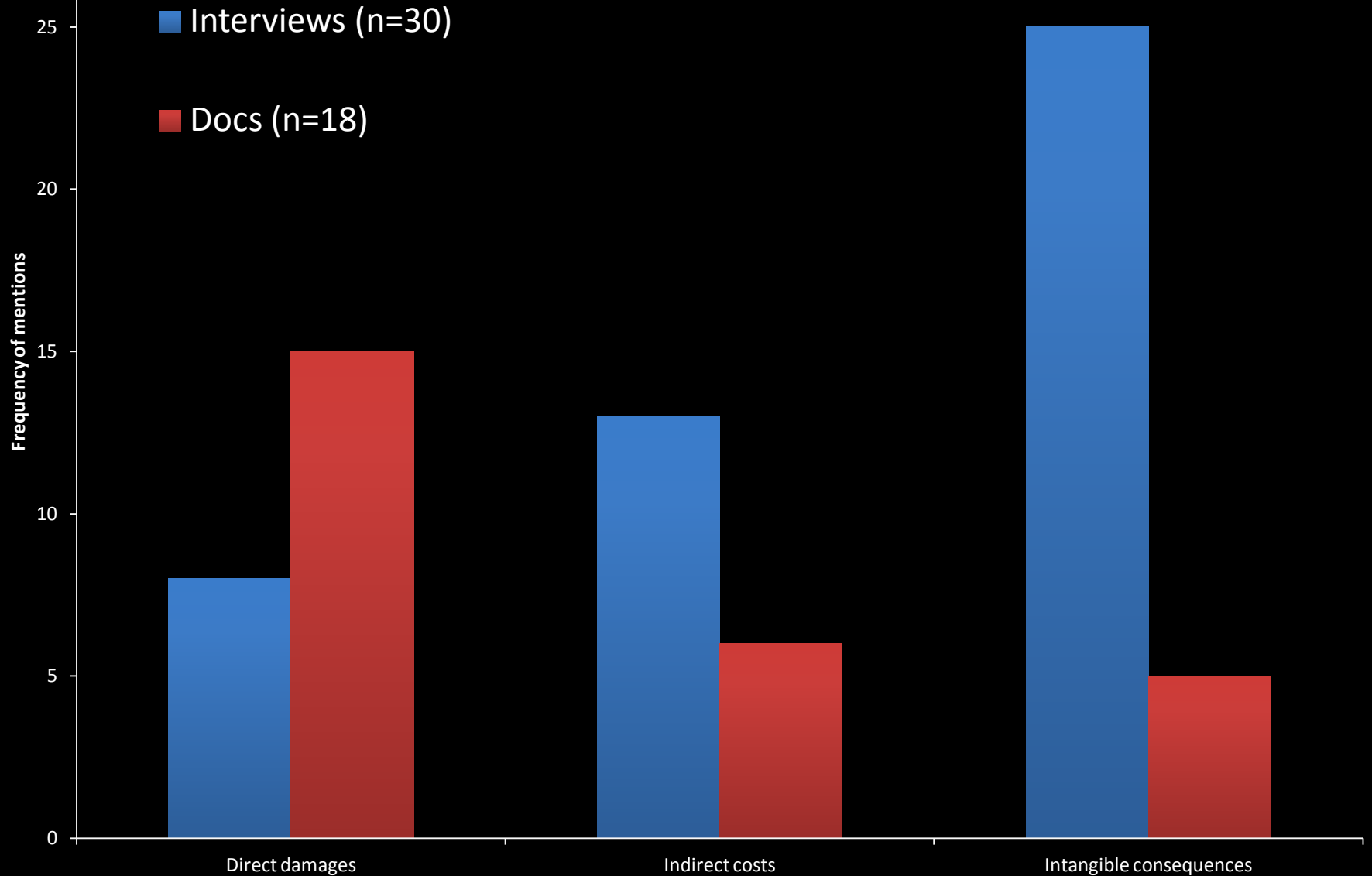


# Risk identification

<i>Type of consequence</i>	Methods/data sources (examples)	Scale	Limitations
<b><i>Direct damages</i></b>	Replacement/repair values; disaster assistance grants; insurance losses	Facility level; regional level; state level (but difficult to determine linkages)	Does not capture full scope of impacts, does not capture links between cause and effect, hard to perform <i>ex ante</i>
<b><i>Indirect costs</i></b>	Input/output models, workers comp; revenues; employment stats; Insurance costs	Facility level; regional, state, national	Difficult to trace back to one sector or facility (like a port), hard to perform <i>ex ante</i>
<b><i>Intangible consequences</i></b>	Qualitative assessments	Can be used at any scale before or after an event	Difficult to assign monetary value, difficult to model, very complex, subjective

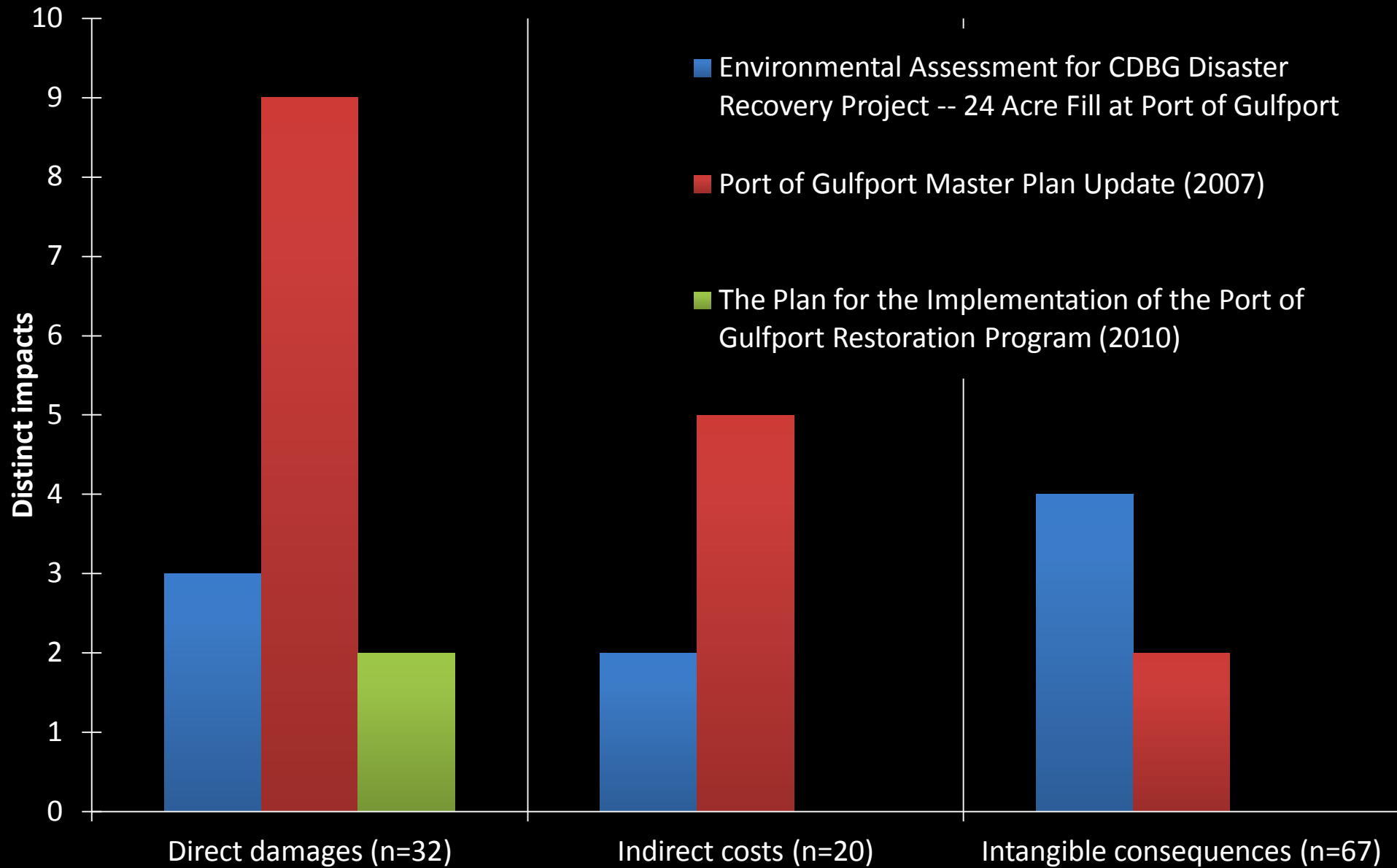
Title	Author	Type	Year	Directs	Indirects	Intangibles	Total
<i>Gulfport Master Plan Update 2007 Final Report</i>	BDMJM Harris and AECOM (MSPA)	Master Plan	2007	16	9	1	26
<i>The Impact of Hurricane Katrina on Mississippi's Commercial Public Ports and Opportunities for Expansion of the Ports</i>	Joint Legislative Committee on Performance Evaluation and Expenditure Review	Report	2006	9	2	3	14
<i>Hurricane Katrina Damage Assessment Report</i>	MSPA	Damage assessment	2005	11	0	0	11
<i>Port of Gulfport Restoration Program Action Plan</i>	MSPA	Master Plan	2008	3	6	1	10
<i>Master Planning the Port of Gulfport, Mississippi - Rebirth after Katrina</i>	John Webb (MSPA)	Report	2007	8	0	0	8
<i>Hurricanes Katrina and Rita - Implications for Hurricane Science and Engineering</i>	Building and Fire Research Laboratory National Institute of Standards and Technology	Report	2006	7	0	0	7
<i>Environmental Assessment for Disaster Recovery Project at State Port at Gulfport</i>	MSPA	Environmental Assessment	2010	2	1	2	5
<i>Hurricane Katrina Storm Surge Reconnaissance</i>	Fritz et al	Academic paper	2008	4	0	0	4
<i>Read the Port of Gulfport's Restoration Program Description</i>	MSPA	Press Release	2008	2	0	1	3
<i>Sustainable Restoration of the Port of Gulfport</i>	Reilly Morse	Report	2011	1	1	0	2
<i>The Plan for the Implementation of the Port of Gulfport Restoration Program</i>	CH2M Hill (MSPA)	Master Plan	2010	2	0	0	2
<i>Advancing in the Aftermath IV:</i>	Loren C. Scott	Report	2007	0	1	0	1
<i>Letter of opposition to HUD funding</i>	Multiple (STEPS community group)	Letter of opposition	2007	1	0	0	1
<i>Maritime Severe Weather Contingency Port Plan</i>	USCG	Hazard mitigation plan	2010	1	0	0	1
<i>Central Harrison County Connector Highway</i>	MDOT	FAQ	2007	1	0	0	1
<i>Testimony of Governor Haley Barbour</i>	Haley Barbour	Testimony	2009	1	0	0	1
<i>Port of Gulfport Restoration Program Presubmittal Meeting</i>	CH2M Hill (MSPA)	Presentation	2009	0	0	0	0
<i>State of Mississippi Hazard Mitigation Plan</i>	State of Mississippi Emerg. Management	Hazard mitigation plan	2007	0	0	0	0
<b>Total</b>				<b>69</b>	<b>20</b>	<b>8</b>	<b>97</b>

# Gulfport Interviews vs. Documents





## Distinct impacts mentioned in key Port of Gulfport master planning documents



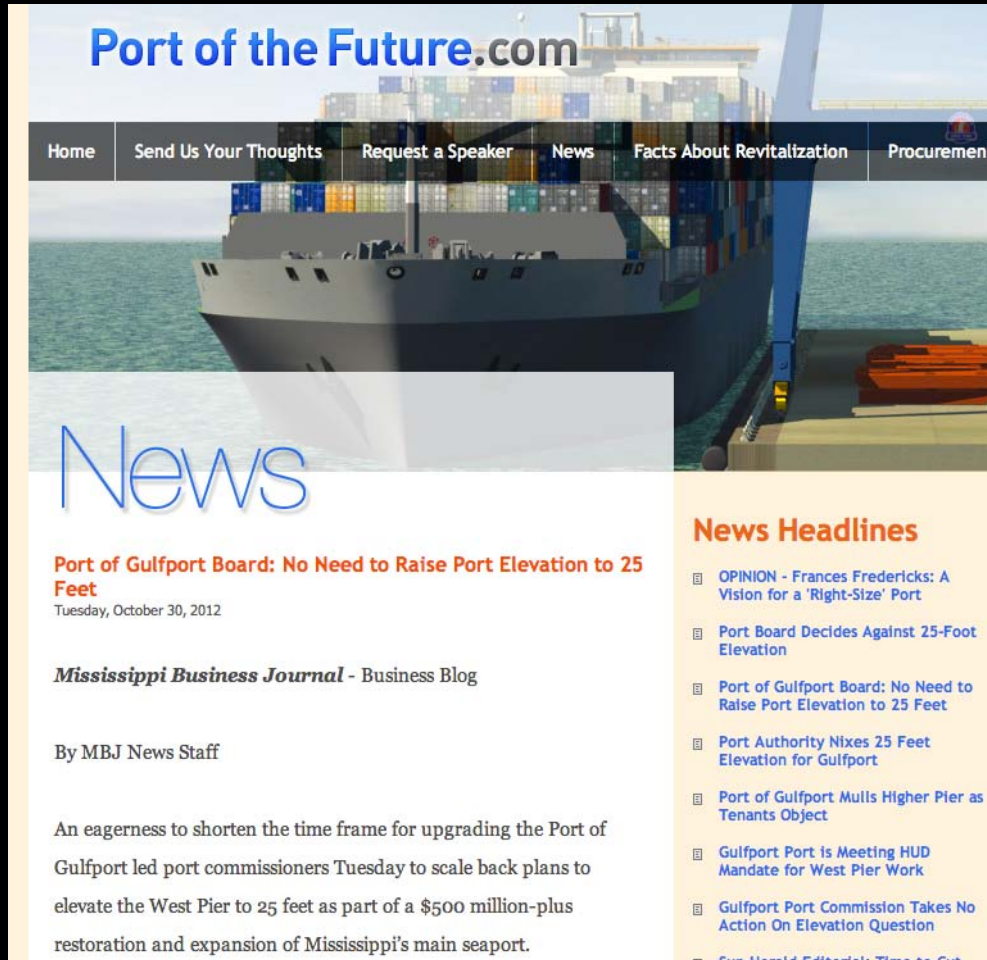
# Conclusions

1. *RISK IDENTIFICATION* on a sectoral scale requires qualitative approach which is traditionally undervalued in planning and policy.
2. Disconnect between stakeholder concerns and representation in the formalized documentation about hurricane impacts upon the port and its dependents.
3. In Gulfport, the Port's investment decisions do not account for the concerns of the wider stakeholder network, in particular with respect to hurricane resistance.

# Port of the Future

*We need to move forward. We need to get jobs. We need to get moving out and get this behind us.*

Port Commissioner 10-29-2012



The screenshot shows the website 'Port of the Future.com' with a background image of a large container ship. The navigation bar includes links for Home, Send Us Your Thoughts, Request a Speaker, News, Facts About Revitalization, and Procurement. The main content area features a 'News' section with a headline: 'Port of Gulfport Board: No Need to Raise Port Elevation to 25 Feet' dated Tuesday, October 30, 2012. The article is attributed to the 'Mississippi Business Journal - Business Blog' and 'By MBJ News Staff'. The text of the article states: 'An eagerness to shorten the time frame for upgrading the Port of Gulfport led port commissioners Tuesday to scale back plans to elevate the West Pier to 25 feet as part of a \$500 million-plus restoration and expansion of Mississippi's main seaport.' To the right of the article is a 'News Headlines' section with a list of links to various news items, including 'OPINION - Frances Fredericks: A Vision for a 'Right-Size' Port', 'Port Board Decides Against 25-Foot Elevation', 'Port of Gulfport Board: No Need to Raise Port Elevation to 25 Feet', 'Port Authority Nixes 25 Feet Elevation for Gulfport', 'Port of Gulfport Mulls Higher Pier as Tenants Object', 'Gulfport Port is Meeting HUD Mandate for West Pier Work', 'Gulfport Port Commission Takes No Action On Elevation Question', and 'Sun Herald Editorial: Time to Cut'.

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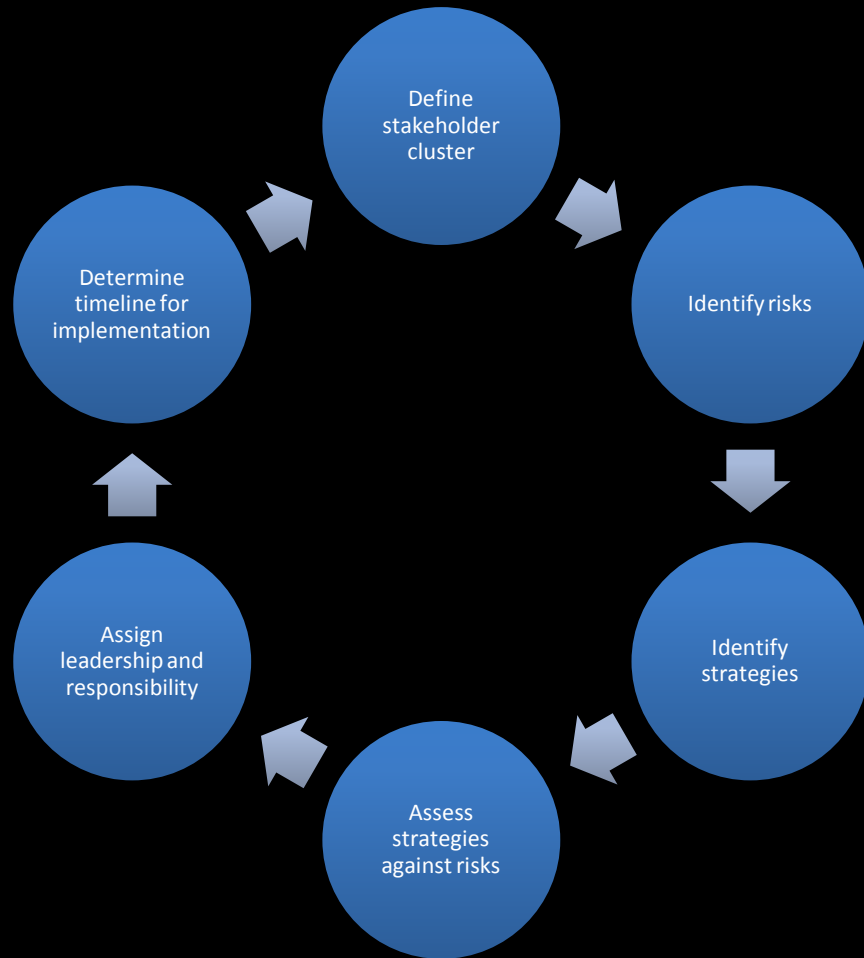
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# A better way forward...

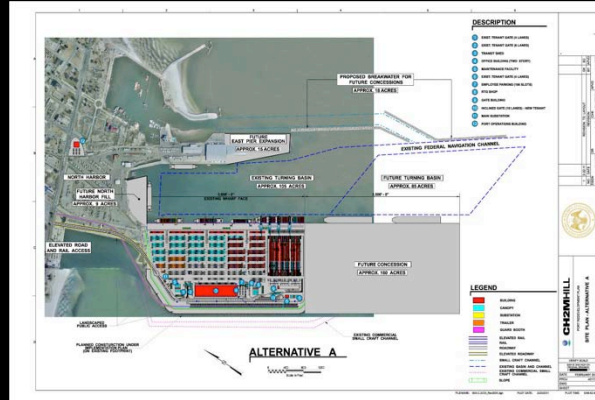
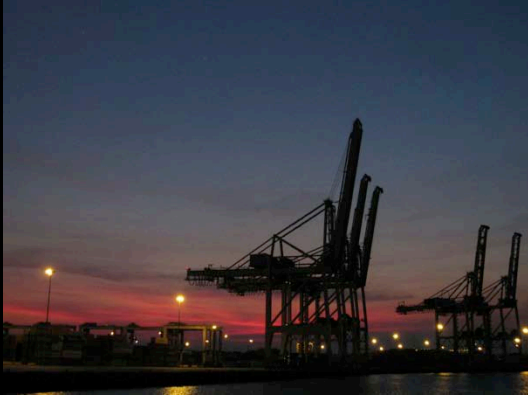


- Engage the full stakeholder network to better understand the breadth of consequences
- Consider the seaport as “public infrastructure” and utilize a broad range of resilience-building strategies that engage the full network of stakeholders
- Don’t rely on quantitative analysis to understand the consequences of sector-level disasters

*...Scholars...characterized...climate as a “wicked problem”...because of the enormous interdependencies, uncertainties, circularities, and conflicting stakeholders implicated by any effort to develop a solution. Climate change has been fairly described as a “super wicked problem” because of its even further exacerbating features. First, time is not costless, so the longer it takes to address the problem, the harder it will be to do so. Another [problem]...is that those who are in the best position to address the problem are not only those who caused it, but...the least immediate incentive to act within that necessary shorter timeframe... (Lazarus, 2009, pp. 1154)*



# Questions?



Many thanks to  
Roger Williams University's Marine Affairs Institute  
Emmett Interdisciplinary Program in Environment and Resources  
Stanford's Seaports2100 project

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[www.seaports2100.org](http://www.seaports2100.org)