

CONSIDERATIONS FOR ADAPTATION TO CLIMATE CHANGE

Ron Sass

**Emerging U.S. Climate Policy: Trans-
Atlantic Approaches and Market
Harmonization**

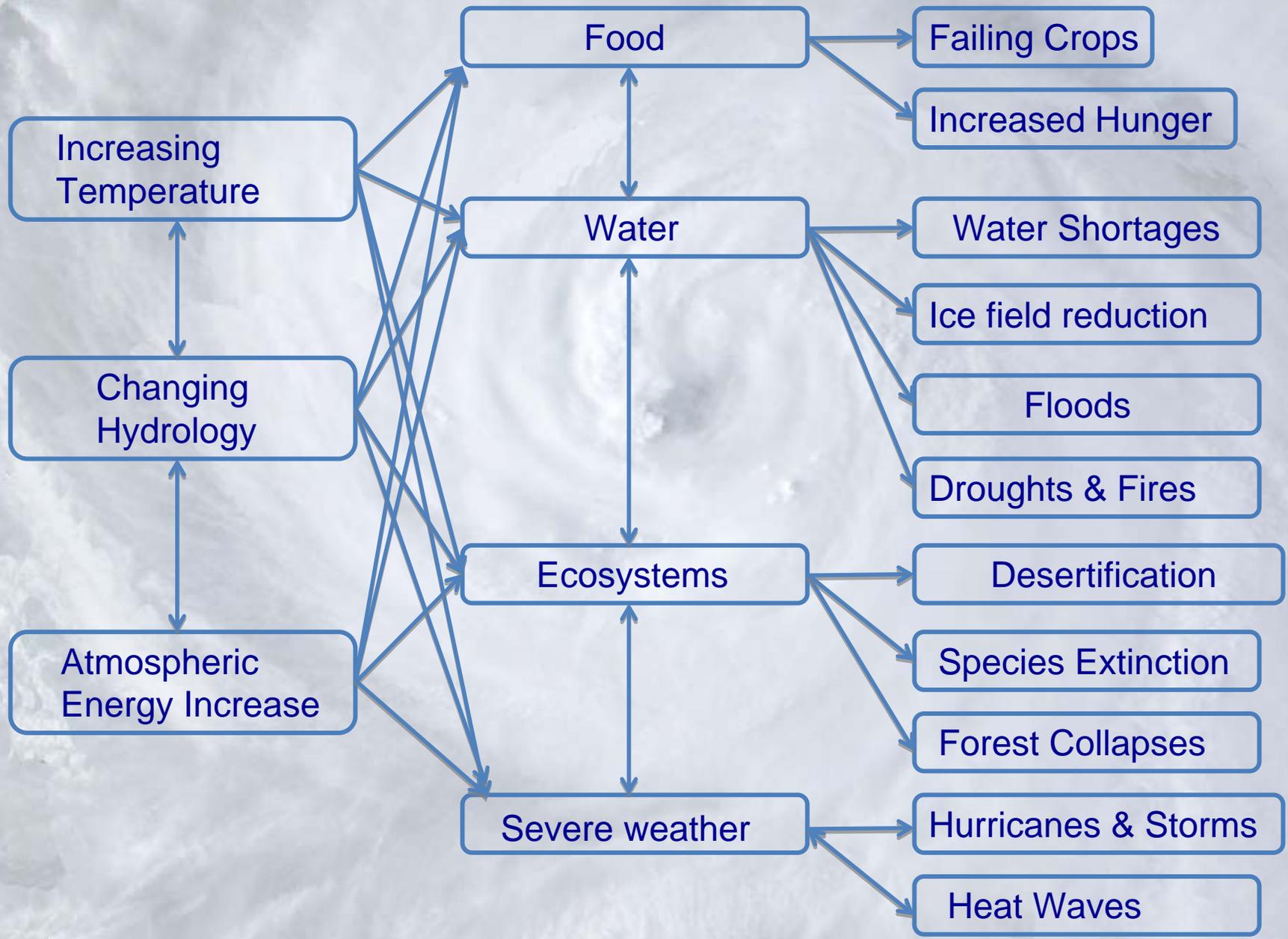
**James A. Baker Institute for Public Policy
December 15, 2008**

Global Warming

Cause

Sector

Effect



Reaction to Global Warm has overwhelmingly stressed mitigation rather than adaptation.

Al Gore

1992 Adaptation represents “a kind of laziness, an arrogant faith in our ability to react in time to save our skins.”

2007 “We really have to focus on prevention [mitigation]”

Other opinions on adaptation are emerging

UNFCCC, Article 4.1b. “”formulate, implement...national and where appropriate, regional programs containing measures to...facilitate adequate adaptation to climate change.”

UNFCCC, Article 4.4. “assist developing country Parties that are particularly vulnerable to adverse effects of climate change in meeting costs of adaptation.”

Kyoto Protocol. Article 11 –commits parties to promote and facilitate adaptation to address climate change

THE NEED FOR ADAPTATION TO CLIMATE CHANGE

Mitigation efforts alone cannot avoid further impacts of climate change in the next few decades,

Adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions.

A wide array of adaptation options is available, but more extensive adaptation than is currently occurring is required to reduce future climate vulnerability .

Adaptation is occurring now, but on a limited basis.

Impacts of climate change will vary regionally but, aggregated and discounted to the present, they are very likely to impose costs that will increase greatly over time as global temperatures increase.

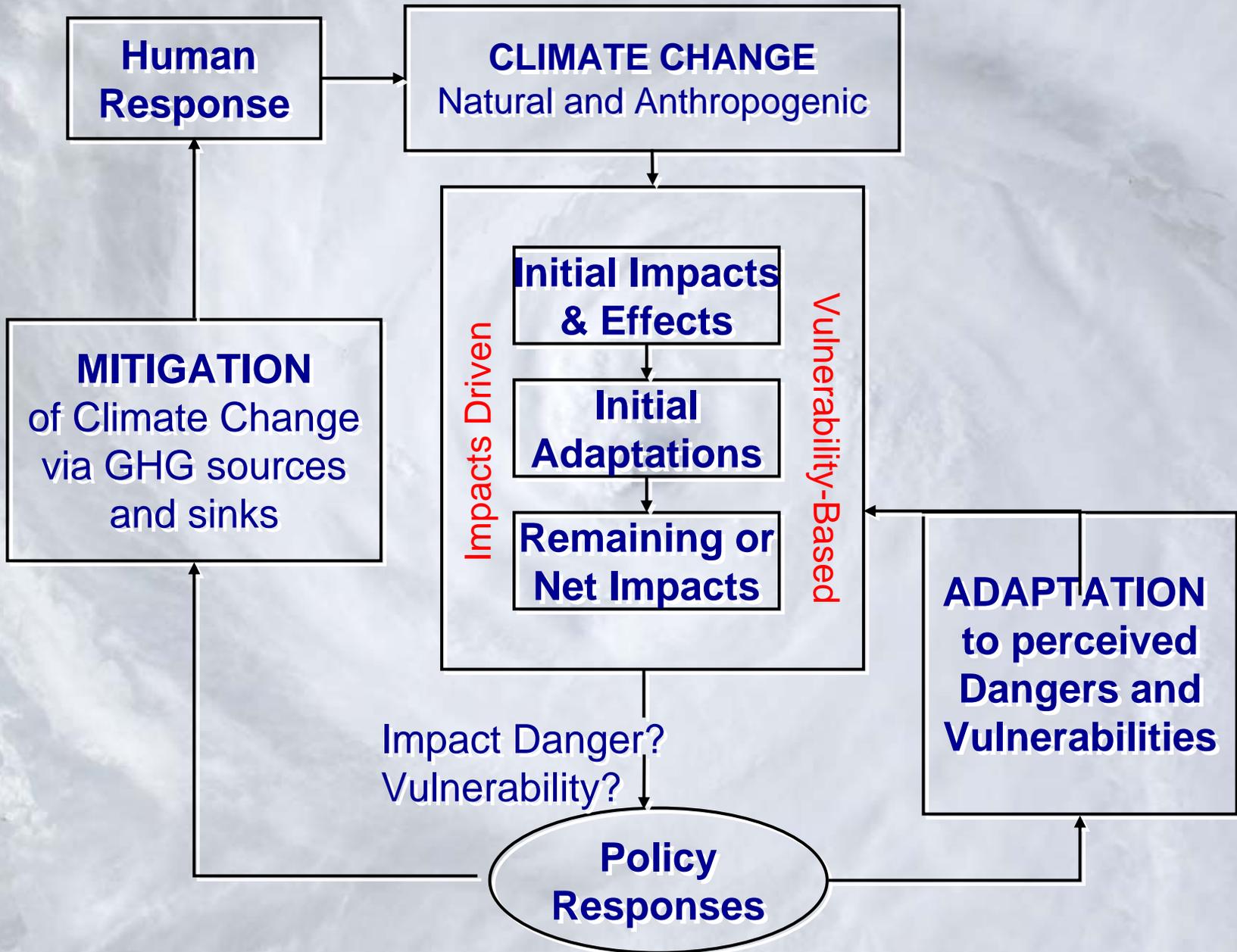
This suggests the need for a portfolio or mix of strategies that includes mitigation, adaptation, technological development (to enhance both adaptation and mitigation) and research (on climate science, impacts, vulnerability, adaptation and mitigation).

Governments must manage the incentives for both individuals and corporations to both mitigate and adapt to climate change.

ADAPTATION: Measures taken to reduce or moderate the negative impacts of climate change.

Potential Adaptations:

1. Modify the hazard, Cut fire lanes or clear flammable brush
2. Prevent or limit impact. Build sea wall, dam rivers and reservoirs
3. Move to avoid loss. Don't rebuild in flood plain or in a probable hurricane surge area.
4. Share the losses. Provide flood insurance, promote the red cross or other disaster organizations.
5. Bear the loss. Take one's chances on a probable risk factor, bet on favorable statistical outcomes.



Identifying the thresholds in gradual changes for abrupt or catastrophic changes

The Earth system is generally considered to be stable, or at least only undergoing slowly changing processes

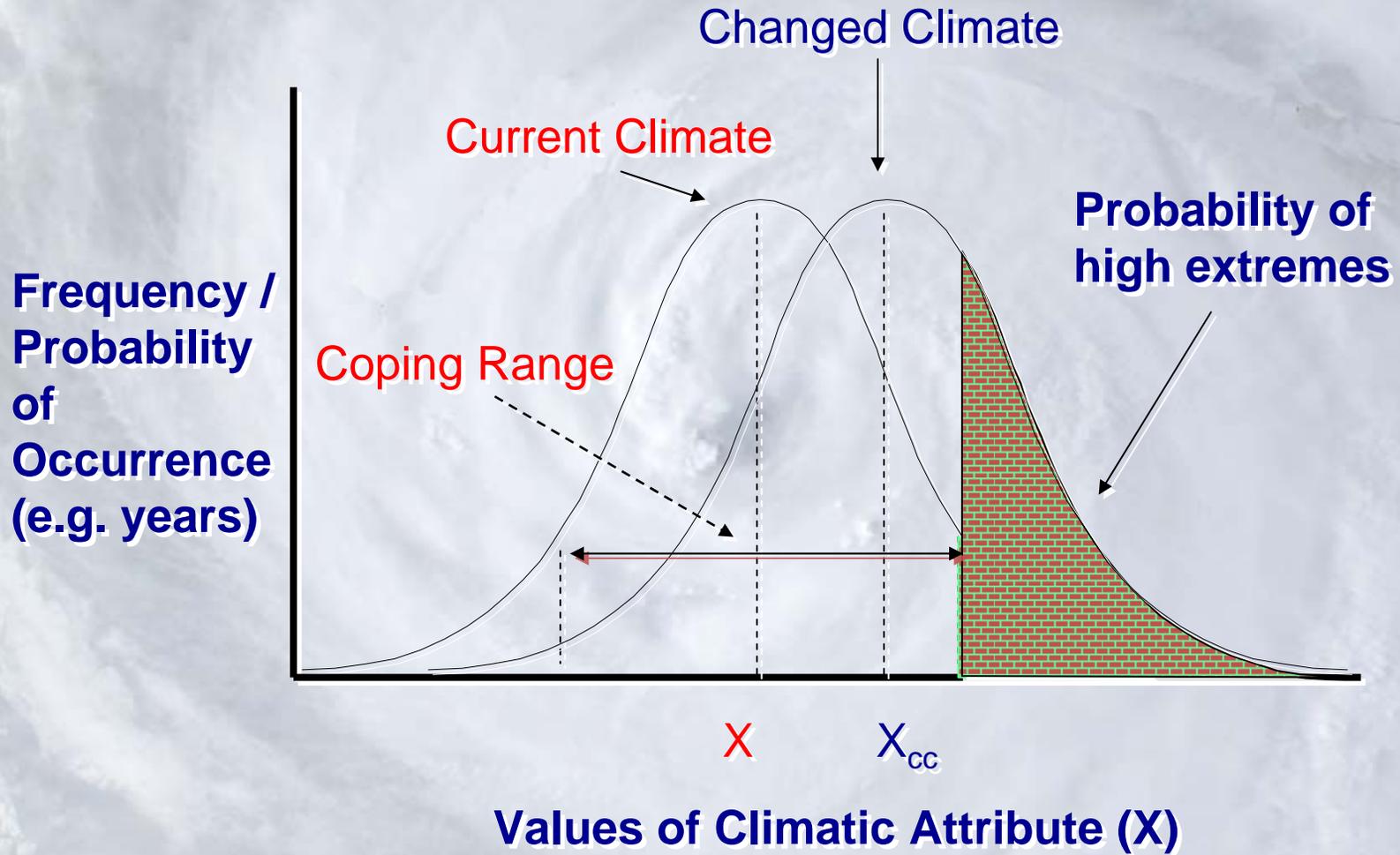
The Earth may not respond to the current climate change in that way

We cannot wait for the science to exactly define the thresholds of change; it simply takes too long to reduce all uncertainties

Rather we need to rely on subjective or qualitative determination of thresholds and to be ready to respond

Subjective thresholds generate conflicting response views held by risk takers, risk averse individuals and risk makers

All countries need to have intelligent and effectual leaders and advisors who will work together to prepare all nation to deal with the consequences of climate change.



**Governmental policy decisions generally are in response to crisis situations,
not slow or gradual changes**

Climate change is often too slow and incremental to elicit immediate government action

Benefits of short term actions overshadow later costs

Government faces several crises at a given time with competing demands for scarce resources

Thresholds for major or irreversible changes in the environmental system are difficult to identify

Slow and incremental changes are not generally associated with crisis situations that decision makers respond to

Monitoring slow or creeping changes requires commitment over the long term

Creeping changes are usually addressed only after they have accumulated to become crises that can no longer be ignored

**Focus attention on gradual change in climate
And the future as well as present effects on environment**

To create a public awareness of the need for adaptive measures to reduce the adverse effects of climate change.

To promote an understanding of rates of change and the processes that drive them

To reduce scientific and policy uncertainty about rates and processes of changes to the environment and define possible societal responses to them

To underscore the potential societal impacts of climate change and of the human aspects of global environmental change

To generate heightened need for action plans to cope with climate change induced disasters.

To underscore the societal and political importance of early warning systems

TEXAS GULF COAST ADAPTATION NEEDS CASE HISTORY HURRICANE IKE

- Damage from Hurricane Ike now estimated to cost between \$13 and \$21 billion.
- Estimates include \$10 billion to \$15 billion for wind and storm surge on the coast.
- Ike could become the 3rd costliest storm in U.S. history after Katrina and Andrew.





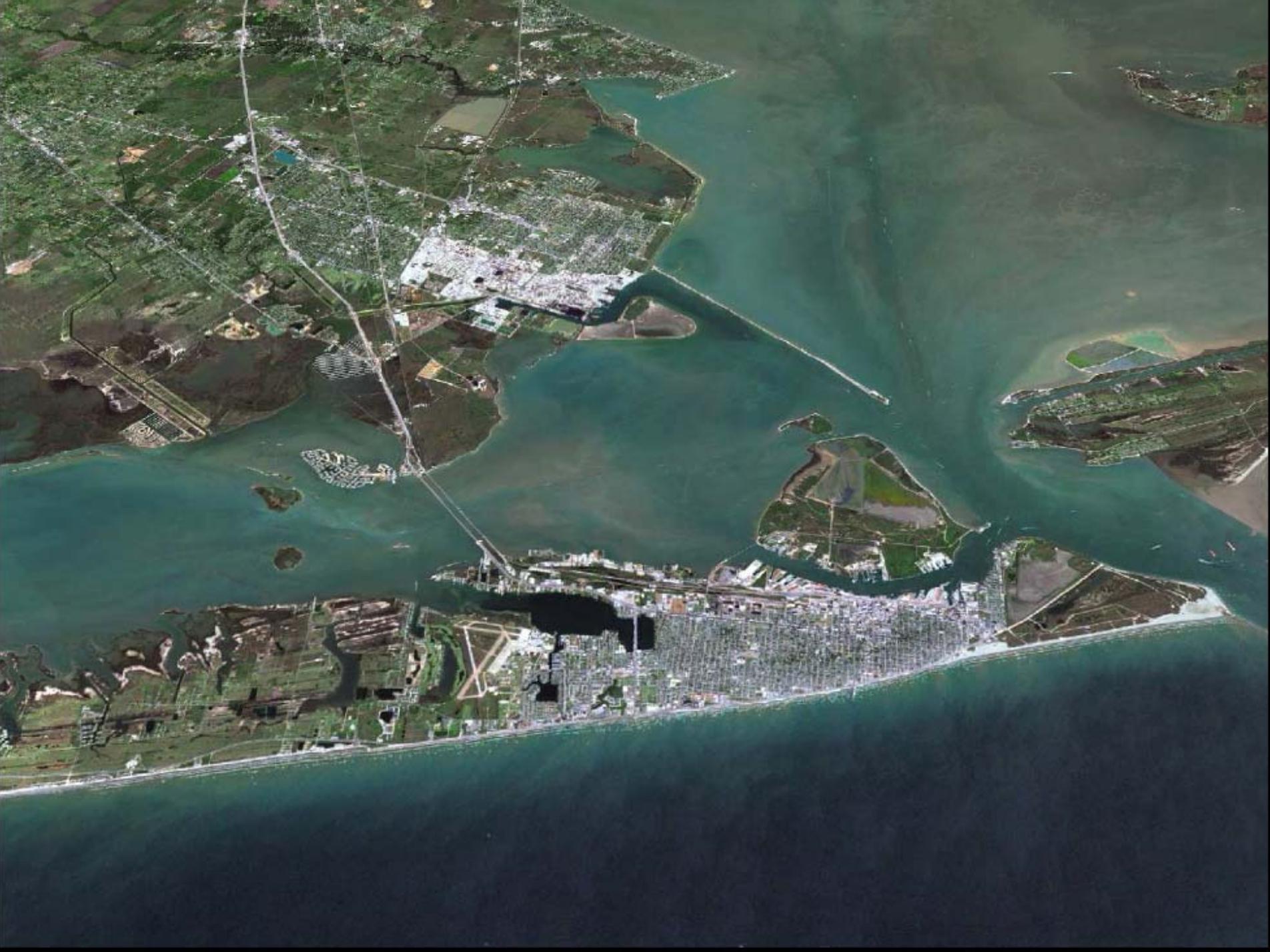
Hurricane Ike
Chinese FY1-D MVISR
September 12, 2008 at 6:18 PM CDT

September 15, 2008



September 9, 2008







Galveston Island submerged by a 19.0-foot storm surge from a Category 5 hurricane.

ADAPTATION EFFORTS BETWEEN KATRINA AND IKE

Successes

1. Rapid, adaptive field deployment to conduct the evacuation.
 - Fuel availability, fewer breakdowns and bottlenecks
 - Actively engaged local law enforcement in plan development
2. Special needs evaluation tracking system
 - Each convoy (coaches or school buses) will have at least one of the tracking devices. Location updates will be sent every 30 seconds
3. Each evacuee registered on site and issued an ID bracelet.
4. Accurate hydrodynamic model forecasts of regional storm surge vulnerability.
5. Exceptional post-event documentation of the impact region for forensic analysis.

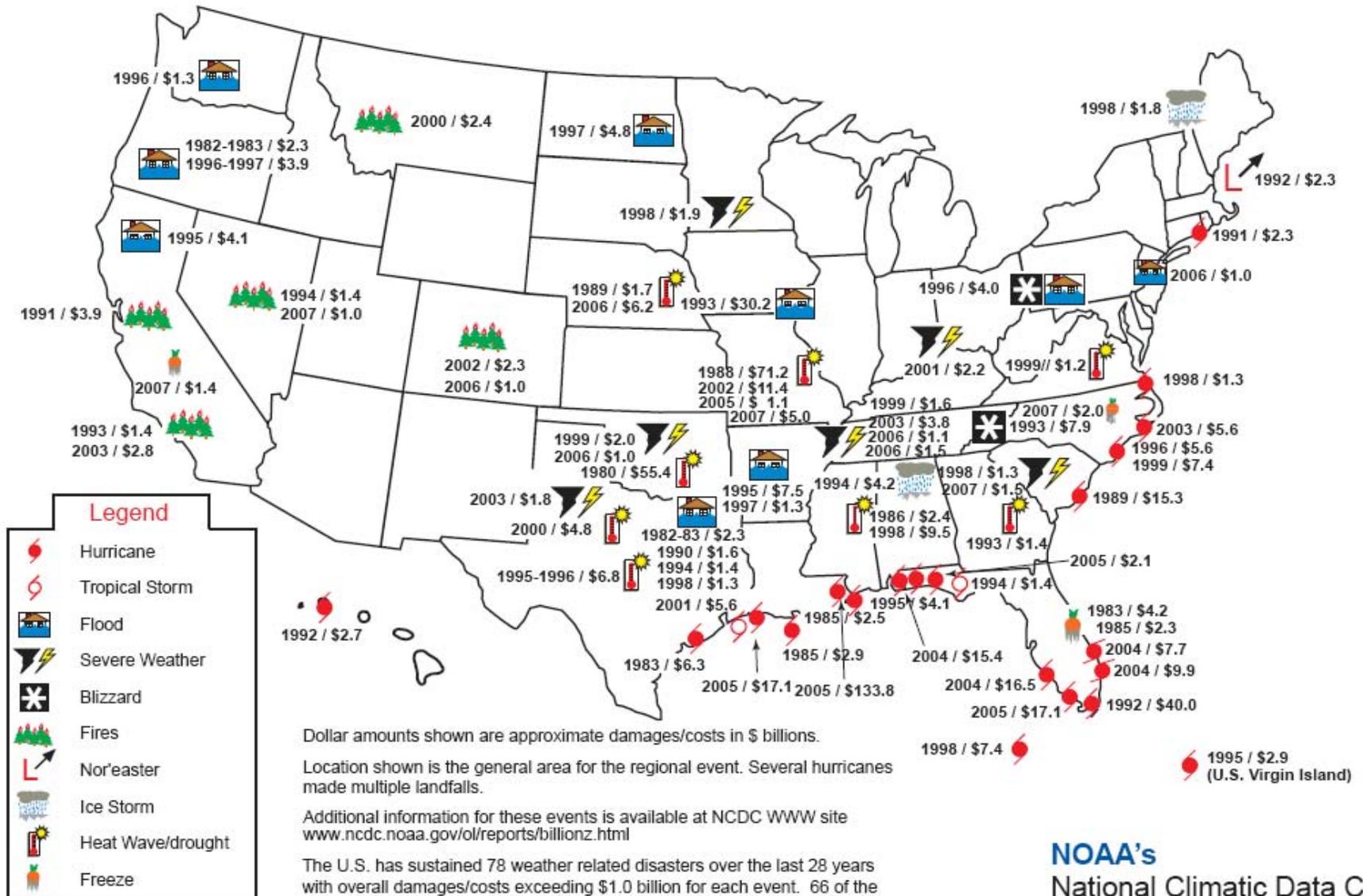
Failures

1. Inefficient coordination of the supply chain to Points of Distribution.
2. Ineffective communication to isolated populations of the threat geography and event magnitude.
3. Shortage of “out of region media communications” on “return” instructions
4. Prolonged loss of electric power and need for more rapid return of temporary power to strategic intersections.
5. Need for a better predictor of hurricane surge as well as wind strength.
6. Slow and inefficient response by federal governmental agencies.

Harriss County Hurricane Wind Risk

HAZUS-MH Level 1 Modeled Category CivilTech Engineering, Inc. 2008		Saffir-Simpson Hurricane Scale			
		1	2	3	5
Building Stock Exposure		\$244 Billion (868,176 Buildings)			
Expected Building Damage (count)	Total	1,168	16,587	165,294	686,977
	<i>Residential</i>	<i>1,108</i>	<i>16,223</i>	<i>161,738</i>	<i>670,945</i>
	<i>Commercial</i>	<i>48</i>	<i>300</i>	<i>2,898</i>	<i>12,672</i>
Essential Facility Functionality	Fire Stations	100%	99%	36%	0%
	Hospitals	100%	100%	12%	0%
	Police Stations	100%	100%	14%	0%
	Schools	100%	100%	24%	0%
Building-Related Economic Loss (Million Dollars)	Building Loss	48	585	4,101	51,984
	<i>Residential</i>	<i>46</i>	<i>558</i>	<i>3,560</i>	<i>39,776</i>
	<i>Commercial</i>	<i>1</i>	<i>21</i>	<i>380</i>	<i>7,660</i>
	Business Interruption	1	64	758	10,751
	Total	49	649	4,859	62,736
Debris (Million Cubic Yards)		0.2	1	7	44
# People Needing Short Term Shelter		0	192	3,522	56,134

Billion Dollar Weather Disasters 1980 - 2007



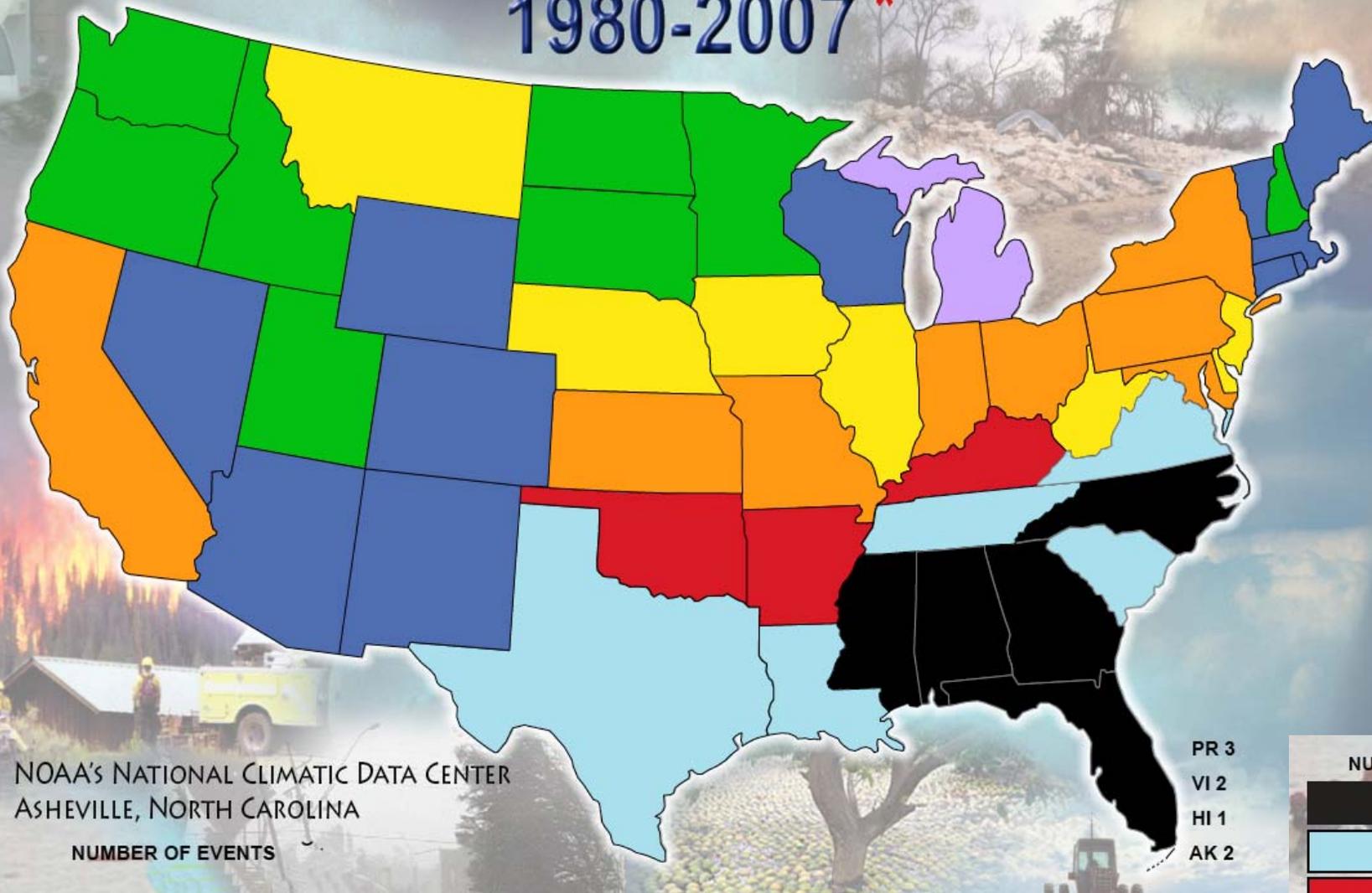
Dollar amounts shown are approximate damages/costs in \$ billions.

Location shown is the general area for the regional event. Several hurricanes made multiple landfalls.

Additional information for these events is available at NCDC WWW site www.ncdc.noaa.gov/ol/reports/billionz.html

The U.S. has sustained 78 weather related disasters over the last 28 years with overall damages/costs exceeding \$1.0 billion for each event. 66 of the disasters occurred during or after 1990. Total costs for the 78 events were 600 billion using a GNP inflation index.

1980-2007*



The national map by state reflects a summation of each billion dollar event, for each state affected--ie, it does not mean that each state shown suffered at least \$1 billion in losses for each event. For example, one event causing \$1 billion in overall U.S. damages spread over 5 states, would cause well under \$1 billion in damage in each affected state. However, larger multi-billion dollar events would sometimes cause over \$1 billion in damages in one or more states.

Adaptation to the dangers and vulnerabilities of climate change

- ◆ Harden local and state infrastructure to withstand natural disasters of increased intensity.
- ◆ Provide for assistance to individuals and communities to lessen the effects of natural disasters on economy.
- ◆ Anticipate and provide solutions to problems associated with public evacuation, injury and death associated with natural disasters.
- ◆ Prepare for climate change related public health issues.
- ◆ Promote an awareness of the potential loss of biodiversity.
- ◆ Prepare for the impacts of climate change on the translocation of the geographical distribution of forest and grasslands as well as severe changes in agricultural practices.

Adaptation—how much could it cost?

It will not be optimal to adapt to eliminate an entire climate effect: averting all damage or removing all risks may simply be too expensive.

Very little is known about the aggregate extent of the costs of adaptation, but there are some rough estimates.

- Adaptation costs would be about 0.2–0.5 percent of world GDP, or about \$70–150 billion a year.
- The financial impact of adaptive measures, according to Munich Re, the world's largest reinsurer, may ultimately run to more than \$300 billion a year
- According to the latest IPCC report, total global costs for climate change will run to 1– 5% of the GDP.
- However, towards the end of this century excessive sea-level rise could increase adaptation costs to at least 5-10 % of the GDP.
- Other abrupt climate changes might have equal impacts

Take home cost message

A better understanding of the fiscal costs of adapting to climate change, at the personal, local, regional and country level, is urgently needed.

THANK YOU

GALVESTON BAY, TEXAS

