

Oct 27th, 12:00 PM - 1:00 PM

## **Social Vulnerability and Community Disaster Resilience in the Southeast United States**

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Emrich, Chris T., "Social Vulnerability and Community Disaster Resilience in the Southeast United States" (2015). *Coastal Resilience Workshop*. 3.

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HAZARDS & VULNERABILITY  
RESEARCH INSTITUTE

# Social Vulnerability and Community Disaster Resilience in the Southeast United States

## Understanding Vulnerabilities and Building Resiliency

2nd Workshop on Coastal Risk and Resilience  
Broward County Governmental Center  
Ft. Lauderdale Florida

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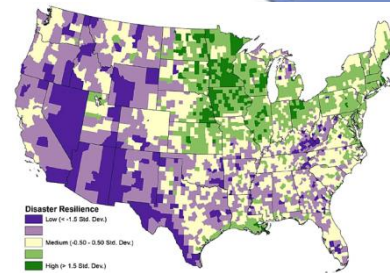
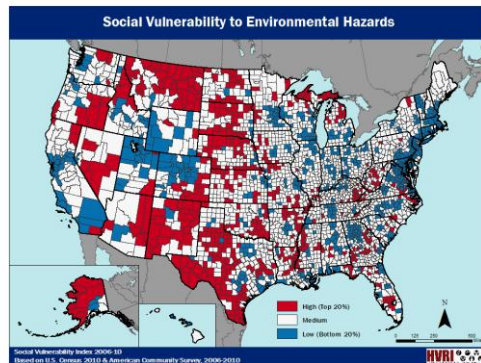
# The HVRI @ USC

Mission (in part)  
improvement of  
emergency preparedness,  
planning, response,  
*resilience* and recovery at  
local, state, national, and  
international scales.

Tools/technologies for use in every stage of the EM cycle.



Integrated Hazards Assessment Tool (IHAT)

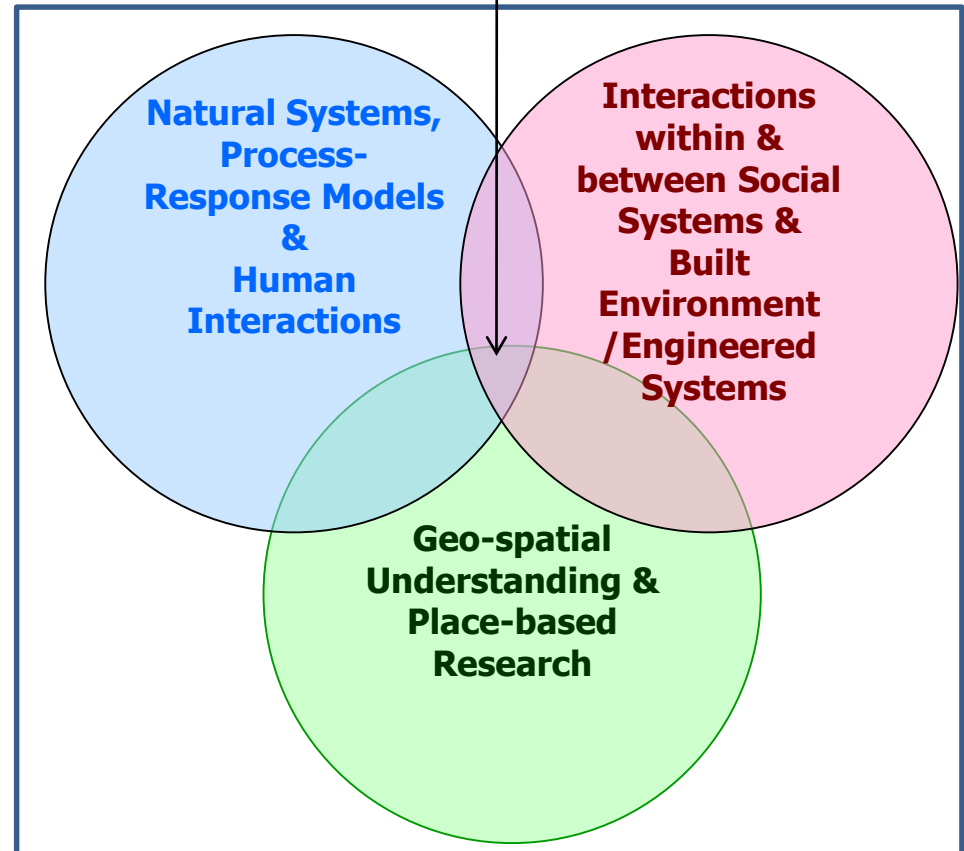


Benchmarking Disaster Recovery  
Using Collector for ArcGIS



# Vulnerability and Resilience Science

- What circumstances place people and localities at risk?
- What enhances or reduces the ability to respond to and recover from environmental threats?
- What are the geographic patterns between and among places?



Goal: Provide scientific basis for disaster and hazard reduction policies through the development of methods and metrics for analyzing societal vulnerability and resilience to environmental hazards and extreme events

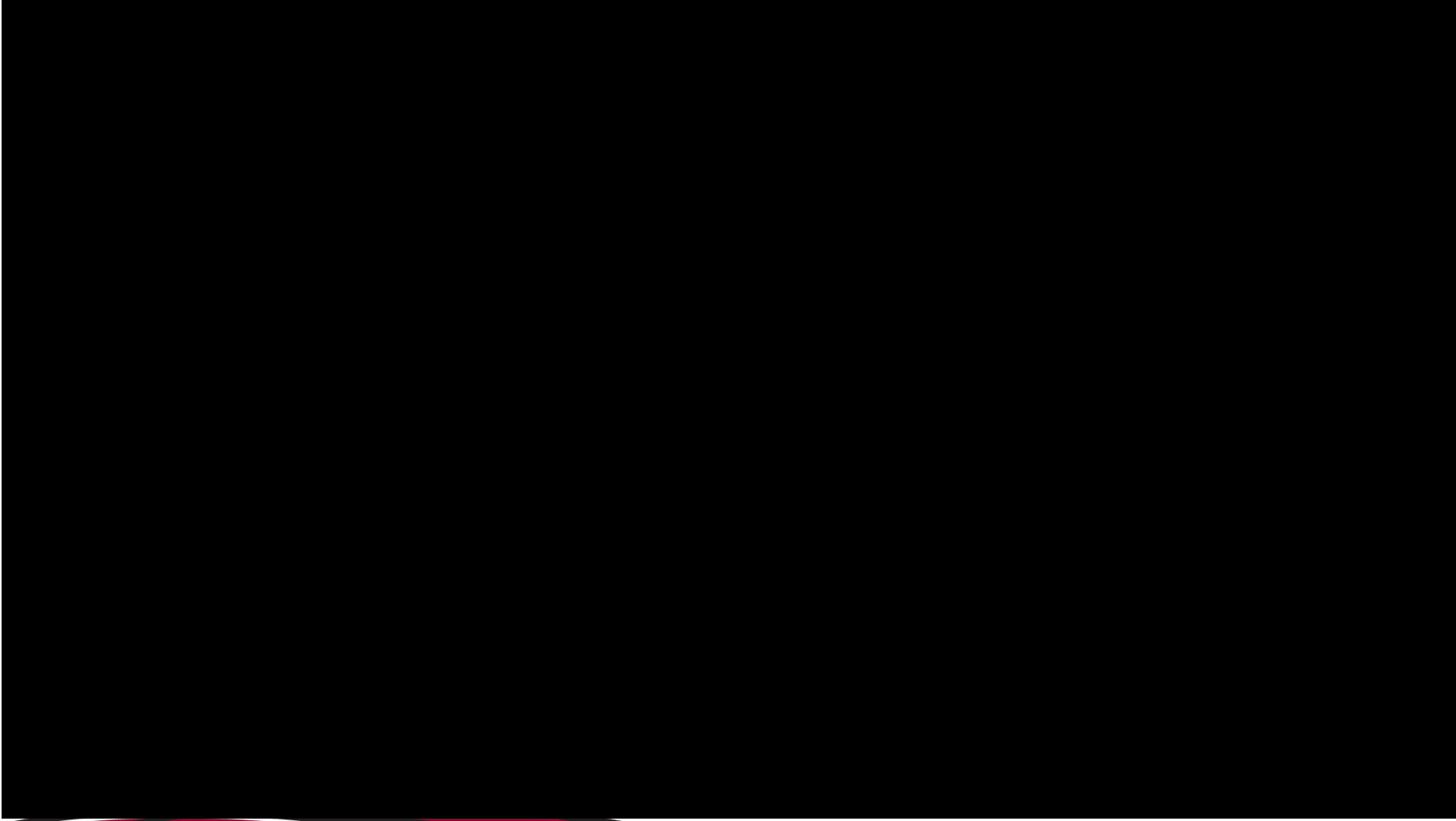


30 years of research in 15 minutes  
What could go wrong?



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# What could go wrong?



# What could go right?



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# Some examples of what makes people/places vulnerable to hazards and disasters:

## Special needs populations

difficult to identify (infirm, transient) let alone measure; invariably left out of recovery efforts; often invisible in communities



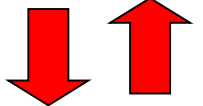
## Age (elderly and children)

affect mobility out of harm's way; need special care; more susceptible to harm



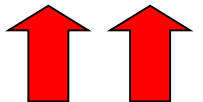
## Socioeconomic status (rich; poor)

ability to absorb losses and recover (insurance, social safety nets), but more material goods to lose



## Race and ethnicity (non-white; non-Anglo)

impose language and cultural barriers; affect access to post-disaster recovery funding; tend to occupy high hazard zones



## Gender (women)

gender-specific employment, lower wages, care-giving role



## Housing type and tenure (mobile homes, renters)



Heinz Center, 2002. *Human Links to Coastal Disasters*. Washington D.C.: The H. John Heinz III Center for Science, Economics and the Environment.





# Social Vulnerability in the Florida

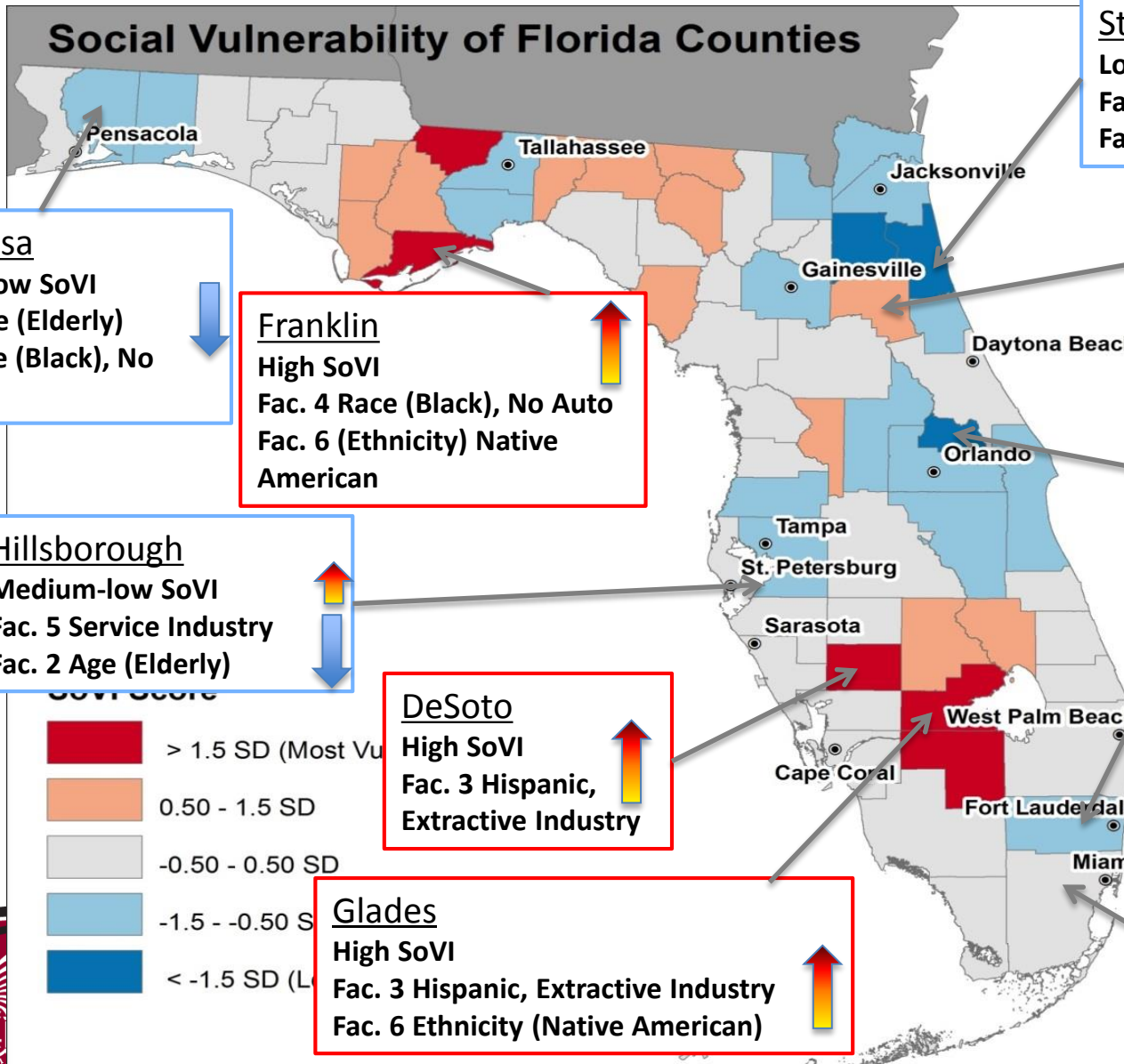
Component	Cardinality	Name	% Variance Explained	Dominant Variables	Component Loading
1	+	Race (Black) and Poverty	17.172	QBLACK	0.806
				QPOVTY	0.790
				QNOAUTO	0.724
				QFHH	0.669
				QRENTER	0.616
				QED12LES	0.554
				QSERV	0.548
				QFAM	-0.669
2	+	Age (Old)	14.148	QSSBEN	0.882
				QAGEDEP	0.834
				MEDAGE	0.768
				QCVLUN	0.656
3	-	Wealth	12.043	MDHSVAL	0.880
				QRICH200K	0.837
				PERCAP	0.722
				MDGRENT	0.553
4	+	Ethnicity (Hispanic)	8.456	QMOHO	-0.504
				QHISP	0.861
				QESL	0.681
				QED12LES	0.516
5	+	Gender (Female)	7.662	QFEMALE	0.762
				QFEMLBR	0.537
				QEXTRACT	-0.516
6	+	Retirement Communities	6.913	PPUNIT	-0.749
<b>Cumulative Variance Explained</b>			<b>66.394</b>		<b>0.806</b>

Component	Cardinality	Name	% Variance Explained	Dominant Variables	Component Loading
1	+	Race (Black) and Class (Poverty)	16.599	QFHH	0.863
				QBLACK	0.752
				QPOVTY	0.715
				QNOAUTO	0.615
				QCVLUN	0.612
				QED12LES	0.547
				QFAM	-0.837
2	-	Wealth	15.905	MEHSEVAL	0.891
				QRICH200K	0.854
				MDGRENT	0.850
				PERCAP	0.805
3	+	Age (Old)	13.196	QASIAN	0.681
				MEDAGE	0.889
				QAGEDEP	0.767
				QSSBEN	0.763
				QUNOCCHU	0.718
4	+	Ethnicity (Hispanic)	9.479	PPUNIT	-0.596
				QRENTER	-0.669
				QNOHLTH	0.744
				QHISP	0.725
				QEXTRACT	0.545
5	+	Nursing Home Residents	7.471	QED12LES	0.532
				QFEMLBR	-0.621
				QNRRES	0.666
6	+	Ethnicity (Native American)	5.042	HOSPTPC	0.643
				QATAM	0.892
7	+	Employment in Service Industries	4.809	QSERV	0.739
				QFHH	-0.660
<b>Cumulative Variance Explained</b>			<b>72.501</b>		<b>0.806</b>

29 total variables, populations < 1 excluded.



# Social Vulnerability in Florida



**Social Vulnerability of Florida Counties**

St. Johns  
 Low SoVI  
 Fac. 1 Lack of Wealth  
 Fac. 4 Race (Black) No Auto

Putnam  
 Medium-high SoVI  
 Fac. 1 Lack of Wealth  
 Fac. 4 Race (Black) No Auto

Seminole  
 Low SoVI  
 Fac. 5 Service Industry  
 Fac. 2 Age (Elderly)  
 Fac. 1 Wealth

Broward  
 Medium-low SoVI  
 Fac. 5 Service Industry  
 Fac. 1 Wealth

Miami-Dade  
 Medium SoVI  
 Fac. 3 Hispanic, Extractive Industry  
 Fac. 6 Ethnicity (Native American)  
 Fac. 1 Wealth

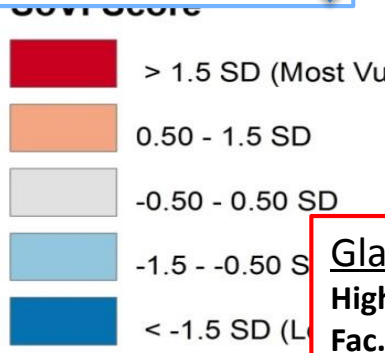
Santa Rosa  
 Medium-low SoVI  
 Fac. 2 Age (Elderly)  
 Fac. 4 Race (Black), No Auto

Franklin  
 High SoVI  
 Fac. 4 Race (Black), No Auto  
 Fac. 6 (Ethnicity) Native American

Hillsborough  
 Medium-low SoVI  
 Fac. 5 Service Industry  
 Fac. 2 Age (Elderly)

DeSoto  
 High SoVI  
 Fac. 3 Hispanic, Extractive Industry

Glades  
 High SoVI  
 Fac. 3 Hispanic, Extractive Industry  
 Fac. 6 Ethnicity (Native American)



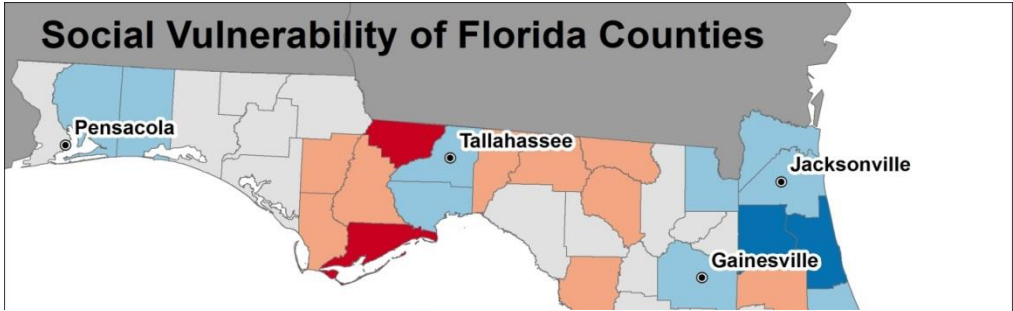
# How can SoVI inform you?

SoVI <sup>®</sup> Category	Characteristic	Alabama	Arkansas	Florida	Georgia	Kentucky	Louisiana	Mississippi	North Carolina	Tennessee	Virginia
High	Number of Counties	1	2	5	8	1	3	6	1	1	2
	Population (2010)	10,591	22,224	251,501	60,555	4,755	30,206	93,931	13,981	7,832	12,969
Medium-high	Number of Counties	7	21	19	33	22	20	17	17	4	20
	Population (2010)	138,326	340,658	3,249,709	570,585	343,498	853,635	328,666	525,446	55,690	535,626
Medium	Number of Counties	35	44	33	70	67	29	47	47	61	49
	Population (2010)	1,696,717	1,377,372	11,691,218	2,704,347	1,684,847	2,227,347	1,747,021	2,733,645	2,158,905	1,480,249
Medium-low	Number of Counties	23	8	9	33	26	8	9	30	25	35
	Population (2010)	2,739,017	1,175,664	3,418,017	3,456,711	2,031,400	900,423	399,607	4,838,334	3,524,794	1,534,734
Low	Number of Counties	1	0	1	15	4	4	3	5	4	28
	Population (2010)	195,085	-	190,865	2,895,455	274,867	521,761	398,072	1,424,077	598,884	4,437,446

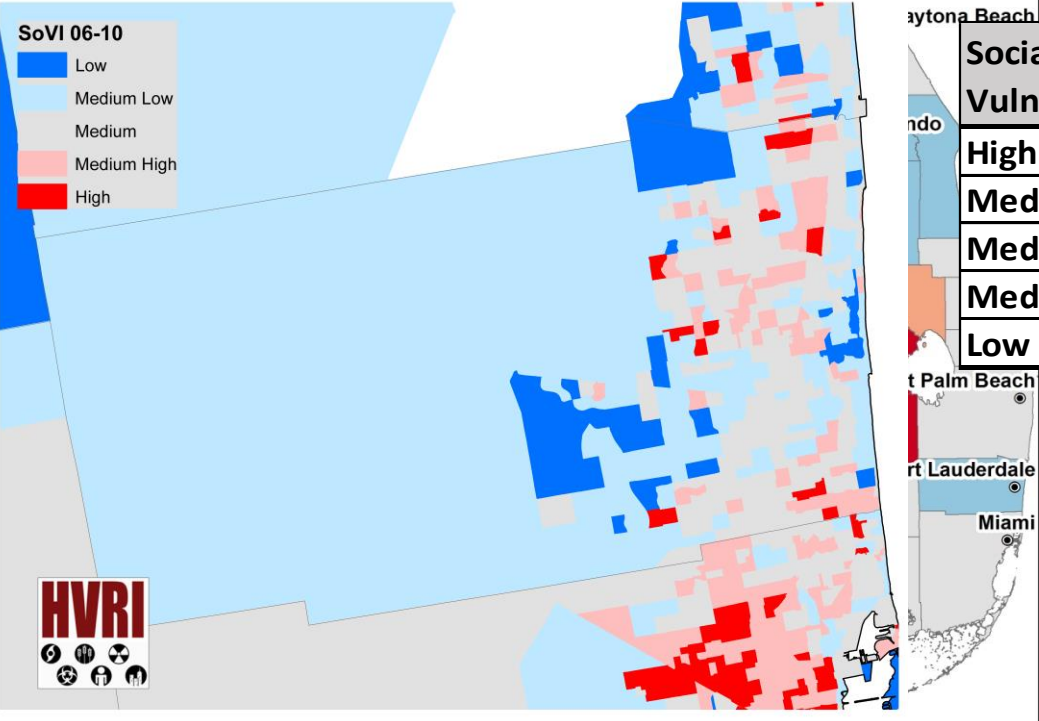
- How does your state/citizenry measure up?
- Do you have more counties characterized by 'high' vulnerability than 'low' vulnerability?
- What percentage of your total population resides in a vulnerable county?
- Are your socially vulnerable places coincident with hazardous places?



# Social Vulnerability for Florida



Just because a county is characterized by one level of vulnerability does not mean that all parts of the said county exhibit the same characteristics.



Social Vulnerability	Tract Count	Housing Units	2010 Population
High	14	49,476	65,980
Medium High	62	140,578	261,646
Medium	152	339,128	747,580
Medium Low	103	216,956	512,144
Low	30	64,250	160,716

Zooming in or downscaling enables a more comprehensive understanding of the driving forces of vulnerability

# What we know about SoVI

- SoVI is
  - Utilized at many levels of intervention from local to national
  - Scalable
  - Replicable
  - Not without issues and challenges

Using Science for  
Disaster Risk Reduction

REPORT OF THE UNISDR SCIENTIFIC AND  
TECHNICAL ADVISORY GROUP – 2013

IWR White Paper



Social Vulnerability Analysis: A  
Comparison of Tools

How Can Social Science Data Help Me?

*Using Social Science Data and Tools*

Home

What

How

Get It



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# What SoVI is not

- It is not an absolute value
  - A SoVI score of 10 is not twice as vulnerable as a SoVI score of 5
- **Resilience**
  - SoVI is not the other side of the coin
  - Resilience metrics for the US are available
  - A great story can be told when coupling SoVI, Resilience, and hazard zones



# Medical Vulnerability in Florida

The medical vulnerability index (MedVI) illustrates pre-event baseline health surveillance conditions among places.

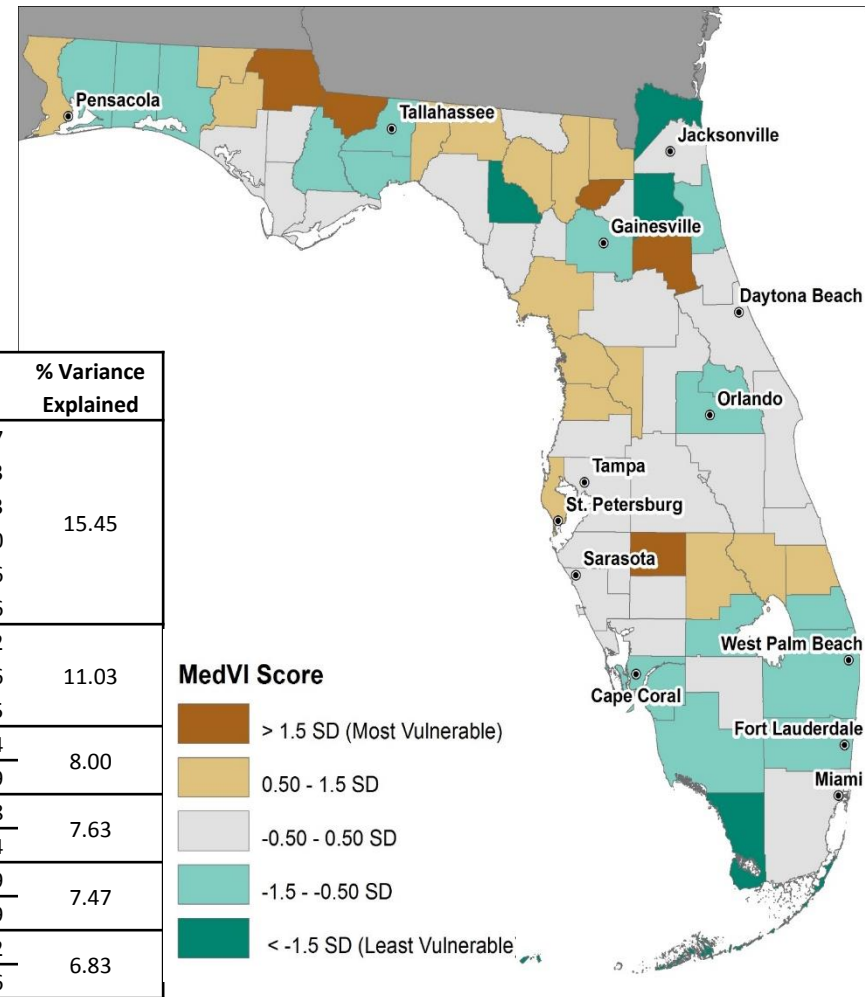
The health disparities of place (or medical vulnerability) complements current approaches in the social determinants of health by measuring and comparing the spatial interaction of social traits, health needs, and healthcare access.

Four general categories of medical vulnerability data were identified including physical medical needs, psychological medical needs, social medical needs, and healthcare access.

Concept	Description	Increases (+), or Decreases (-) Vulnerability
<b>Physical health needs</b>	Individuals dependent on the public healthcare system for medication, medical treatments, equipment, or supervision from skilled medical professionals to maintain quality of health and life. Examples include chronic illness, communicable diseases, physical disability or immobility.	Extensive physical health needs of the individuals within a community (+)
<b>Psychological health needs</b>	Individuals with psychological or psychosomatic disorders, or having mental limitations that often require medical consideration including medication, therapy, supervision, and in some acute cases institutionalization. Conditions are not limited to depression and mental illness, but also drug/alcohol addiction, and mental retardation.	Extensive psychological health needs of the individuals within a community (+)
<b>Social health needs (Domestic violence, homelessness)</b>	Physical, mental or behavioral health issues materialized in direct response to social distress. Examples include homelessness or domestic abuse.	Poor social health within a community (+)
<b>Healthcare access</b>	Individuals or communities with limited access to healthcare resources, either through direct local scarcity of healthcare providers, or through financial proxies such as insurance status.	Increased access (-), decreased access (+)





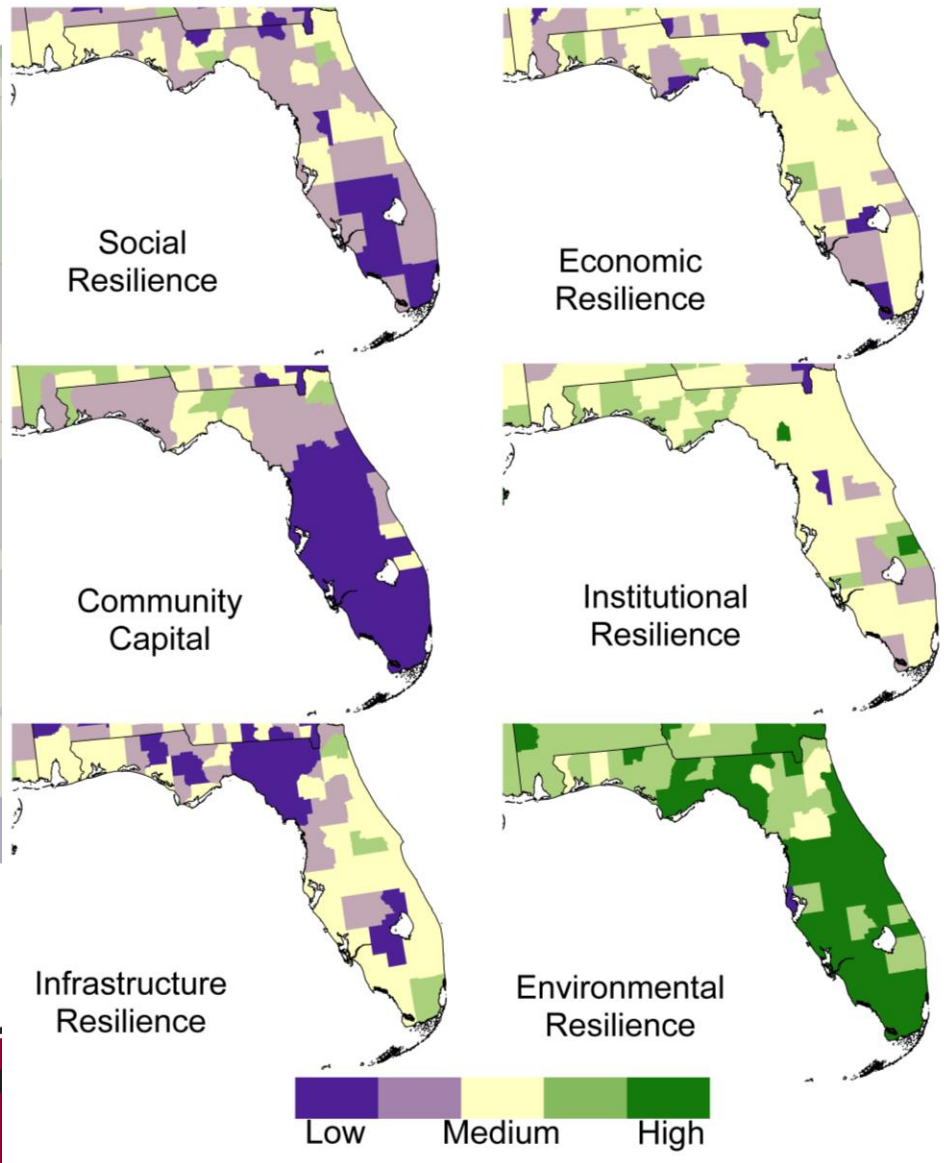


Component	Cardinality	Description	Dominant Variables	Component Loading	% Variance Explained
1	+	Low Perception of Health, Diminished Healthcare Access, Preexisting Conditions	QLOWHLTH	0.877	15.45
			PHYSICIAN_RATE	-0.853	
			QUNINSURED	0.763	
			QMEDICAID	0.600	
			QHYPERTENS	0.566	
		QDIABETES	0.516		
2	+	Disability and Oxygen Dependence	QO2	0.912	11.03
			QDISABLED	0.896	
			QHEART	0.665	
3	+	Chronic Disease	CANCER_RATE	0.914	8.00
			QDIALYSIS	0.879	
4	+	Mental and Emotional Illness	QMENTILL	0.858	7.63
			QDIST_CHD	0.784	
5	+	Specialized Care	SPEC_NEED_FAC_PC	0.849	7.47
			QALZHEIM	0.659	
6	+	Medical Care Dependence	QCMS	0.792	6.83
			QDEV_DIS	0.636	
7	+	Nursing Home Residents	QNRRES	0.727	6.69
8	+	Low Birth Weight Babies	QLBW	0.812	6.19
9	-	Emergency care access	EMS_RATE	0.854	5.09
			DVIOL_PC	-0.634	
<b>Total Variance Explained</b>					<b>74.37</b>





# Community Disaster Resilience



Composite of six broad categories influencing community disaster resilience

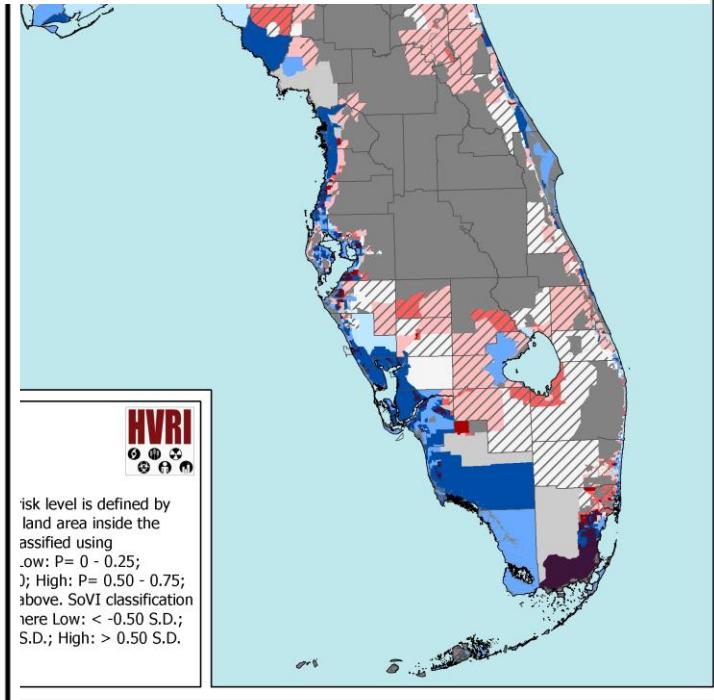
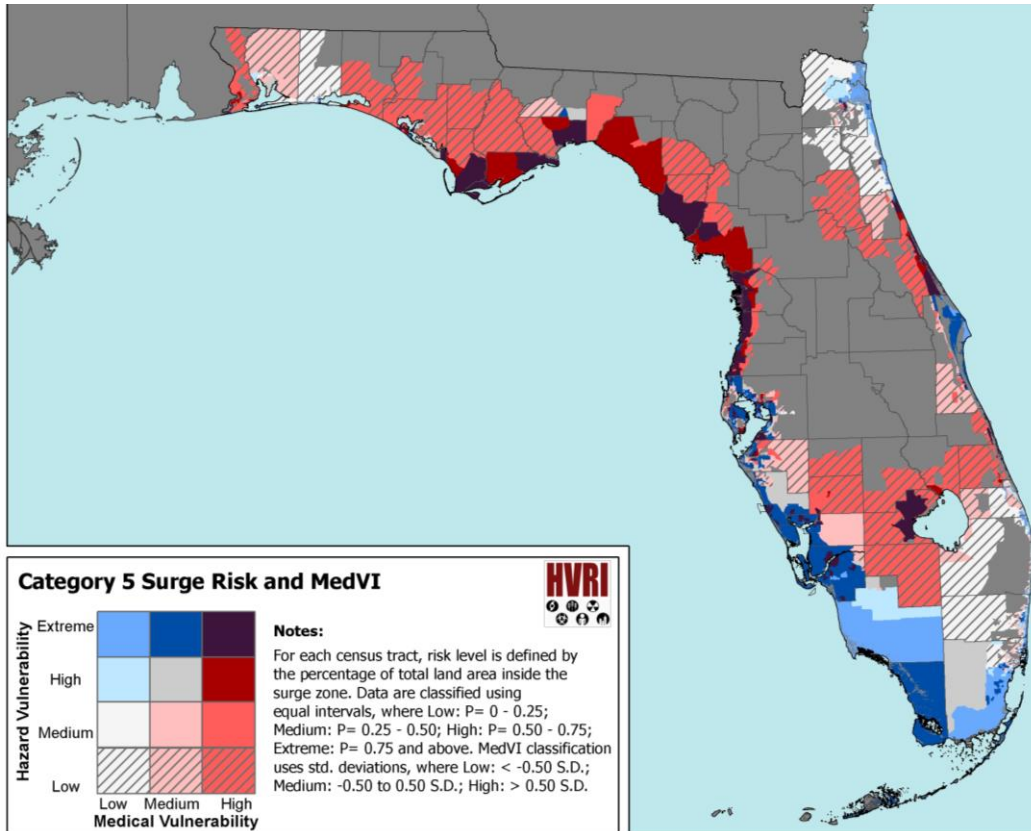
- Social
- Economic
- Community Capital
- Institutional
- Infrastructure
- Environmental

*Not the resilience of each of category but how these characteristics influence overall community resilience*

# SoVI + MedVI + Hazards = Resilience Opp.

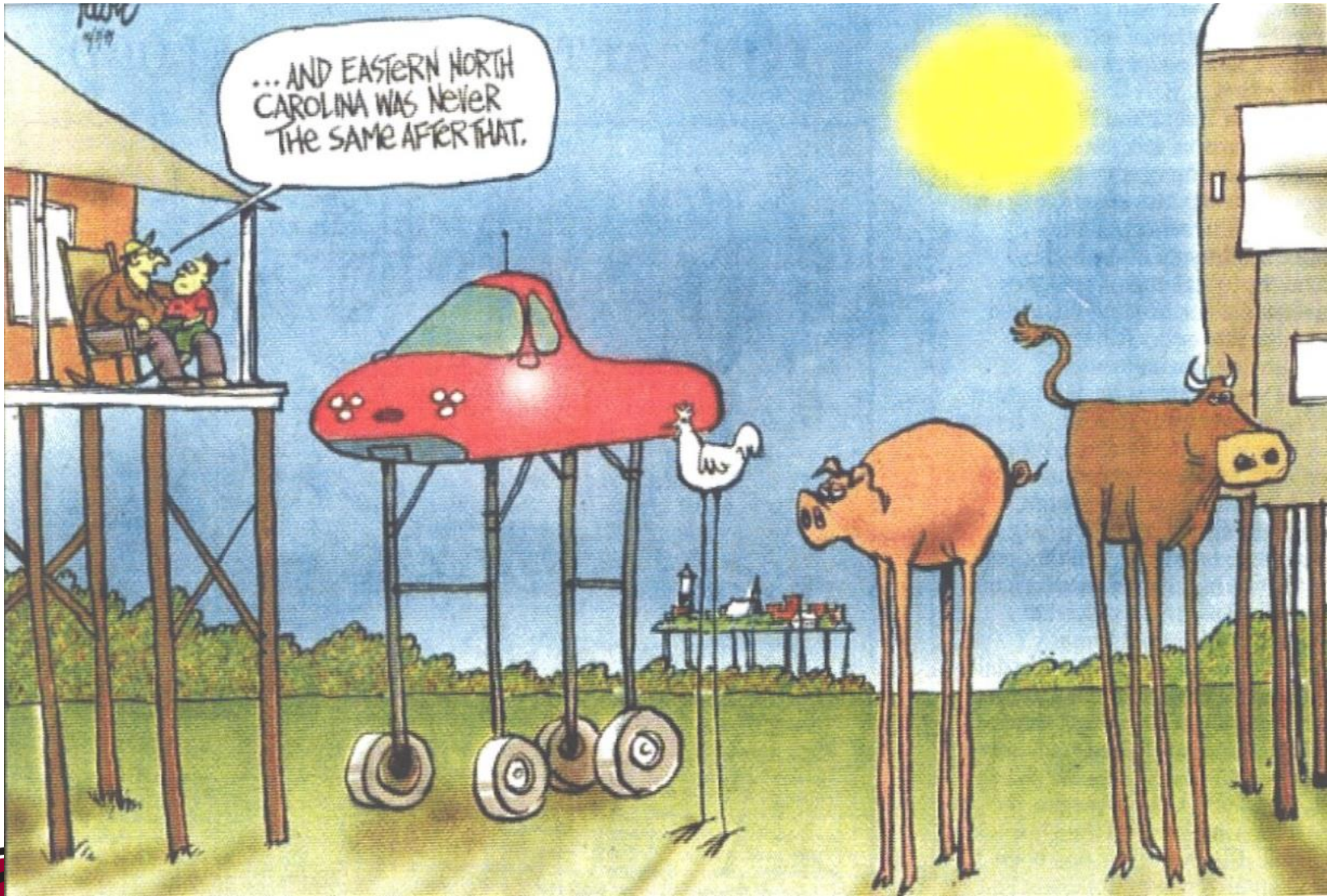
Broward

Cat 5 Surge Risk	Extreme Category 5 Surge Risk																	
	Count									Pop								
	48									175,493								
SoVI	High SoVI						Medium SoVI						Low SoVI					
	Count			Pop			Count			Pop			Count			Pop		
	5			19,173			9			42,904			34			113,416		
MedVI	High MedVI		Medium MedVI		Low MedVI		High MedVI		Medium MedVI		Low MedVI		High MedVI		Medium MedVI		Low MedVI	
	Count	Pop	Count	Pop	Count	Pop	Count	Pop	Count	Pop	Count	Pop	Count	Pop	Count	Pop	Count	Pop
	-	-	4	16,075	1	3,098	-	-	4	20,316	5	22,588	-	-	5	27,064	29	86,352





# Florida is not North Carolina



# Contact Information

SoVI – [www.sovius.org](http://www.sovius.org)

SHELDUS – [www.sheldus.org](http://www.sheldus.org)

BRIC –

[http://webra.cas.sc.edu/hvri/research/drrc\\_resilience.aspx](http://webra.cas.sc.edu/hvri/research/drrc_resilience.aspx)

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