Reducing Vulnerability to Extreme Heat: Science-Policy Interface

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Science-Policy Interface

- Scientific goal: understand and characterize current and future vulnerability of urban population to extreme heat
 - Advance vulnerability methods
 - Improve datasets and models
 - Explore interactions among environmental, social and behavioral elements
- Decision making goal: *reduce* negative outcomes
 - Land use, policy and regulations
 - Public health interventions
 - Education and communication
- SIMMER strategy: solution-oriented research that informs policy
 - Usable science "a science that meets the changing needs of decision makers" (Dilling et al. 2011)





Integrating complex heat-health information for decision makers

Framework

 Create shared vision, outline possible courses of action or to present a preferred approach

Methods and data

Does scale of analysis match scale of decisionmaking?

*Tools

Simple representation of complex problems

Actions

Short-term and long-term

SIMMER conceptual framework



Wilhelmi and Hayden (2010, ERL)

Data and scales

							Sens	itivity				
	Exposure			Observed (Census)								
Climate Change			Modeled and Observed			Demographic and socio-	Census block	2000 2005	Adaptation and response Modeled and			
Modeled (CCSM)			(HRDAS, MODIS, NUDAPT, Parce <u>ls)</u>				economic	group				
Temp. Humidity Wind Padiation	1/8°	1990- 2009	Tem Hum Radi	p. iidity ation		1990-2009 Half-hour	Adaptive	capac	ity	Ob Urban planning	serv	ed 2013- 2040
Heat indices	City- scale	2040- 2065 Daily	Wind Heat Surfa	d indices ace	1 km	Daily, 8 day composite	Observed (Survey, Parcels)			Heat warning	City and	daily
			Temp				KAP Household	Points 2	2011	Programs	local	seasonal
			Build prop	ding erties	Parcels 250 m	2010	Resources Social capital Programs	Parcols	2010	Outreach		ong.
						Hoolth o		Faiceis	2010			
					Observ	ved (Heal	th and Fire d	ept)		1		
Mortality I				y ICD-9; I	CD-10)	Points	1999-200 Daily	6				
Heat distress 911 calls					2007-201 Time stan	0 np						

Data and Knowledge Integration









What are the next steps?

Houston stakeholder survey: Describe how you think the vulnerability to health risks from extreme heat may decrease in the future



- Decreased urban heat island effect due to urban planning
- Improvements in housing infrastructure
- Improvements in preparedness and response capacity
- Community-based adaptation (e.g.community centers, cooling centers)
 Don't know
- 60 percent of survey respondents highlighted non-structural ways for reducing urban vulnerability to extreme heat

Stakeholder workshop

- ✤ August 29th, 2013 Rice University, Houston, TX
- 40 attendees represented diverse organizations in public and private sectors, NGOs, and academia
 - HDHHS, Harris county (Dept. Health, Emergency Management, Agency on Ageing), H-GAC, NWS, broadcast meteorologists, transportation, housing and energy management

Workshop goals

- Present SIMMER results
- Identify next steps in reducing future impacts from extreme heat
- Promote coordination and collaborations



Specific gaps and activities

Cooling Centers

Advertise. Expand services. Provide transportation.

Heat Advisories, Products and Services

Thresholds. Sub-urban scale. Include public health messaging

Public Education / Effective Communication and Messaging

 Early in the season. Multi-media. Heat awareness day. Incorporate heat into multi-hazard preparedness communication

✤ Research

Integration of SIMMER with forecasting. Air pollution & heat. Climate change scenarios. Acclimatization

Policy

Weatherization. Utility subsidies. Reduce UHI. Roofs. Community cohesion.

Collaboration and coordination of activities

 NWS and HDHHS, EMS, media, community service organizations. Heat champion is needed.

GIS tool: common data sharing platform

Work in progress





Interactive web-based GIS tool

 Risk of heat-related mortality is linked with vulnerability indicators and response / adaptation options

Data exploration and visualization (1)



Data exploration and visualization (2)



Data exploration and visualization (3)



Data exploration and visualization (1)



Zoom to Get Directions Edit

Data exploration and visualization (4)



Data exploration and visualization (5)

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Contents	Cooling_Stations:Looscan
Cooling Centers	This Cooling Station is located at 2510 WILLOWICK RD, 77027.
V Heat Mortality Relative Risk	This cooling station is a
0.08 - 0.40	Libraries.
0.41 - 0.90	It is open during the following
0.91 - 1.10	times : M 10-8 • T 10-6 • W 10-6 • Th 12-8 • F 12-6 • Sa
1.11 - 2.20	10-6
2,21 - 5.00	
5.01 - 7.90	Cooling Station Image
Percent Impervious Surface	
Distance to Cooling Centers	
Heat - Nighttime Warmest	
Temperature	
24.21 - 24.60	
24.6 - 24.83	
24.83 - 24.97	Zoom to Get Directions Edit
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25.1 - 25.22	
25.22 - 25.32	
25.32 - 25.45	
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Data query application

Query Map

Filter the layer by specifying values.		
Heat Mortality Relative Risk All of the following expressions must be true. Percent 0.1 African American (enter a number between 0 - 100)	Jersey Village	
Percent 0.1 disabled (enter a number between 0 - 100) Percent 0.1 poverty (enter a number between 0 - 100) Apply	Chennel view Chennel view Chennel view	IF. BORN
	Pasadena Deer Park	
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Data query application (2)

Query Map

Filter the layer by specifying values. Heat Mortality Relative Risk	=	1
All of the following expressions must be true. Percent African		
American (enter a number between 0 - 100) Percent 0 disabled		
(enter a number between 0 - 100) Percent 40 poverty (enter a number between 0 - 100)	Hilshire Village	
Apply	Spring Valley Hunters Creek Village Bunker Hill Village	Jacinto City
	Piney Point Village	Galena Parl
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		South Hous
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Current and future heat risk

Heat Mortality Relative Risk Slider

SIMMER



resho

Pearland

Interactive "slider" allows to compare current and future heat risks

esri

Kemah

Friends NPS, Esri, DeLorme, TAVTEO, USGS, USDA, EPA, NGA

Current and future heat risk (2)

Heat Mortality Relative Risk Slider

SIMMER

esri



Interactive "slider" allows to compare current and future heat risks

Thank you!

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