

# WAS\*IS

CULTURE CHANGE

weather & society \* integrated studies

[www.sip.ucar.edu/wasis/](http://www.sip.ucar.edu/wasis/)



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Changing from what **WAS** to what **IS**  
the future of integrated weather studies

## Eve Gruntfest

## University of Colorado Colorado Springs

## University of Texas San Antonio

## 11/02/2007

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# Today's talk

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- Not focusing mostly on research findings on flash flood warnings
- Focusing on **WAS\*IS**  
Weather and Society  
Integrated Studies
  - What it is
  - What we are doing
  - Possible future activities



(Lisa Krantz, *San Antonio Express-News/AP Photo*, June 29, 2007)

# Eve's background - applied geographer

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UCCS Geography  
Professor since  
1980

Social scientist  
in world of  
engineers &  
physical  
scientists



Focus on flash floods & warning systems

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# The Big Thompson Flood - July 31, 1976



140 lives lost - between  
Estes Park & Loveland

Studied the behaviors that  
night

- Who lived?
- Who died?
- Led to detection & response systems



*You can't outrun the flood  
in your CAR, climb to  
safety*

# The Big Thompson Flood

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New focus for next generation of policy makers & scientists involved in flood mitigation - especially in Colorado



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# What we know about warnings - Public response components

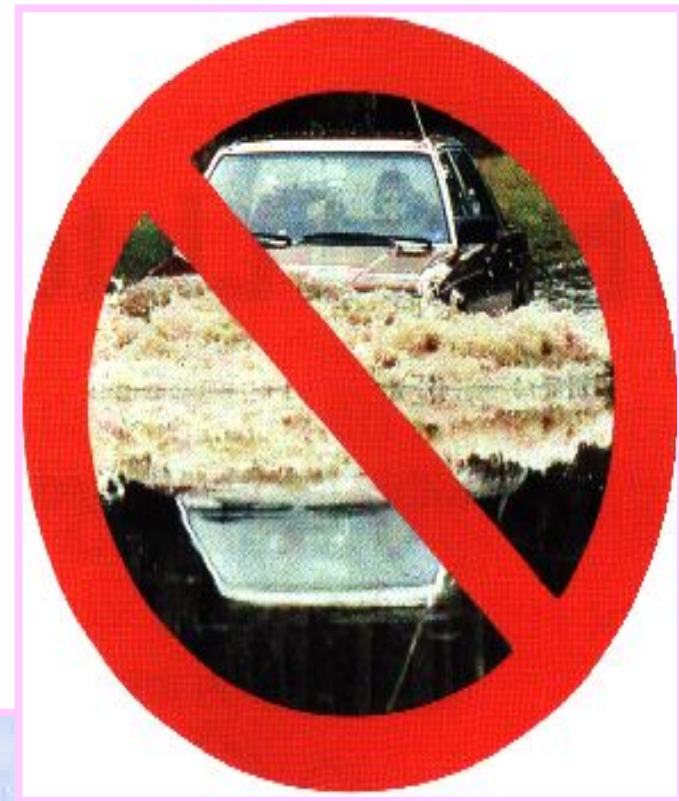
- Hear/receive
- Understand
- Believe
- Personalize
- Decide to act
- Respond



The warning process is complex

# How can we convince people that they're better wet than dead?

**CLIMB to SAFETY**



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# The vehicle issue...

Ad says: Warning: use the cup holders at your own risk



**JEEP GRAND CHEROKEE.  
STILL THE BEST INSURANCE POLICY OUT THERE.**



Better off wet  
than dead...

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**BOATS FLOAT  
CARS DON'T**



**REGIONAL  
FLOOD  
CONTROL  
DISTRICT**

**LOOK MOM,  
NO BRAINS.**



**REGIONAL  
FLOOD  
CONTROL  
DISTRICT**

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

455-3139

**RAINDROPS KEEP FALLIN'.  
USE YOUR HEAD.**



**REGIONAL  
FLOOD  
CONTROL  
DISTRICT**

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

455-3139

Innovative  
public  
education:  
Flash flood  
mitigation  
Las Vegas  
Billboards

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# Las Vegas Billboards - suggested by public

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# Youtube - watching driving behavior

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- <http://70.253.207.10/view/index.shtml>
- <http://youtube.com/watch?v=MIQrSH6LMgA>
- <http://webmail.uccs.edu/Redirect/vids.myspace.com/index.cfm?fuseaction=vids.individual&VideoID=18506760>

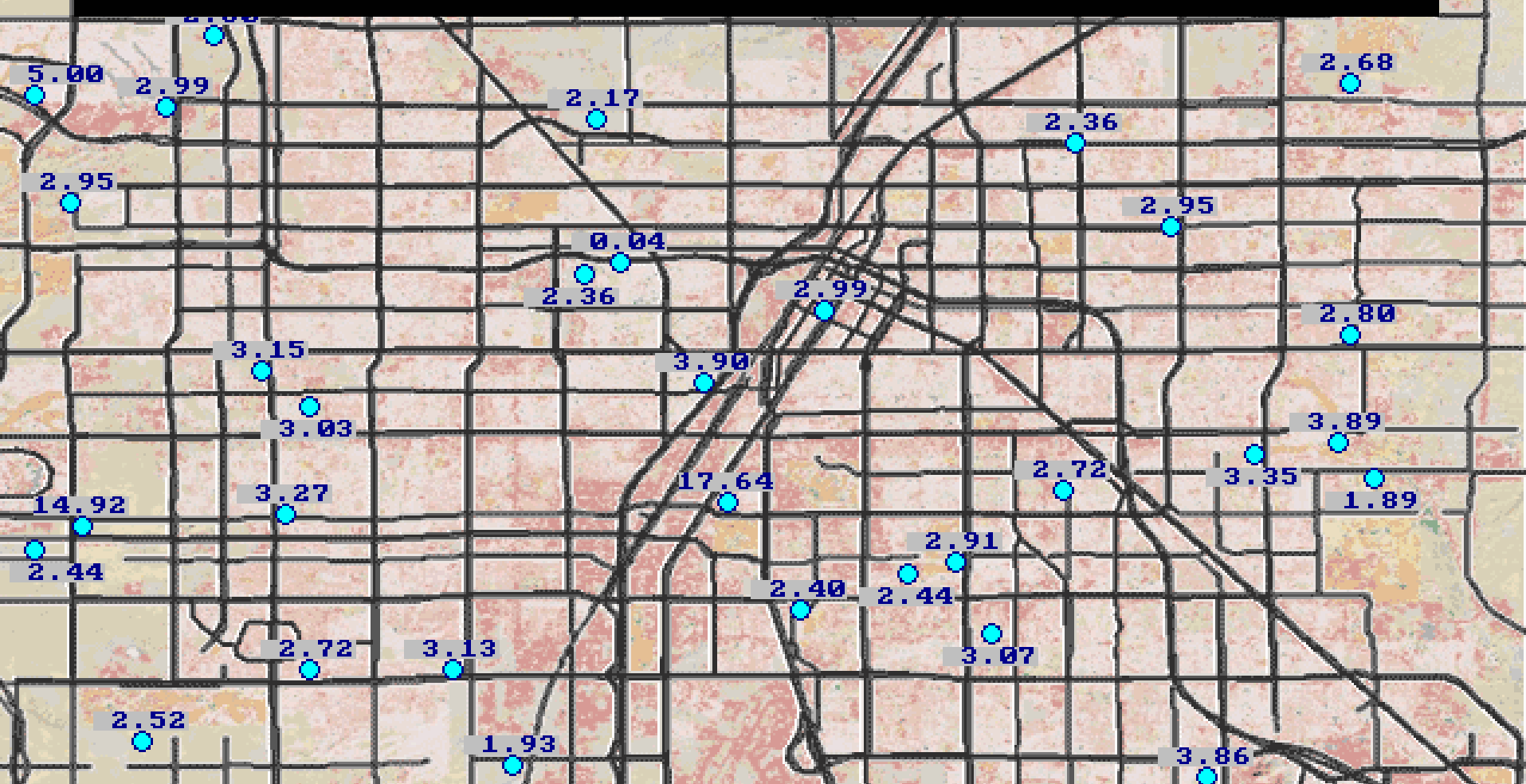


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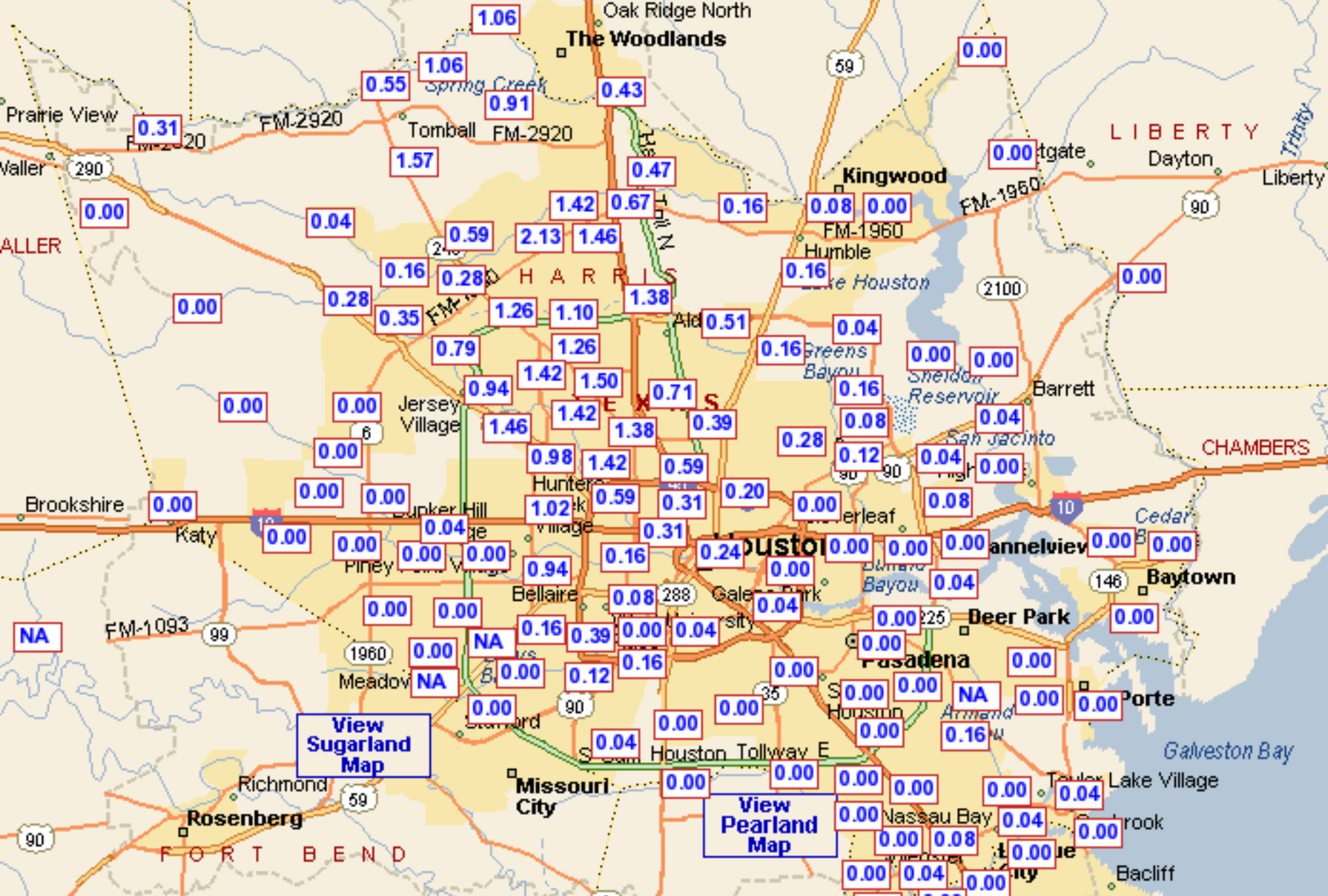
Rainfall totals for 1 year

May 6 2006 12:00

# Las Vegas, Nevada - real time rainfall map



**Central Las Vegas Valley  
Rainfall (inches)**



**Real time rainfall map for Harris County, Texas --Houston**

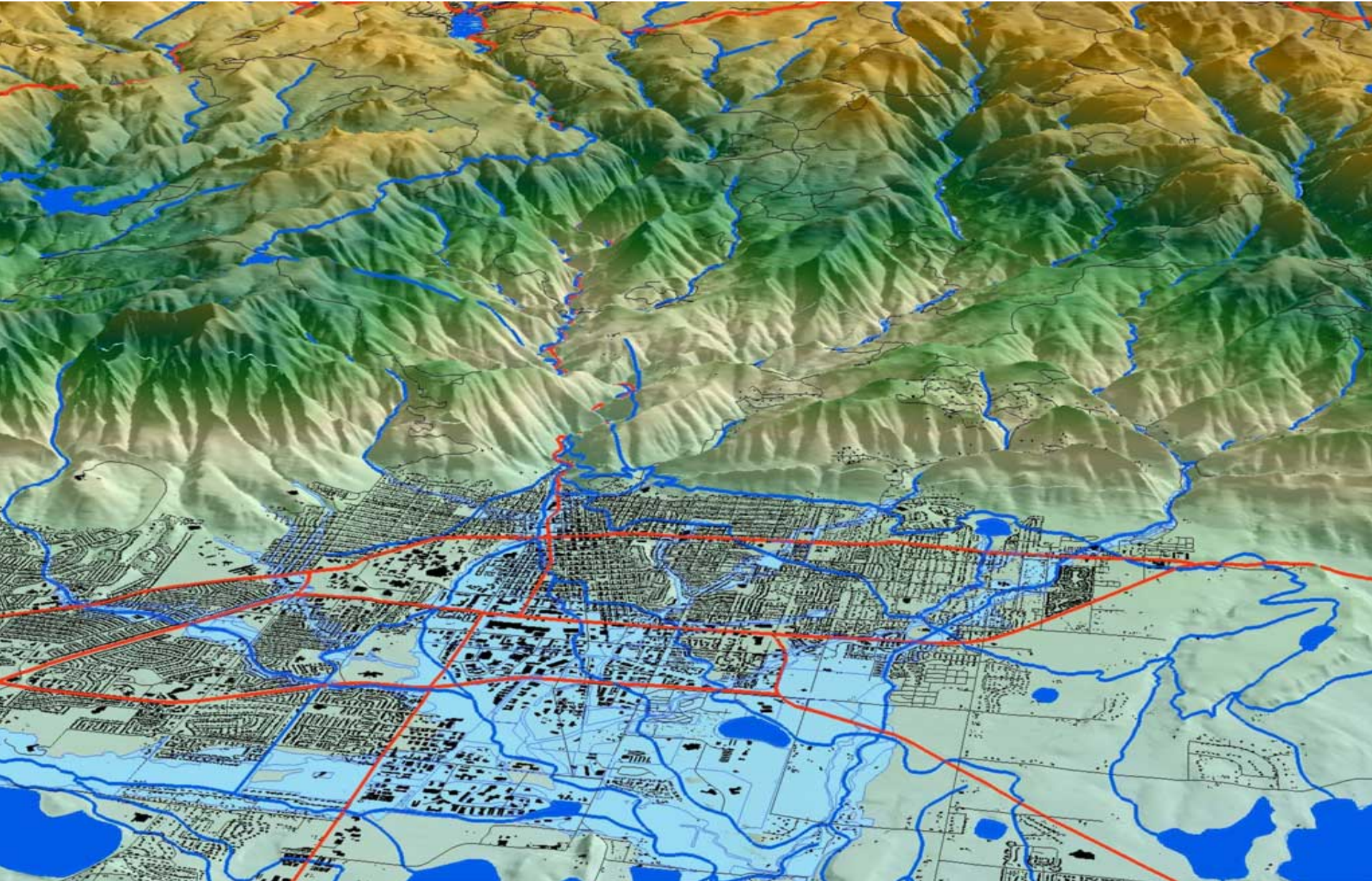
Early Warning ALERT System data comes from remote automatic sensors. The HC-OEM assumes

Dickinson San Leon  
 Dickinson Bayou

# For Internet users: Boulder, Colorado floodplains

## Beautiful graphics, so what?!

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# How do we address nuisance events vs catastrophic events? Height of the 1997 Fort Collins flash flood



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# Gruntfest looks back-- After 30 years of being

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- Frustrated at being a social science  
**ADD ON** with no enduring impacts
- Left out of major scientific initiatives



**Being encouraged but kept separate & unequal**

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# WAS \* IS addresses two persistent issues

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“I want to do work that integrates meteorology & hydrology & societal impacts BUT...

- I don't know how &
- I don't know anyone else who does this kind of work”

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New culture change initiative

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To change the weather enterprise by *comprehensively & sustainably* integrating social science into meteorological research & practice



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# What is **WAS\*IS**?

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1. Building an interdisciplinary community of practitioners, researchers, & stakeholders -  
- from the grassroots up --who are *dedicated to the integration of meteorology & social science* -  
Mostly early career folks!

Capacity building -- creating a community for lifelong collaboration & support!

# What is **WAS\*IS**?

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2. Providing opportunity to learn & examine *ideas, methods, & examples* related to integrated weather-society work

- **Tools** - GIS, surveys, qualitative methods
- **Concepts** - initiating & building relationships, many publics, end-to-end-to-end
- **Topics** - risk communication, communicating uncertainty, vulnerability

# Why **WAS** \***IS**?

Integrate (not add on)  
social science into meteorology?

Grow a community of  
people passionate  
about & dedicated to  
this?

Avoiding another Hurricane Katrina is  
NOT just about improving the weather  
forecasts

Recognize that  
(meteorology + social  
science)  
> sum of its parts!

Address societal  
impacts in real &  
sustained ways

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# The **WAS\*IS** movement - so far

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- Originally envisioned as only 1 workshop
- Have now been 5 workshops ... and counting!
  - Original 2-part Boulder WAS\*IS (Nov 2005 & Mar 2006)
  - Condensed 3-day **Norman** WAS\*IS (April 2006)
  - **2006 Summer** WAS\*IS (July 2006)
  - **Australia** WAS\*IS (January-February 2007)
  - **2007 Summer** WAS\*IS (July 2007)

**Now 145 WAS\*ISers**



# Opportunity to develop **WAS** \* **IS** concept & workshops

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**Support from**  
**US Weather Research Program**  
**The National Oceanic &**  
**Atmospheric Administration**  
**(NOAA)**



**Eve Gruntfest & Julie Demuth**  
**WAS \* IS** founders

**The National Center for Atmospheric Research**  
**Institute for the Study of Society & the Environment**  
**(ISSE) & the Societal Impacts Program (SIP)**  
**The University of Oklahoma, & Monash University**  
**Sustainability Institute, Australian Bureau of**  
**Meteorology, Emergency Management Australia & others**



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THE CHANGE IS UNDERWAY  
Recognizing **WAS\*ISers'** talent &  
research--this is just a small sample

Rebecca Morss - Atmospheric scientist at  
National Center for Atmospheric Research,  
Boulder *Bulletin of the  
American Meteorological Society*  
articles on problem definition &  
end-to-end-to-end process



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**End-to-End-to-End  
Researchers & Decision-Makers**

# Lindsey Barnes Grad student at U of South Carolina

## New conceptual model of false alarms & close calls

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in October 2007 *Weather & Forecasting*

Emphasis on social relevance rather than product performance -- *Provide what public needs/wants*

Unwarned Event		Perfect Warning		False Alarm
Warning was not issued but event occurred	Event occurred but was more severe than warning	Event followed warning as specified	Event occurred but was less severe than warning	Warning was issued but event did not occur
December 2004 Tsunami	Red River Flood 1997	1999 Oklahoma Tornadoes	Hurricanes Fran & Bertha	Connecticut False Evacuation

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# Olga Wilhelmi - Organizing spatial data in a GIS

The "G" in GIS = Geographic

Weather

Atmospheric  
Conditions

Population

Hydrology

Topography

Geology

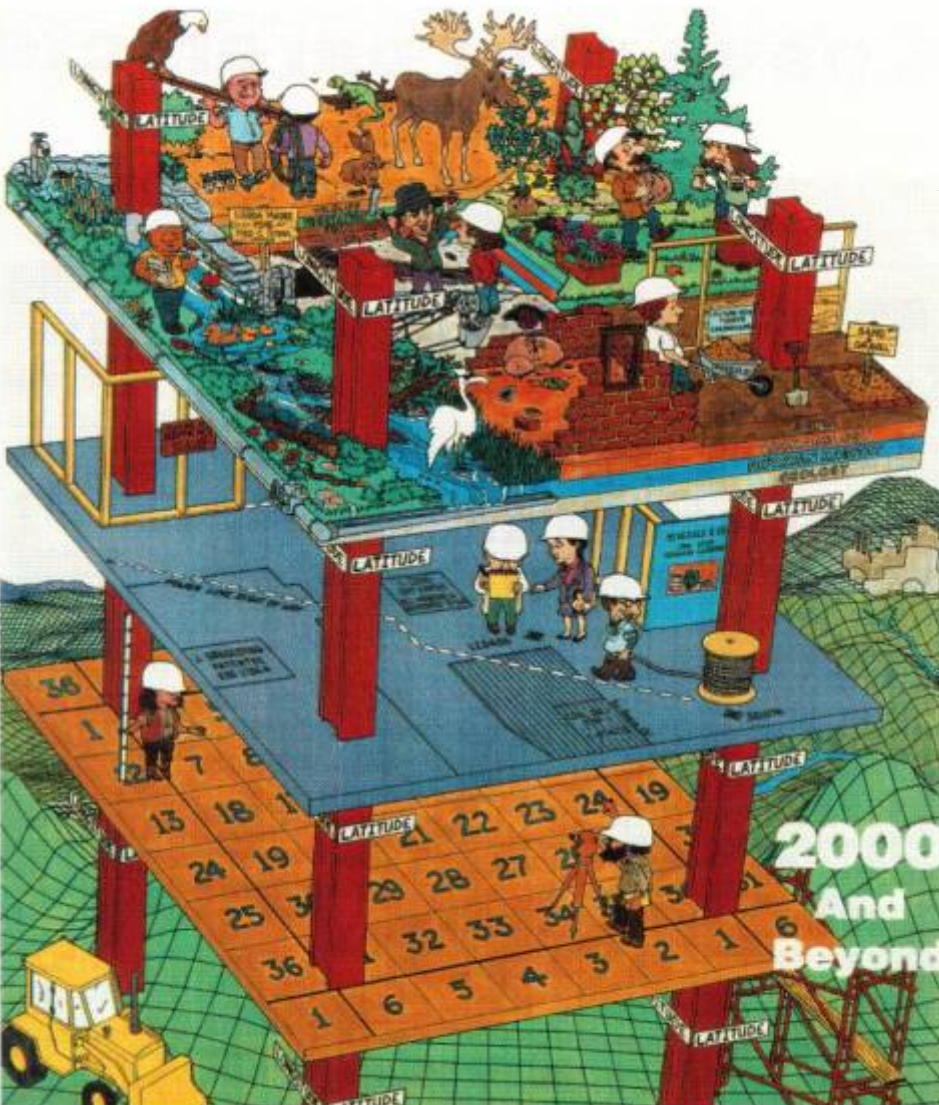
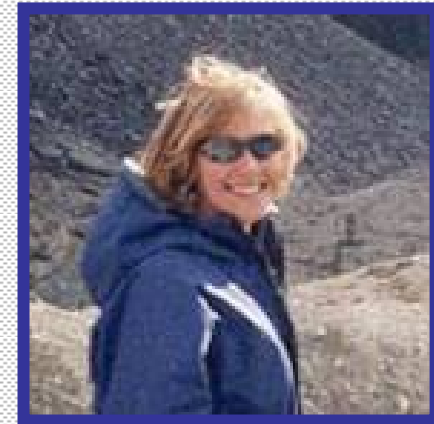


Image courtesy of ESRI (<http://www.esri.com>)

# Vulnerability assessment - physical & social

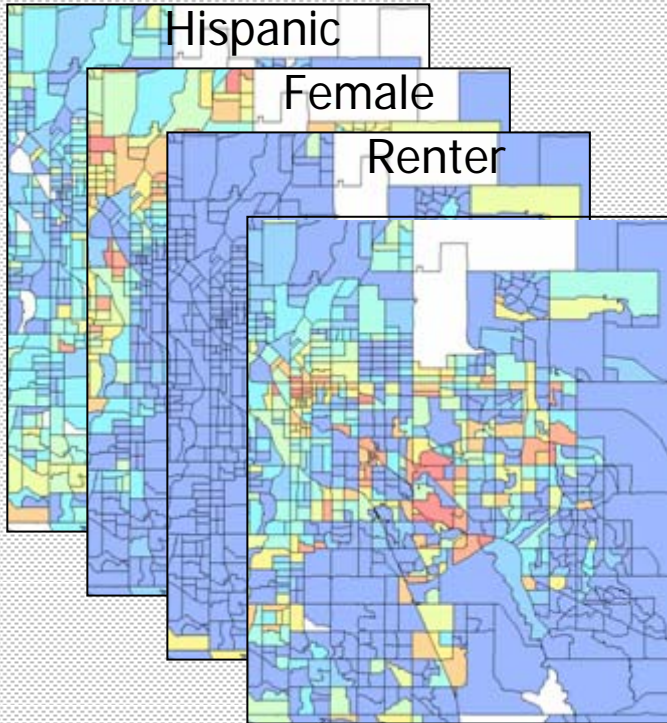
## Identify Vulnerability Factors

65\_up

Hispanic

Female

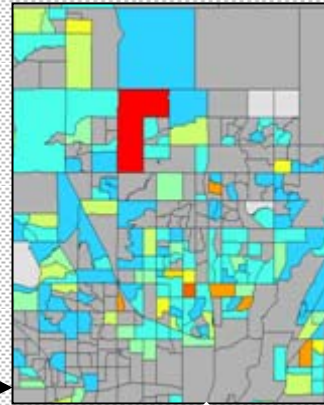
Renter



classification

weighting

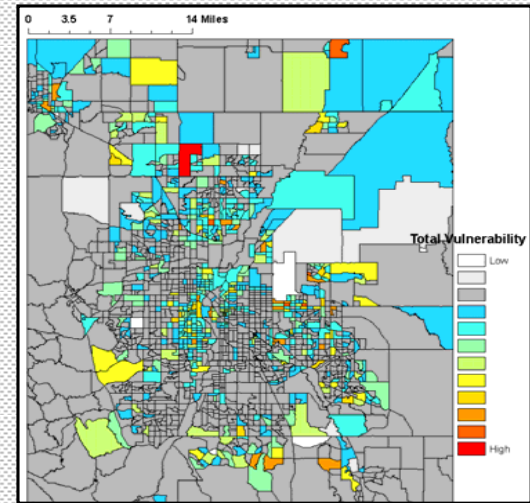
## Demographic vulnerability



## Critical Facilities



## Total Vulnerability

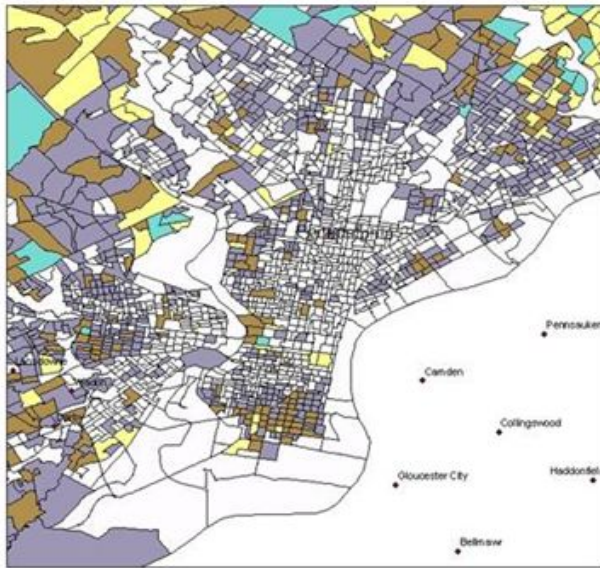


# Chris Uejio

- **Overlay analysis of mortality from July 1999 heat wave**
  - Reduced analysis of demographics, income, & biophysical predictors



1999 Philadelphia Heat Wave  
(Census Block Groups: Age > 65)



• Cities and Towns

AGE > 65

AGE\_65\_UP

0 - 100

101 - 201

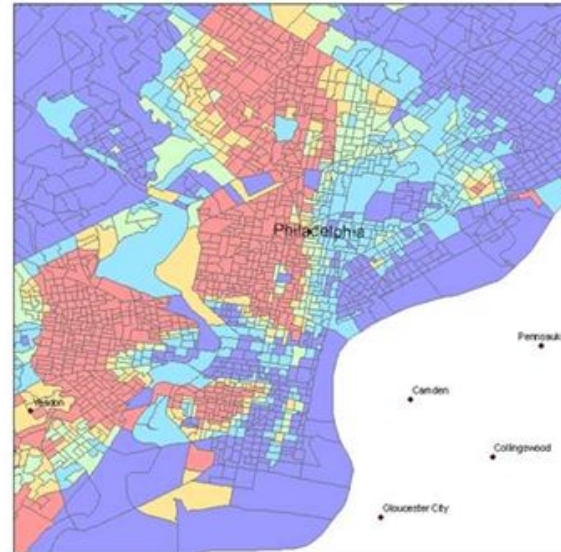
202 - 352

353 - 672

673 - 1400



1999 Philadelphia Heat Wave  
(Census Block Groups: Black Population Density) (Census Block Groups: Hispanic Population Density)



• Cities and Towns

Black Population Density

Per\_Black

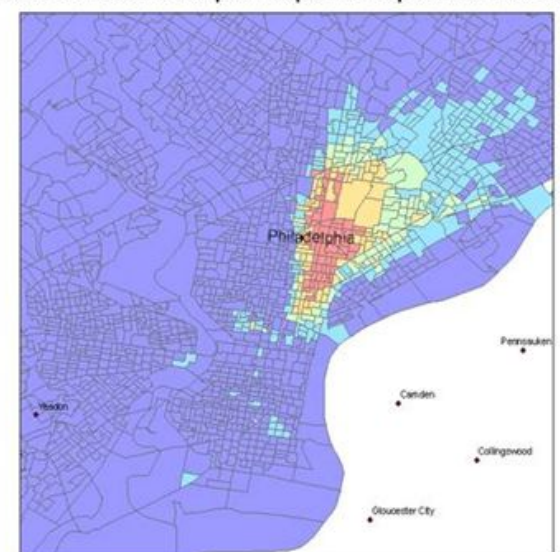
0 - 11

12 - 32

33 - 57

58 - 82

83 - 100



• Cities and Towns

Hispanic Population Density

Per\_Hisp

0 - 7

8 - 21

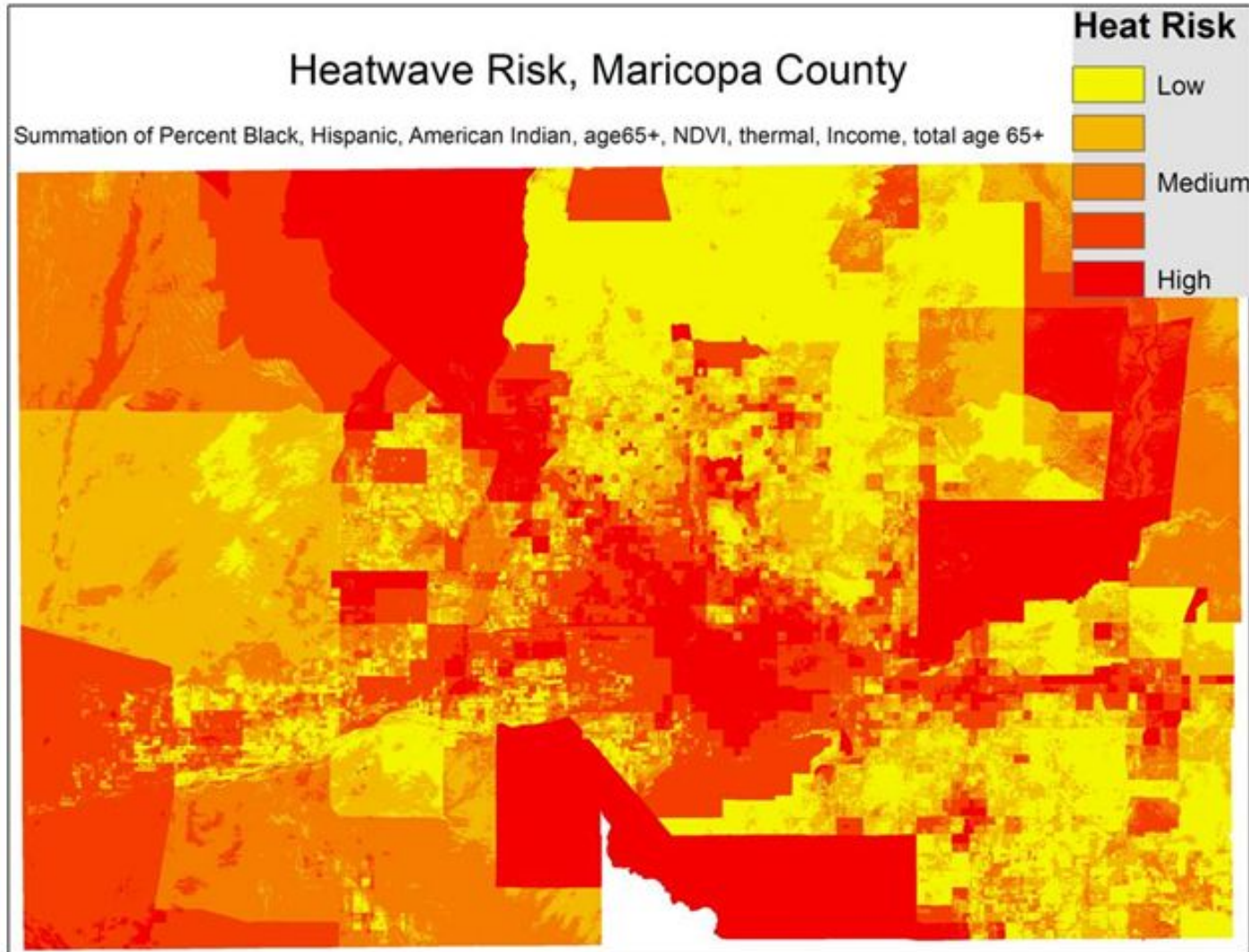
22 - 40

41 - 63

64 - 93



# Social vulnerability indices



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# Toward improved understanding of warnings for short-fuse weather events

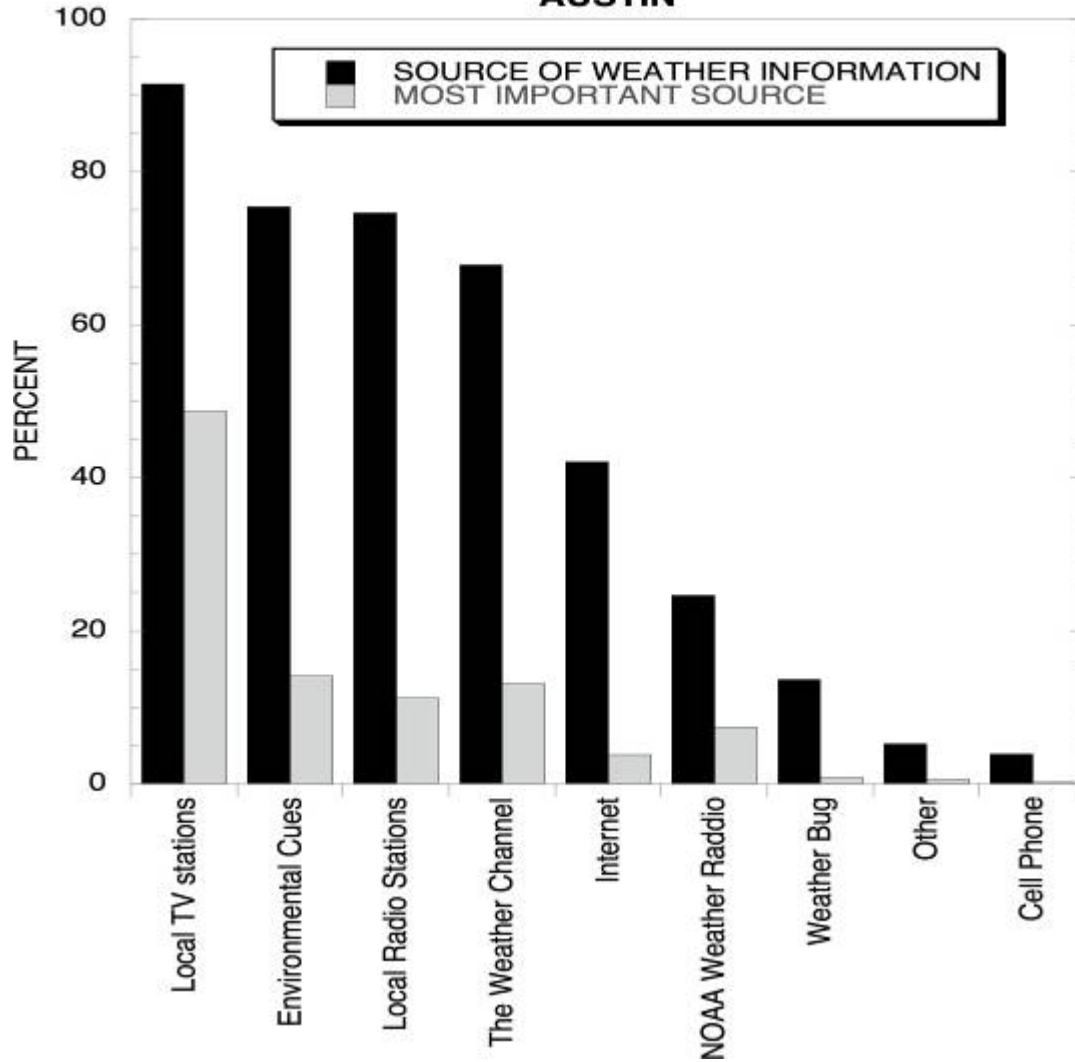
National Science Foundation funded study of perceptions in Austin, TX & Denver, CO incorporates **WAS** \* **IS** talent



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# Dave Schultz - Leading new efforts in perceptions of tornado warnings

SOURCES OF WEATHER INFORMATION:  
AUSTIN



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# Sheldon Drobot Formally trained as geographer & atmospheric scientist



Influence of weather & non-meteorological information on decision-making in hazardous driving situations

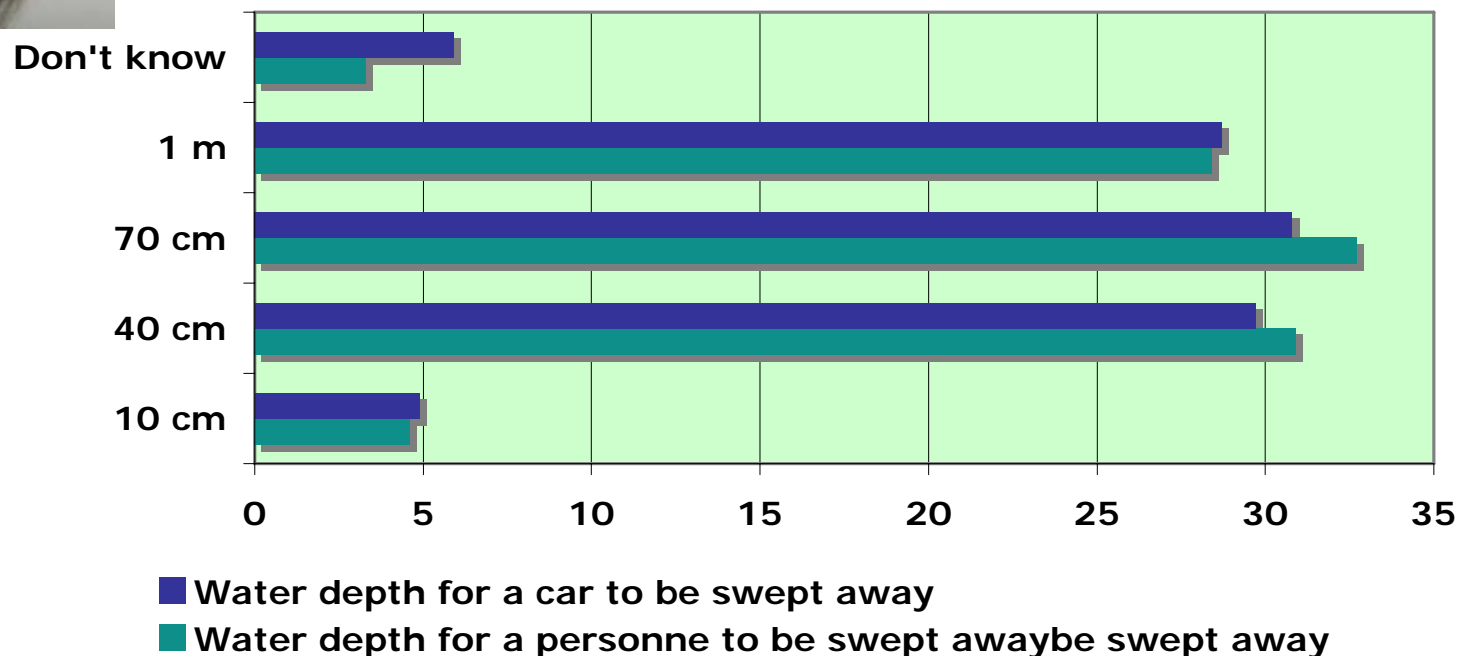
Preferences for in-car weather & roadway information



# Isabelle Ruin - Flash flood research & links between warnings & officials & publics - awarded National Center for Atmospheric Research Post-doc for 2008



Compared risk perception for car drivers and walkers



# Melissa Tuttle Carr & Kevin Barjenbruch

## WAS\*IS Partnership Initiative

Collaborations between the government  
& private sectors—WeatherBug,  
AccuWeather & The Weather Channel

Public will benefit  
by receiving  
better & more  
understandable  
weather  
information



# Randy Peppler - Leading efforts at U of Oklahoma in cultural studies of weather



**Dissertation topic:** Native American perceptions of weather information

Interdisciplinary doctoral committee

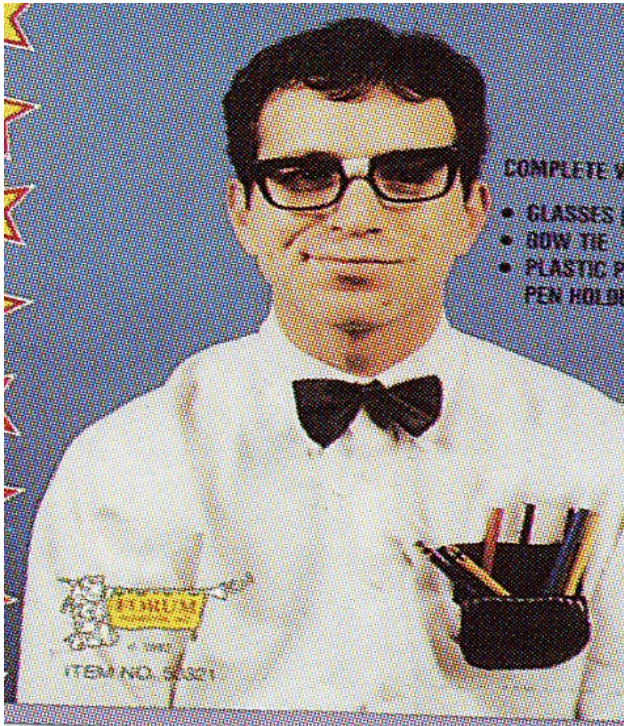
**Julie Demuth** - Leading efforts in  
how U.S. publics understand & use  
weather forecast uncertainty  
information



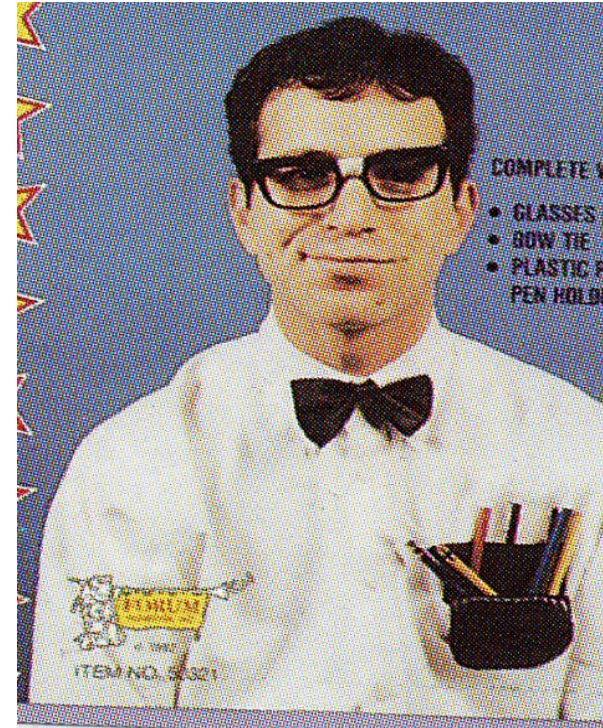
Working with economists & meteorologists

Overview of **WAS** \* **IS** manuscript in Nov 2007  
*Bulletin of the American Meteorological Society*

# WAS \* IS means changing from WAS to IS



**WAS** physical scientist  
goes to **WAS \* IS** workshop



Becomes **WAS** social scientist!

Moving from WAS to IS...is not an instant transition! WAS\*ISers realize the joys of CONNECTING WITH STAKEHOLDERS

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# Tangible accomplishments

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- **New collaborations**
- **Manuscripts to be published** November 2007 *Bulletin of the American Meteorological Society, Environmental Hazards, Weather & Forecasting*
- **Development of forecast confidence scale on weather blog ([www.capitalweather.com/](http://www.capitalweather.com/))**

The image shows a horizontal bar labeled 'FORECAST CONFIDENCE' with four colored segments: LOW (light green), MEDIUM (green), HIGH (yellow), and VERY HIGH (red). A blue vertical line is positioned at the boundary between the HIGH and VERY HIGH segments.
- **New jobs, invited presentations**
- **New courses - *Weather & Society***
- **Visibility -**
  - 18 presentations at American Meteorological Society Meeting 2007, more in 2008!
  - sessions at Association of American Geographers meeting, Chicago 2006, San Francisco 2007

# Some additional funding obtained

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- **WAS\*IS virtual textbook (Demuth, Drobot, Gruntfest)**
  - Highlight the methods, results, & cooperative efforts of successful integrated weather & social science projects

Use as

- (1) part of undergraduate graduate-level courses &
  - (2) a reference for scientists & practitioners to apply in their own work
- **First Advanced WAS \* IS - National Weather Service WAS \* ISer retreat to be held October 23-25, 2007 in Kansas City**

# Possibilities under the **WAS\*IS** Umbrella

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- More Advanced **WAS\*ISes**
- Facilitating career advancement for **WAS \* ISers**
- Moving from **WAS** to **IS** beyond weather to hydrology, engineering, emergency management, climate, & other fields
- Links between climate/weather work
- Capstone courses in physical science programs
- Annual **WAS \* IS** workshops
- **WAS\*IS** for introducing meteorology to social scientists - for stronger partnerships



© Dennis Flood 2001

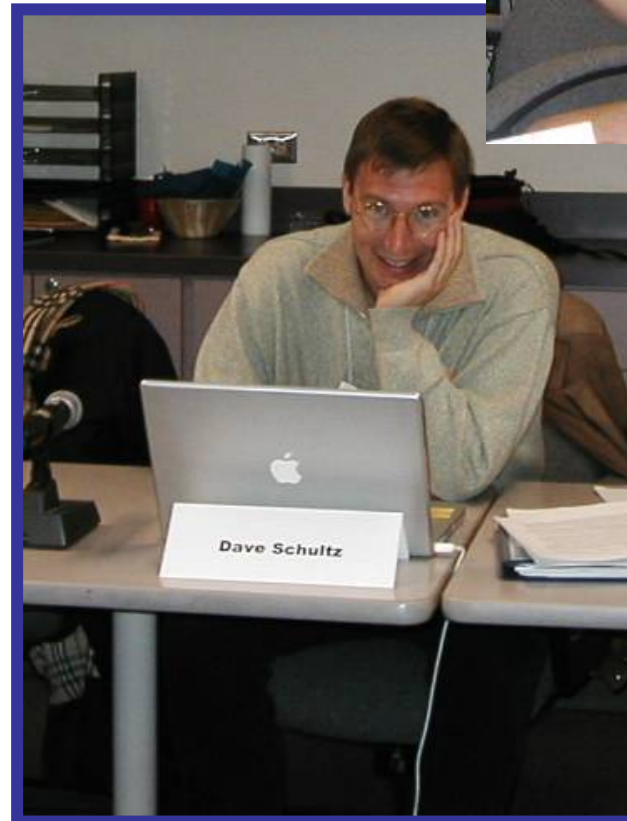
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# Incorporating societal impacts will take time

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Requires changing metrics, bureaucracy, academic programs, partnerships!

Social scientists need retooling too - to understand some meteorology & potential areas for collaboration!



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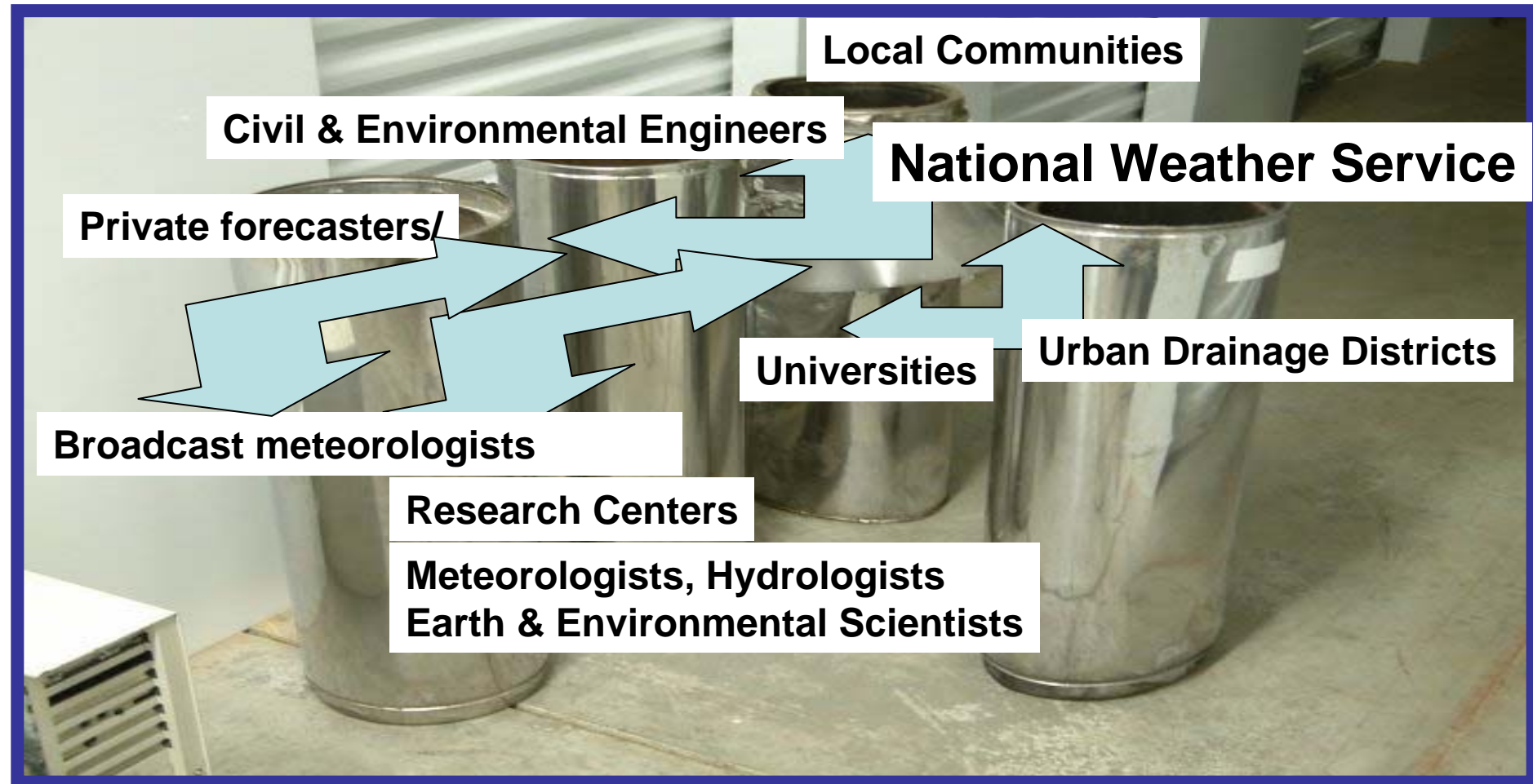
# New areas to ponder - *What wouldn't have happened without **WAS** \* **IS**?*



What are the best ways to weave social science into meteorologic and hydrologic practice?

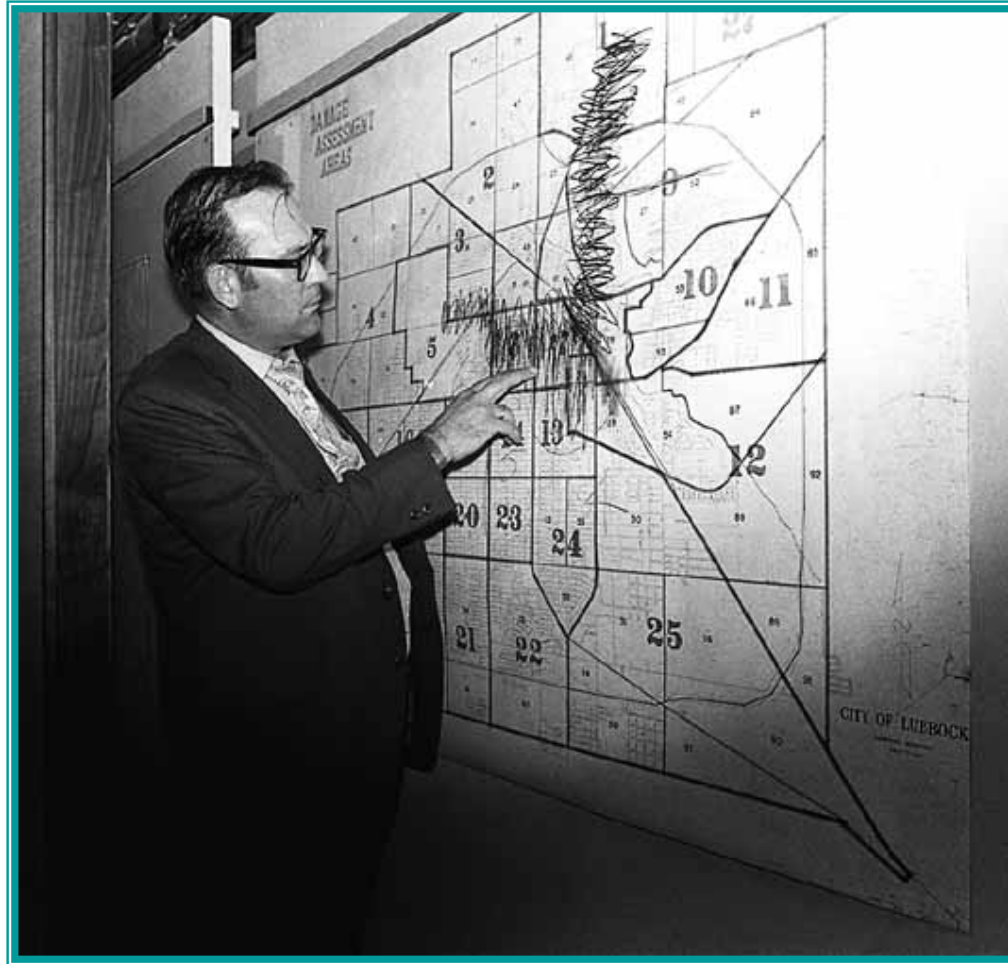
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The move from **WAS** to **IS** occurs when stovepipes are not the model - Bring social science into environmental science programs & research efforts in sustainable ways



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# Looking Back --What did many of the most influential players in meteorology look like prior to **WAS\*IS**?



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# **WAS\*IS**ers are NOT the same people with new models, widgets, or other technologies



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# The new fiesta - **WAS** \* **IS**ers! Maybe you will join us?!



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# Forecasting accuracy is improving but...

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Physical science & engineering innovations will only make a difference **if warning, warning response, & risk communication are better understood**

Thanks to **Hatim Sharif** for today's invitation

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Eve Gruntfest      ecg@uccs.edu

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