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THE ROLE OF SOCIAL SCIENCE RESEARCH IN DISASTER PREPAREDNESS AND RESPONSE

HEARING

BEFORE THE

SUBCOMMITTEE ON RESEARCH

COMMITTEE ON SCIENCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

FIRST SESSION

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THE ROLE OF SOCIAL SCIENCE RESEARCH IN DISASTER PREPAREDNESS AND RESPONSE

THURSDAY, NOVEMBER 10, 2005

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON RESEARCH,
COMMITTEE ON SCIENCE,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:05 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Bob Inglis [Chairman of the Subcommittee] presiding.

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON RESEARCH

The Role of Social Science Research in Disaster Preparedness and Response

Thursday, November 10, 2005
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building (WEBCAST)

Witness List

Dr. Susan Cutter
Professor, Department of Geography
Director, Hazards Research Lab
University of South Carolina

Dr. Shirley Laska
Professor, Environmental Sociology
Director, Center for Hazards Assessment, Response and Technology
University of New Orleans

Dr. H. Dan O'Hair
Chairman, Department of Communications
University of Oklahoma

Dr. Roxane Cohen Silver
Professor, Department of Psychology and Social Behavior and the Department of Medicine
University of California, Irvine

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HEARING CHARTER

SUBCOMMITTEE ON RESEARCH
COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

The Role of Social Science Research in Disaster Preparedness and Response

THURSDAY, NOVEMBER 10, 2005
10:00 A.M.—12:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

1. Purpose

On Thursday, November 10, 2005, the Research Subcommittee of the Committee on Science of the U.S. House of Representatives will hold a hearing to better understand how the social sciences can inform planning for, response to, and recovery from natural hazards and disasters.

2. Witnesses

Dr. Susan Cutter is a Professor of Geography at the University of South Carolina, and the Director of the Hazard Research Laboratory.

Dr. Roxane Silver is a Professor in the Department of Psychology and Social Behavior in the Department of Medicine at the University of California, Irvine.

Dr. H. Dan O'Hair is a Professor and the Chair of the Department of Communication at the University of Oklahoma. He is also the current Vice President of the National Communications Association.

Dr. Shirley Laska is a Professor of Environmental Sociology and Director of the Center for Hazards Assessment, Response and Technology at the University of New Orleans.

3. Overarching Questions

- How do individuals perceive risk and respond to warnings and other crisis communications? What role does the media play in risk communication and the formation of public views and behavior?
- How do individuals respond to traumatic experiences, such as terrorist attacks or natural disasters? How can insights into fundamental questions of cooperation, social order and resilience improve preparation for and response to new threats and disasters?
- How is local or regional vulnerability to natural hazards and disasters assessed? How does the natural and built environment affect the perception of risk and subsequent behavior?
- What are the priority social science research areas related to disaster preparedness and response? How are the results of such research being translated into practice?

4. Brief Overview

- The U.S. is exposed to a wide range of natural hazards, such as hurricanes, floods and earthquakes, as well as the continuing threat of terrorism and other technological disasters. While new tools and technologies have improved the prediction of many natural hazards, complete preparedness and response also requires an understanding of human behavior, particularly in emergency situations. This is the domain of the social sciences.
- The National Science Foundation (NSF) accounts for nearly half ($106 million in fiscal year 2004) of the overall federal investment in basic social sciences research at colleges and universities. In the areas of disaster preparedness and response, NSF supports short-term research projects immediately after

disasters to gather and analyze information about public attitudes and behavior. NSF also supports longer-term studies on individual and group perception of risk, the vulnerability of different regions and populations to particular dangers, and individual and group resiliency in the aftermath of a natural or other disaster.

- While there is a body of social science knowledge on disasters, particularly in the context of natural hazards, the lack of connections between researchers and emergency planners and responders has led to uneven or incomplete application of lessons learned to improve current disaster preparedness.

5. Background

Because of its natural, climatic and geographic diversity, the U.S. is exposed to a wide range of natural hazards, such as hurricanes, floods and earthquakes, as well as the continuing threat of terrorism and other technological disasters. These risks, combined with increased population densities and the development of flood plains, coasts, and other vulnerable areas, have raised the disaster risk for the U.S. to an all time high.

The Federal Government has been investing in science and technology to combat terrorism and manage natural hazards. As a result, new tools have been developed to improve the detection and remediation of biological, chemical, radiological and nuclear threat agents, and new technologies, such as satellites and Doppler radar systems, have improved the prediction of hurricane, tornado and other storm paths. These tools are an important part of managing a disaster, but a complete response also requires an understanding of human behavior, particularly in emergency situations.

Disaster Research at the NSF Directorate for Social, Behavioral and Economic Sciences

Most social science research at NSF is funded through the Social, Behavioral and Economic Sciences (SBE) Directorate. For more than thirty years, NSF has supported disaster research that immediately dispatches scientists and engineers in the wake of crises ranging from hurricanes to terrorist attacks. NSF has a variety of mechanisms available to support this type of research, including the Small Grants for Exploratory Research (SGER, pronounced "sugar"). These SGER grants are offered across the foundation and they are awarded quickly to allow scientists to gather data that is likely to disappear over time.

Within SBE, SGER grants are used to focus on such issues as organizational preparedness for and response to social crises, risk assessment and vulnerability analysis, and resilience. In the aftermath of hurricane Katrina, for instance, SBE awarded 35 SGER grants to study decision-making and political mobilization before, during, and after the hurricane, the economic and psychological dimensions of recovery on children and adults, and the breakdown of law and order following Katrina and its effects on recovery efforts and on victims. Similarly, after the terrorist attacks of 2001, SBE SGER grants funded research on issues predicting affective reactions to collective loss, understanding individual response to a salient and pervasive health threat such as anthrax, and resiliency and coping in the wake of the attacks and ongoing threats.

SBE also funds longer-term research that is relevant to natural hazards and disasters. SBE research on how human emotion drives decisions can help emergency planners understand how personal choices can turn a crisis into a disaster. For instance, one NSF study found that most people living in areas prone to floods, earthquakes, and other devastating natural disasters take no steps to protect themselves or their property—important information for federal, State and local emergency managers. In addition, according to NSF-supported research, there are several myths about public response to crisis warnings, including the belief that people are confused if given too much information, that "crying wolf" leads to inaction, and that people automatically follow instructions. Other research into risk perception has highlighted how the genders react differently—white males perceive risks as much smaller and much more acceptable than other groups do, while women are more likely than men to seek out information from the media and then take responsibility for adapting in a crisis.

Other SBE supported research is helping gain insights into the origins of terrorism and the after effects of an attack. For instance, the intelligence community and NSF are sponsoring research on the detection of deception that includes investigation and development of behavioral biometrics, content analysis of foreign documents and speech, alternatives to the polygraph, and improvements in intelligence analysis by increasing understanding of thought processes, learning and decision-making in individuals and teams. In addition, and in an attempt to better under-

stand the beliefs of people in Islamic societies, SBE recently supported an analysis of attitudes and values of the Islamic public in Egypt, Iran and Morocco. Researchers concluded that there is considerable and unexpected variation in values. Despite living under a religious regime for more than two decades, Iranians appear to be less religious and more nationalistic than either Egyptians or Jordanians, who live under secular regimes. They also found that Iranians have more liberal attitudes toward marriage and women working outside the home than the respondents from the other two countries.

National Science and Technology Council Reports on Research Related to Disasters and Counterterrorism

Interagency coordination of research related to disaster preparedness and response and to combating terrorism occurs through meetings and reports of the National Science and Technology Council (NSTC), a cabinet-level council tasked with coordinating federal policies for science and technology. In July 2003, the NSTC's Subcommittee on Disaster Reduction issued a report on Reducing Disaster Vulnerability Through Science and Technology which identified six areas critical for meeting the challenges of future hazard risk reduction for the Nation.[1] They are:

1. Leverage existing knowledge of natural and technological hazards to address terrorism events;
2. Improve hazard information data collection and prediction capability;
3. Ensure the development and widespread use of improved hazard and risk assessment models and their incorporation into decision support tools and systems;
4. Speed the transition from hazard research to hazard management application;
5. Increase mitigation activities and incentives; and
6. Expand risk communication capabilities, especially public warning systems and techniques.

Social science research plays a critical role in the each of these areas, from development of vulnerability assessment techniques (area 2) to determination of effective incentives for risk mitigation (area 5) and evaluation of effective risk communication (area 6).

In February 2005, NSTC's Subcommittee on Social, Behavioral and Economic Sciences released a report entitled *Combating Terrorism: Research Priorities in the Social, Behavioral and Economic Sciences.*[2] The report found that the social sciences have much to contribute to the development of strategies that enhance the Nation's capacity to predict, prevent, prepare for and recover from a terrorist attack. The immediate priorities for social science research include:

- collection of data, such as the outcomes of threat scenario exercises and health surveillance data, that can be used to inform and model preparation strategies;
- application of modeling methods to complex problems such as understanding the intersections of terrorists and victims and the vulnerabilities of terrorist networks;
- application of decision science research to risk communication strategies, including assessing people's risk perception and educating those who deliver risk and vulnerability messages about how to increase their effectiveness; and
- application of risk, threat and vulnerability assessment and vulnerability models in the creation and evaluation of response plans.

NSF Directorate for Social, Behavioral and Economic Sciences

NSF Directorate for Social, Behavioral and Economic Sciences (SBE) supports basic research, education and infrastructure in the behavioral, cognitive, social and economic sciences, referred to collectively as the social sciences. The Fiscal Year 2006 (FY06) budget seeks $198.79 million for SBE, nearly $2 million over the FY05 level, or about 4.2 percent of overall funding for NSF research. SBE accounts for nearly half of all federal support for basic research in the social sciences at colleges

[1] NSTC's report *Reducing Disaster Vulnerability Through Science and Technology* can be found on line at *http://www.ostp.gov/NSTC/html/SDR_Report_ReducingDisasterVulnerability 2003.pdf.*

[2] NSTC's report *Combating Terrorism: Research Priorities in the Social, Behavioral and Economic Sciences* can be found on line at *http://www.ostp.gov/nstc/html/terror.pdf.*

and universities, and, in some fields, such as anthropology, SBE is the predominant or exclusive source of federal support.

Table 1. SBE Funding v. Total NSF Research Funding (Dollars in Millions)

	FY04	FY05 Current Plan	FY06 Request
Total NSF Research	$4,293.34	$4, 220.55	$4,333.49
SBE	$184.30	$196.90	$198.79

SBE comprises two research divisions: Social and Economic Sciences (SES) and Behavioral and Cognitive Sciences (BCS). Research in economics, sociology, political science, decision-making and risk analysis, supported by SES, has yielded theories and information that have helped inform and improve public policy, business management, and economic and regulatory action. Research into the psychological, cognitive anthropological and geographic sciences, supported by BCS, has improved understanding of human cognition, action and development, helping scientists answer fundamental questions, including how the human brain learns. SBE also supports the collection and dissemination of statistics related to the science and engineering enterprise through the Science Resources Statistics Division.

Other NSF Disaster Research

Outside of SBE, most of NSF's long-term research into natural hazards, disasters and their mitigation takes place within the Geosciences and Engineering Directorates. Specifically, the Engineering Directorate funds research on the impact of natural and technological hazards on buildings and the environment, including studies of the mechanisms of structural failures. The Geosciences Directorate supports research into the mechanisms that cause tornadoes, windstorms, and hurricanes through the collection and analysis of meteorological data, including wind speeds and storm surge. Like SBE, the Engineering and the Geosciences Directorates use SGER grants to fund research in the immediate aftermath of disasters.

NSF also funds research into Human and Social Dynamics, an NSF-wide priority area which supports research on human actions and development as well as on organizational, cultural, and societal adaptation. Although responsibility for Human and Social Dynamics priority area, and the bulk of the $40 million in funding, comes from SBE, other NSF Directorates contribute support and expertise to the research on how humans and societies understand and cope with change, including natural hazards and disasters.

Other Federal Support for the Social Sciences

Outside of NSF, the National Institutes of Health (NIH) and the Department of Defense (DOD) provide the bulk of federal funding for social science research. At NIH, behavioral and social science research is integrated into most NIH institutes and centers, with the largest amounts of funding being used to study the impact of behavior and society on diseases and illnesses such as drug abuse, mental health, cancer, and alcohol abuse. Now that budget increases are more modest, most of this research is associated with a specific disease and more projects are becoming clinical or applied in nature. The National Institute for Mental Health (NIMH) has developed a research program to assess the mental health impact of the World Trade Center and Pentagon attacks, it has convened a major national workshop on mental health needs in disaster response and it is currently exploring additional behavioral/mental health research aimed at the treatment of trauma in individuals and communication during public health crises and other traumatic events.

At DOD, the social and behavioral sciences fund research in the broad categories of personnel training, leadership development, war-fighter sustainment and physical performance, and systems interfaces and cognitive processing. This research is typically more applied and more specific to DOD's mission. Similarly, federal support for social science research closely tied to their missions also comes from the Departments of Agriculture and Justice.

A new source of funding for basic social science research related to natural hazards and disasters is emerging at the Department of Homeland Security (DHS). In January 2005, DHS established a Center of Excellence for Behavioral and Social Research on Terrorism and Counter-Terrorism at the University of Maryland. The $12

million, three-year grant supports basic research in the social sciences, including studies on the sources of, and responses to, terrorism, the psychological impact of terrorism on society, and how to increase the American public's preparedness, response, and resilience in the face of threat. In addition, in 2003, DHS established the Center for Risk and Economic Analysis of Terrorism Events at the University of Southern California to support the development and application of tools for assessing the risks and consequences of terrorism. Also, the DHS Scholars and Fellows Program supports the development and mentoring of the next generation of scientists, including social scientists, as they study ways to prevent terrorist attacks within the U.S., reduce America's vulnerability to terrorism, and minimize the damage and recovery efforts from attacks that do occur.

6. Witness Expertise and Questions:

Susan Cutter is a Carolina Distinguished Professor of Geography at the University of South Carolina. She is also the Director of the Hazards Research Lab, a research and training center that integrates geographical information science with hazards analysis and management. Dr. Cutter's primary research interests are in the area of vulnerability science—what makes people and the places where they live vulnerable to extreme events and how this is measured, monitored, and assessed. In response to the 9/11 terrorist attack, Dr. Cutter led a team of researchers who examined the use of geographical information science techniques (e.g., geographical information systems, remote sensing) in the World Trade Center rescue and relief efforts. Dr. Cutter has also led post-event field studies of evacuation behavior from the 2005 Graniteville, SC train derailment and chlorine spill, and the geographic extent of the storm surge inundation along the Mississippi and Alabama coastline after hurricane Katrina.

Dr. Cutter has been asked to address the following questions in her testimony:

- How do you assess local or regional vulnerability to environmental hazards? How can differences in vulnerability and losses be anticipated and embodied in mitigation and response to lessen the impact on individuals and places? And what are the limitations of risk modeling in emergency management or response or in determining overall vulnerability?
- How does the natural and built environment impact the perception of risk and subsequent behavior?
- What role do technologies, such as geographic information systems and remote sensing, contribute to forecasting and managing a disaster? How can lessons learned mitigate the consequences of natural hazards and disasters?
- What are the top remaining research questions in this area?

Shirley Laska is a Professor of Environmental Sociology at the University of New Orleans and the Director of the Center for Hazards Assessment, Response and Technology. Dr. Laska's work has drawn attention to the need for more sub-regional analysis of hurricane evacuation behavior; more consideration to flood-proofing structures for less than 100-year floods to complement more stringent protection; more attention to considering local area drainage solutions to repetitive flood loss rather than demolition of individual repeatedly flooded structures; inclusion of the human/social impacts of coastal restoration rather than only the ecological; and also improving hazard mitigation outcomes by including community members and stakeholders as full participants in efforts to reduce the human risk to hazards. In November 2004, she published an article in *Natural Hazards Observer* entitled "What If Hurricane Ivan Had Not Missed New Orleans?"

Dr. Laska has been asked to address the following questions in her testimony:

- How do you assess local or regional vulnerability to environmental hazards? How can differences in vulnerability and losses be anticipated and embodied in mitigation and response to lessen the impact on individuals and places?
- What are the top remaining research questions in this area?
- How is social science research on disaster preparedness and response being translated into practice? What are the barriers to the implementation of research findings and how can these barriers be overcome or removed?

H. Dan O'Hair is Professor in the Department of Communication at the University of Oklahoma. His teaching and research interests include organizational communication, health systems, risk communication, and terrorism. Dr. O'Hair has published over 70 research articles and scholarly book chapters in communication, health, management, and psychology journals and volumes, and has authored and edited 12 books in the areas of communication, business, and health. In 2006, Dr. O'Hair will serve as president of the National Communication Association, the

world's largest professional association devoted to the scholarly study of communication.

Dr. O'Hair has been asked to address the following questions in his testimony:

- How do individuals respond to warnings and other risk communications? How important is the perception of risk—rather than a quantitative estimate of it—in determining individual or societal response to a natural hazard or disaster? And how do responses vary, based on individual cultural, economic and experiential differences?
- How is risk communicated in an uncertain environment? What role does the media play in risk communication and the formation of public views and behavior?
- What lessons have we learned from effective—and ineffective—risk communications about natural hazards or disasters? How are these lessons being used to improve future risk communications?
- What are the top remaining research questions in this area?

Roxane Cohen Silver is a Professor in the Department of Psychology and Social Behavior at the Department of Medicine at the University of California, Irvine. Dr. Silver is an expert in acute and long-term psychological reactions to stressful events, ranging from the loss of a child to war and natural disasters, and she has researched and written extensively on the predictors of effective coping and the general theme of individual and community resiliency. Dr. Silver recently completed a three-year national longitudinal study of responses to the September 11, 2001 terrorist attacks. In 2003, Dr. Silver was appointed to the Department of Homeland Security's Academe and Policy Research Senior Advisory Committee. More recently, she was appointed to the Department of Homeland Security's Homeland Security Advisory Council's Weapons of Mass Effect Prevention Task Force.

Dr. Silver has been asked to address the following questions in her testimony:

- How do individuals respond to traumatic experiences, such as terrorist attacks or natural disasters? Are there common misperceptions about the coping process and its outcome? Is misinformation about response to a traumatic experience a problem in terms of managing a natural hazard or disaster?
- What explains the variability in response to a traumatic experience by individuals and by communities?
- What lessons have we learned about individual and community resiliency following a trauma? And how are these lessons being used to design effective interventions for response and recovery?
- What are the top remaining research questions in this area?

Chairman INGLIS. Good morning. I would like to call this meeting of the Research Subcommittee to order, and I appreciate the presence of our witnesses this morning, and have an opening statement.

Today's hearing on *The Role of Social Science Research in Disaster Preparedness and Response* is one that we undertake even as we are beginning to understand the physical and emotional consequences of hurricanes Katrina and Rita.

From the 2001 terrorist attacks to the 2004 Asian tsunami, to hurricanes Katrina and Rita, and now, to the devastating earthquake in Kashmir, we have been inundated with natural disasters and other events recently. Even as this nation comes to terms with the human and economic toll of these events, we continue to face the threat of terrorism, and inevitable other natural disasters that will come our way, as well as potential pandemics like the avian flu.

This committee has heard from experts who can forecast the paths of hurricanes with great accuracy, monitor fault lines to determine potential danger from earthquakes, and identify potential cyberinfrastructure vulnerabilities. It is reassuring to know that science and technology can and have aided our ability to predict and manage natural hazards and disasters. To effectively plan for, mitigate against, and respond to natural hazards and disasters, we may also benefit from a better understanding of human behavior, and how that behavior can turn a localized hazard into a full-blown catastrophe.

This hearing will focus on the social, behavioral, and economic aspects of disaster planning. Among other things, our witnesses will discuss how the social sciences assess the vulnerability of a group or region, how individuals perceive and respond to risk and disaster warnings, and how disasters impact individuals and groups. I hope this hearing will contribute to a better understanding of the social and psychological impacts of a disaster, the complexities of disaster response and relief, and the issues that affect the physical, social, and economic recovery of individuals and communities in general.

Mark Twain once said that everyone talks about the weather, but nobody does anything about it. Well, we will be talking about the weather a bit today, and educating ourselves on what the social sciences have to offer on these difficult problems we face, and how these lessons, especially about the weather and other extreme events, can help us plan and prepare for additional, more complex hazards and disasters.

[The prepared statement of Chairman Inglis follows:]

PREPARED STATEMENT OF CHAIRMAN BOB INGLIS

Good morning. Today's hearing on "The Role of Social Science Research in Disaster Preparedness and Response" is one that we undertake even as we are only beginning to understand the physical and emotional consequences of hurricanes Katrina and Rita.

From the 2001 terrorist attacks, to the 2004 Asian tsunami, to hurricanes Katrina and Rita and now to the devastating earthquake in Kashmir, we have been inundated with natural hazards and other disasters recently. Even as this nation comes to terms with the human and economic toll of these events, we continue to face the threat of terrorism and inevitable other natural disasters, as well as new threats, such as Avian Flu.

This committee has heard from experts who can forecast the path of hurricanes with accuracy, monitor fault lines to determine potential danger from earthquakes, and identify potential cyber infrastructure vulnerabilities. It's reassuring to know that science and technology can and have aided our ability to predict and manage natural hazards and disasters. To effectively plan for, mitigate against, and respond to natural hazards and disasters, we may also benefit from a better understanding of human behavior—and how that behavior can turn a localized hazard into a catastrophe.

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Mark Twain once said, "Everyone talks about the weather but nobody does anything about it." We'll be "talking about the weather" a bit today and educating ourselves on what the social sciences have to offer on the difficult problems we face—and how these lessons, especially about the weather and other extreme events, can help us plan and prepare for additional, more complex hazards and disasters.

With that, I'd like to welcome the witnesses who have joined us today, and I would turn to the senior Democratic Member, Ms. Hooley, for any opening statement she may wish to make.

Chairman INGLIS. With that, I would like to welcome the witnesses who have joined us today, and I would turn to our Ranking Member, Ms. Hooley, for any opening statement she may wish to offer.

Ms. HOOLEY. Thank you, Mr. Chairman.

I am pleased to join you in welcoming our witnesses today to this hearing on the role of social and behavioral sciences, and understanding how better to prepare for, respond to, and recover from natural and manmade disasters. The events of the past year bring the importance of this subject sharply into focus.

Greater attention to coping with disasters is prudent when one considers the increased vulnerability of the Nation to larger disasters associated with growing population concentrated in hazardous coastal zones and earthquake-prone regions, such as Oregon. And in addition to natural hazards, including the threat of avian flu pandemic, we now have the ever-present specter of terrorist attacks. We need to develop the knowledgebase about the nature of risks, what can be done to mitigate them, and how relevant stakeholders can apply that knowledge effectively.

Social science research has a long history of contributing to our understanding of the factors and influencing the way individuals, communities, and organizations respond to disasters. The focus of research has broadened over time to tackle various aspects spanning the entire hazard cycle, from pre-disaster mitigation through preparedness, response, and recovery.

But in addition to research aimed at increasing understanding, attention must be directed and appropriate processes put in place to ensure that this increased understanding is acted upon by individuals and organizations. The main goal of reducing human suffering and physical damage is linked to the degree of success that is achieved in applying research results.

Today, I hope to hear from our panel of experts about the important research that has been done in the social and behavioral sciences, and the research opportunities that are being pursued. I

am also interested in the state of health of the research community that studies disasters, and whether or not important research issues are not being adequately addressed because of funding shortfalls or faulty priorities.

But equally important, I am very interested in your experiences and thoughts on how research is translated into practice. My question would be what is working and what isn't working? Are there impediments to applying the findings from social and behavioral sciences to disaster planning, recovery and response activities of the responsible public and private sector organizations?

Mr. Chairman, I want to thank you for calling this hearing, and I want to thank our witnesses for appearing before the Subcommittee today, and I look forward to our discussion.

[The prepared statement of Ms. Hooley follows:]

PREPARED STATEMENT OF REPRESENTATIVE DARLENE HOOLEY

Mr. Chairman, I am pleased to join you in welcoming our witnesses today to this hearing on the role of the social and behavioral sciences in understanding how better to prepare for, respond to, and recover from natural and man-made disasters. The events of the past year bring the importance of this subject sharply into focus.

Greater attention to coping with disasters is prudent when one considers the increased vulnerability of the Nation to larger disasters associated with a growing population concentrated in hazardous coastal zones and earthquake prone regions—such as Oregon. And, in addition to natural hazards, including the threat of an Avian flu pandemic, we now have the ever-present specter of terrorist attack.

We certainly need to develop the knowledge base about the nature of risks; what can be done to mitigate them; and how relevant stakeholders can apply that knowledge effectively.

Social science research has a long history of contributing to our understanding of the factors that influence the way individuals, communities, and organizations respond to disasters. The focus of research has broadened over time to tackle various aspects spanning the entire hazards cycle, from pre-disaster mitigation through preparedness, response and recovery.

But in addition to research aimed at increasing understanding, attention must be directed and appropriate processes put in place to ensure that this increased understanding is acted upon by individuals and organizations. The main goal of reducing human suffering and physical damage is linked to the degree success is achieved in applying research results.

Therefore, today I hope to hear from our panel of experts about the important research that has been done in the social and behavioral sciences and the research opportunities that are being pursued. I am also interested in the state of health of the research community that studies disasters and in whether there are important research issues that are not being adequately addressed because of funding shortfalls or faulty priorities.

But equally important, I am very interested in your experiences and thoughts on how research is translated into practice. My questions would be: What is working, and what isn't working? Are there impediments to applying the findings from the social and behavioral sciences to the disaster planning, recovery, and response activities of the responsible public and private sector organizations?

Mr. Chairman, I want to thank you for calling this hearing and thank our witnesses for appearing before the Subcommittee today. I look forward to our discussion.

Chairman INGLIS. And we thank you, Ms. Hooley. Thank you.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF REPRESENTATIVE EDDIE BERNICE JOHNSON

Thank you, Mr. Chairman and Ranking Member.

As the third-ranking Democrat on the Full Committee and former Ranking Member of the Research Subcommittee, I am pleased to see the Committee's interest in a variety of research sub-specialties, including the social sciences.

We as a nation are limited in disaster preparedness planning unless we can better understand human behavior, particularly in emergency situations.

The National Science Foundation accounts for nearly half of the federal investment in basic social sciences research at colleges and universities. Although NSF will receive an increase in research funding for next year, the NSF budget it not nearly where it needs to be.

It is my hope that today's hearing will uncover how great the needs are for social sciences research funding. I am also interested to know how Congress can facilitate better connections between researchers and emergency planners and responders.

I would like to extend a warm welcome to today's witnesses and voice my support for increased federal funding for NSF and for social sciences research.

Thank you, Mr. Chairman. I yield back.

[The prepared statement of Mr. Carnahan follows:]

PREPARED STATEMENT OF REPRESENTATIVE RUSS CARNAHAN

Chairman Inglis and Ranking Member Hooley, thank you once again for hosting this hearing. Dr. Cutter, Dr. Silver, Dr. O'Hair and Dr. Laska, thank you for taking the time and effort to appear before us today and share your views on the important issue of disaster preparedness and response.

Over the past years, we have become all too familiar with the ramifications of disaster, both man-made and natural. Most recently, this committee has considered the issue as it relates to the World Trade Center collapse and hurricanes Katrina and Rita.

I represent a congressional district in St. Louis City that runs south along the Mississippi river. Our region is near the New Madrid earthquake center, which struck the area from 1811 to 1812. These sequences are the most powerful earthquakes ever to have been felt on the North American continent. The New Madrid Fault System remains a threat to our region, and thus, I am eager to learn more about the social science implications of a possible earthquake and how our community can best plan, respond and recover from an earthquake should it occur.

Thank you for your time today. I look forward to hearing your testimony.

Chairman INGLIS. At this point, I will happily introduce our witnesses. From my left over here, Dr. Susan Cutter, is a Professor of Geography at the University of South Carolina, and the Director of the Hazards Research Laboratory. Dr. Shirley Laska is a Professor of Environmental Sociology and Director of the Center for Hazards Assessment, Response and Technology at the University of New Orleans. I am going to skip over Dr. O'Hair just a second. And then next to him, Dr. Roxane Silver is a Professor in the Department of Psychology and Social Behavior and the Department of Medicine at the University of California, Irvine.

And I would recognize our colleague from Oklahoma, Mr. Lucas, to recognize, or to introduce to us Dr. O'Hair.

Mr. LUCAS. Thank you, Mr. Chairman, and I appreciate you extending me this courtesy.

And I am proud to introduce one of my fellow Oklahomans. Although my district includes Oklahoma State University, which is my alma mater, I think all of my fellow third District citizens are always pleased, and my fellow OSU-ites, to work with our friends from Norman, and I am particularly pleased to have him testify before our subcommittee today.

Dr. H. Dan O'Hair is a Professor of Communications at the University of Oklahoma. His teaching and research interests include organizational communications, health systems, risk communication, terrorism. He has published over 70 research articles and scholarly book chapters in communication, health management, and psychology journals and volumes, and has authored and edited 12 books in the areas of communications, business, and health. And in 2006, Dr. O'Hair will serve as the President of the National

Communications Association, the world's largest professional association devoted to the scholarly study of communication.

And I am very pleased to have one of my fellow Oklahomans here today. And once again, Mr. Chairman, thank you for the courtesy.

Chairman INGLIS. Thank you, Mr. Lucas. We are now going to call on our witnesses. I would point out to you that when the light is green, keep going. It is just like driving, you know. When it is yellow, you have to squeeze the orange and get through the light before it turns red. That way, we will get all the way through, if you are finished by the red comes, by the time the red comes.

So, thank you for being here. Dr. Cutter.

STATEMENT OF DR. SUSAN L. CUTTER, CAROLINA DISTINGUISHED PROFESSOR AND DIRECTOR, HAZARDS RESEARCH LAB, UNIVERSITY OF SOUTH CAROLINA

Dr. CUTTER. Thank you very much, Mr. Chairman.

The American hazardscape stretches from border to border and from coast to coast, and there are very few places in the country that are truly devoid of any type of hazard, either from natural, technological, or human-induced sources.

Vulnerability science is an emergent multi-disciplinary field that helps us to address these questions of this hearing today. What I would like to do this morning is to provide you with three examples of social science contributions to our understanding of vulnerability science, and then make a few remarks on how we can move the Nation forward. Next slide.

The first example is the improvement in the metrics, models, and methods for social vulnerability assessments. Our disaster field research tells us that there are pre-existing conditions that make certain social groups—the poor, the elderly, non-English speaking residents—more vulnerable to and slower to recover from disasters. And these findings are consistent, irrespective of the disaster agent involved.

Social scientists at the University of South Carolina have developed a quantitative method for assessing social vulnerability that permits geographic comparisons over time at the county level, as you see here. This social vulnerability index tells us where the most socially vulnerable populations reside, and more importantly, where additional response and recovery resources may be needed before, during, and after an event occurs. Next slide.

[Slide]

The second example is in the area of integrated hazard assessment methodology. Under the Disaster Mitigation Act of 2000, all State and local entities must have approved mitigation plans, and these plans must be based on empirically derived hazard vulnerability assessments. In 1997, we developed a GIS-based hazard assessment methodology that is now the standard for South Carolina, and widely used elsewhere. As you see from this slide, the method enables us to look at the geographic variations in the hazards themselves, the map with mostly pink, and the social vulnerability of residents, which is the map mostly in red. When you put them together, it is easy to see those areas that have the highest levels of vulnerability, but more importantly, the GIS-based approach en-

ables us to see what is contributing to it, social or physical factors. If all counties in the Nation had this level of detail in their hazard vulnerability assessments, preparing for and mitigating disasters would be reflective of the true risk and vulnerability in a community. Next slide.

[Slide]

The third example is in the area of warnings and evacuation behavior. Social science research tells us that people evacuate as family units; evacuees seek shelter with other family members, friends, or in hotels; public shelters are used only if there is no alternative; people often won't evacuate because of pets; and many residents over-respond to evacuation orders, using distance as a way of mitigating the threat. For example, during the January 2005 train derailment and chlorine release in Graniteville, South Carolina, residents within a one mile zone were told to evacuate, and nearly everyone complied. However, and if you look at this slide, the second buffer, 59 percent of the residents who lived in this one to two mile zone also evacuated, placing additional burdens on response resources, a phenomenon that we call the evacuation shadow. Hurricane Rita, an estimated 400,000 people in the mandatory evacuation zone, yet more than 2.4 million took to the roadways in advance of the storm, producing a very large evacuation shadow. Next slide.

[Slide]

The good news is that the social sciences have produced the basic theory and models for understanding social and behavioral responses to disasters, and have demonstrated their application to disaster preparedness and response. The second assessment of disaster research, funded by the National Science Foundation and published by the National Academy, is evidence of this success, yet the state of the art social science is often not translated into practice, and the Nation must relearn lessons time and time again.

There are some exceptions. With support from the NSF, the Association of American Geographers developed a research strategy and action agenda for the community in understanding the complex issues of terrorism in the aftermath of 9/11, and the establishment of the DHS Center on Social and Behavioral Responses to Terrorism is one tangible outcome of this action agenda. Next slide.

[Slide]

The bad news is we still don't know how much disasters cost this Nation on an annual basis, nor where these losses are occurring. How can we monitor the progress of disaster reduction and mitigation programs when we don't have any systematic baseline data? With support from NSF, we now have the beginnings of such a dataset, called the Spatial Hazard Event and Losses Dataset for the U.S., which includes 18 different natural hazard events, and their losses by county for the whole U.S. from the period 1960 to the present. As you can see here, these losses are quite variable from year to year, but they do show an overall increasing trend, and these losses are mainly causes by weather-related events. Next slide.

[Slide]

The geographic pattern is even more telling.

With additional investments in the social sciences, significant improvements in disaster preparedness and response are achievable. Next slide.

[Slide]

While these recommendations have been made before, little has been done to implement them, and they are worth repeating. Create a national inventory on hazard events and losses; establish a national center for vulnerability science; reduce the preparedness divide; bring social science findings to practitioners; and increase our support of rapid response research to secure critical social science and geospatial data and information in disasters.

The hurricane Katrina crisis was precipitated by a physical event, but it was the failure of social and political systems that turned the natural disaster into a human catastrophe. As a nation, we need to understand the human decisions and organizational failures that contributed to this disaster, so it won't happen again. This is what makes social science so important and so relevant.

Thank you.

[The prepared statement of Dr. Cutter follows:]

PREPARED STATEMENT OF SUSAN L. CUTTER

The Role of Vulnerability Science in Disaster Preparedness and Response

The American hazardscape stretches from border to border and from coast to coast. There are few, if any, places in the county that are truly devoid of any type of hazard—either from natural, technological, or human-induced sources. Some places are more hazard-prone than others, and some may experience more events or disasters than others, but they all contribute to the Nation's landscape of hazards. My discipline, geography, has more than a half-century of research expertise and practice in examining responses to environmental hazards. Starting with Gilbert White's floodplain studies in the 1940s and continuing today, geographers have provided the scientific basis for disaster and hazard reduction policies and contributed to the Nation's understanding of the regional variability in hazardousness.[1]

The question posed for today's hearing, what makes people and places vulnerable to natural hazards and disasters, requires first, an understanding of the circumstances that place people and localities at risk, and second and perhaps more importantly from the social science perspective, an understanding of the circumstances that enhance or reduce the ability of people and places to adequately respond to such threats. These circumstances range from the individual characteristics of people or buildings to global-scale processes such as climate change or economic globalization.

Vulnerability science is an emergent multi-disciplinary field that helps us to address those questions. It requires a place-based understanding of the interactions between natural systems, the built environment, and human systems. What I would like to do this morning is to provide you with three examples of social science contributions to our understanding of vulnerability science, largely drawn from the geographical sciences and then make a few remarks on how we can move the Nation forward.

The first example is the improvement in the metrics, models, and methods for social vulnerability assessments. Our disaster field research tells us that there are certain pre-existing conditions that make certain social groups—the poor, the elderly, women, non-English speaking residents—more vulnerable to and slower to re-

[1] G.F. White, 1945. *Human Adjustment to Floods. A Geographical Approach to the Flood Problem in the United States.* Chicago: University of Chicago, Department of Geography Research Paper No. 29; Interagency Floodplain Management Review Committee, 1994. *Sharing the Challenge: Floodplain Management into the 21st Century.* Washington D.C.: Government Printing Office (also known as the Galloway Report).

cover from disasters. And, these findings are consistent irrespective of the disaster agent involved (e.g., earthquakes, floods, hurricanes).[2]

Social scientists at the University of South Carolina have developed a quantitative method for assessing social vulnerability that permits geographic comparisons over time at the county level (Figure 1). As a comparative measure, the social vulnerability index (SOVI) tells us where the most socially vulnerable populations reside.[3] As a predictive measure, the social vulnerability index can help State and local officials determine where additional response and recovery resources may be needed before, during, and after the natural event occurs. This empirically based model of social vulnerability illustrates the disparities in social vulnerability and graphically delineates those areas where extra preparedness will be needed given the greater social vulnerability of the residents.

The second example where social science has made significant contributions to disaster preparedness is in the area of integrated hazards assessment methodology. Under the *Disaster Mitigation Act,* 2000 all State and local entities must have approved mitigation plans in order to retain eligibility for disaster relief funding under the *Stafford Act.* These mitigation plans must be based on empirically derived hazard vulnerability assessments. In 1997, working in conjunction with the South Carolina Emergency Management Division, the Hazards Research Lab first developed a GIS-based hazard assessment methodology that is now the standard for the state (Figure 2), and widely used elsewhere.[4] The method enables us to look at the geographic variations in the hazards themselves, but also the social vulnerability of residents. When put together, it is easy to discern those areas that have the highest levels of vulnerability, but more importantly, the GIS-based approach enables us to see what is contributing to it—social or physical factors. If all counties in the Nation had this level of detail in their hazard vulnerability assessments, preparing for and mitigation disasters would be reflective of risk and vulnerability in a community.

In another example, the Hazard Research Lab has just returned from coastal Mississippi where we were mapping the geographic extent of hurricane Katrina storm surge inundation in order to compare it to the SLOSH model and to the social vulnerability of residents. We were primarily interested in where the physical impacts were the greatest, where the most socially vulnerable populations resided, and where these areas overlap, for it is in these areas that residents will face significant challenges in the longer-term recovery from the disaster.

The third example of social science contributions is in the area of warnings and evacuation behavior. Social science research tells us a number of things about evacuation behavior: people evacuate as family units; most evacuees seek shelter with other family members, friends, or in hotels; public shelters are the least preferred option and are only used if there is no other alternative; many people won't evacuate because they cannot bring their pets with them, and finally, many residents use distance to mediate the threat. This latter point is important as it influences and compounds the management of evacuations at the local level. For example, during the January 2005 train derailment and chlorine release in Graniteville, South Carolina, residents within a one-mile zone were told to evacuate. Nearly all residents complied with the order. However, our research demonstrated that 59 percent of the residents in a 1–2 mile zone (outside the mandated evacuation area) also evacuated, placing additional logistical and support burdens on response resources, a phenomenon known as an evacuation shadow (Figure 3).[5] These evacuation shadows are common, and if not considered in preparedness planning, they have the potential to overwhelm the local emergency response system. During hurricane Rita, an estimated 400,000 people lived in the mandatory evacuation zone yet more than

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[2] See W.G. Peacock , B.H. Morrow and H. Gladwin (eds.), 2000. *Hurricane Andrew and the Reshaping of Miami: Ethnicity, Gender, and the Socio-Political Ecology of Disasters.* Miami: Florida International University, International Hurricane Center; E. Enarson and B.H. Morrow (eds.), 1998. *The Gendered Terrain of Disasters: Through Women's Eyes.* Westport, CT: Praeger; R. Bolin and L. Stanford, 1991. *The Northridge Earthquake: Vulnerability and Disaster.* London: Routledge; The Heinz Center, 2002. *Human Links to Coastal Disasters.* Washington D.C.: The H. John Heinz III Center for Science, Economics and the Environment. Susan L. Cutter, 2005. "The Geography of Social Vulnerability: Race, Class, and Catastrophe," Understanding Katrina: Perspectives from the Social Sciences, Social Science Research Council, *http://understandingkatrina.ssrc.org/Cutter/*

[3] S.L. Cutter, B.J. Boruff, and W.L. Shirley, 2003. "Social Vulnerability to Environmental Hazards," *Social Science Quarterly* 84 (1):242–261.

[4] S.L. Cutter, J.T. Mitchell, and M.S. Scott, 2000. "Revealing the Vulnerability of People and Places: A Case Study of Georgetown County, South Carolina," *Annals of the AAG* 90 (4): 713–737; Also see *http://www.cas.sc.edu/geog/hrl/products.html.*

[5] For a copy of the Graniteville report see *http://www.cas.sc.edu/geog/hrl/projects.html.*

2.4 million took to the roadways in advance of the storm, producing a very large evacuation shadow.

The increasing technological sophistication of the spatial social sciences, especially those that incorporate GIS and remote sensing also have enhanced preparedness and response activities, especially in evacuation. Decision support systems produced by social scientists are used in Texas to assist public officials in making evacuation decisions.[6] Social scientists at the University of South Carolina have developed a spatial decision support system for State emergency managers to enable them to rapidly identify remote sensing assets and geo-spatial data that can be used during emergencies,[7] while social scientists at the University of Utah have developed spatial decision support systems to aid in wildfire evacuation decision-making by local officials, to name but a few examples.[8]

The Good News

The social sciences have produced the basic theory and models for understanding the social and behavioral responses to disasters and have demonstrated their application to disaster preparedness and response. Social science research has assisted in the Nation's understanding of the root causes of disasters. We are better able to understand the disparities in vulnerability and how they lead to differential preparedness and response as a consequence of social science work on social vulnerability. The increasing use of geo-referenced data management systems, especially as the scale of impacts increase, has helped to enhance response and recovery efforts. Yet, state-of-the-art social science is often not translated into practice and the Nation must relearn lessons derived from social science time and time again.

In response to terrorist attack of 9–11, the Association of American Geographers with support from NSF developed a research strategy and action agenda in order to harness the considerable expertise of the geographical community in understanding the complex issues of terrorism.[9] This social science research and action agenda was designed to address important public policy concerns and to identify critical research needs in three areas: regional and international research related to the root causes of terrorism; vulnerability science and hazards research; and geospatial data and technologies infrastructure research. The Department of Homeland Security's National Center on Social and Behavioral Aspects of Terrorism, the START Consortium is one outcome from this call for action from the social science community.

The Bad News

Despite our lengthy national experience with natural disasters, we still do not know how much disasters cost this nation on an annual basis, nor where those losses are occurring. How can we monitor the progress of disaster reduction and mitigation programs when we don't have any systematic baseline data on hazard events or the losses they produce? How can the effectiveness of public policies designed to reduce losses be evaluated when such fundamental data are unavailable? With support from the National Science Foundation, we now have the beginnings of such a national dataset, the Spatial Hazards Events and Losses Dataset for the U.S. (SHELDUS), which includes natural hazard events and losses for 18 different natural hazards for the entire country from 1960 to the present. As can be seen in Figure 4, losses are quite variable from year to year but show an overall increasing trend. These losses are mainly caused by weather-related events. The geographic pattern, shown here in Figure 5, is illuminating as well, with most of the losses in the Pacific Coast and Gulf Coast states including Florida, the Southeast, Iowa and the Northern Great Plains, and in the Northeast.[10]

The Wish List

With additional investments in the social sciences, significant improvements in disaster preparedness and response are achievable. While the following rec-

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[6] The Evacuation Management Decision Support System (EMDSS) was created by social scientists at Texas A&M's Hazard Reduction and Recovery Center with support from NSF.

[7] The Remote Sensing Hazards Guidance System was developed by Michael E. Hodgson at the University of South Carolina with support from NASA. See *http://www.rshgs.sc.edu/* for more details.

[8] Tom Cova (University of Utah) with support from NSF, developed a GIS-based animation of the 2003 Southern California wildfires evacuations that highlights the spread of the wildfires and the implementation of evacuation orders *(http://www.geog.utah.edu/?cova/evac50sd.swf).*

[9] S.L. Cutter, D.B. Richardson, and T.J. Wilbanks (eds.), 2003. *The Geographical Dimensions of Terrorism.* New York and London: Routledge.

[10] See S.L. Cutter and C. Emrich, 2005. "Are Natural Hazards and Disaster Losses in the U.S. Increasing?," *EOS,* Transactions of the American Geophysical Union, 86(41), October 11, 2005, pp. 381, 388–89.

ommendations have been made before, little has been done to implement them, thus they bear worth repeating. First, we need to create a national inventory or baseline on hazard events and losses housed in a social-science based National Clearinghouse with a mandate for an annual "State of Disaster" report on the Nation's progress in achieving disaster resilient communities.[11] Second, we need to establish a multidisciplinary national center (similar in scope to NSF's Science and Technology Centers or Earthquake Engineering Research Centers) to focus on vulnerability science, an effort that will help us develop and improve the data, methods, and models for understanding vulnerability and more importantly, developing tools and strategies for improving our resiliency to future disasters.[12] Third, we need to bring our social science to practitioners by providing a tool-box of data and procedures for local communities. Not only will this reduce the preparedness divide, but it will also create a more uniform baseline across the Nation especially with place-based vulnerability assessments.[13] Lastly, we need to increase our support of rapid response research to secure critical social science and geo-spatial data and information in disasters. While the mechanisms are in place to activate such Quick Response research grants such as those at the Natural Hazards Center or through NSF's Small Grants for Exploratory Research, the funding levels are insufficient.[14] In an extraordinary example of recognizing the critical need to support such rapid response data collection, the University of South Carolina contributed $400,000 of its own money to support 18 research teams to gather perishable data in Katrina's aftermath.[15]

The hurricane Katrina crisis was precipitated by a physical event, but it was the failure of social and political systems that turned the natural disaster into a human catastrophe. As a nation, we need to understand the human decisions and organizational failures that contributed to this disaster so it won't happen again. We need an independent review of the local, State, and federal responses to hurricane Katrina so we can learn the lessons of what went right and what went wrong in the response and use these to improve our preparedness and responses to future disasters. The social science disaster research community is ready and willing to step up to this challenge and participate in such an independent review. Are you willing to authorize one?

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[11] D.S. Mileti, 1999. *Disasters by Design: A Reassessment of Natural Hazards in the United States.* Washington D.C.: The National Academy of Sciences/Joseph Henry Press; S.L. Cutter (ed.), 2001. *American Hazardscapes: The Regionalization of Hazards and Disasters.* Washington D.C.: The National Academy of Sciences/Joseph Henry Press.

[12] See footnote 9, Cutter in footnote 11.

[13] See footnote 9.

[14] For example, the Natural Hazards Center activated 25 Quick Response Grants in response to hurricane Katrina *(http://www.colorado.edu/hazards/qr/katrina.html),* but these grants are normally less than $2,000 each. The NSF made 49 SGER awards, 14 of them to social scientists *(http://www.nsf.gov/awardsearch/).*

[15] Half of the awards are for social science related topics. See *http://uscnews.sc.edu/rsrc223b.html* for the press release.

Figure 1 Social Vulnerability index for 1970 and 2000. In 1970, the most socially vulnerable populations lived in the southern half of the country and in Alaska and Hawaii. By 2000, there is an increase in social vulnerability in California, in the Lower Mississippi Valley, and in the upper Great Plains.

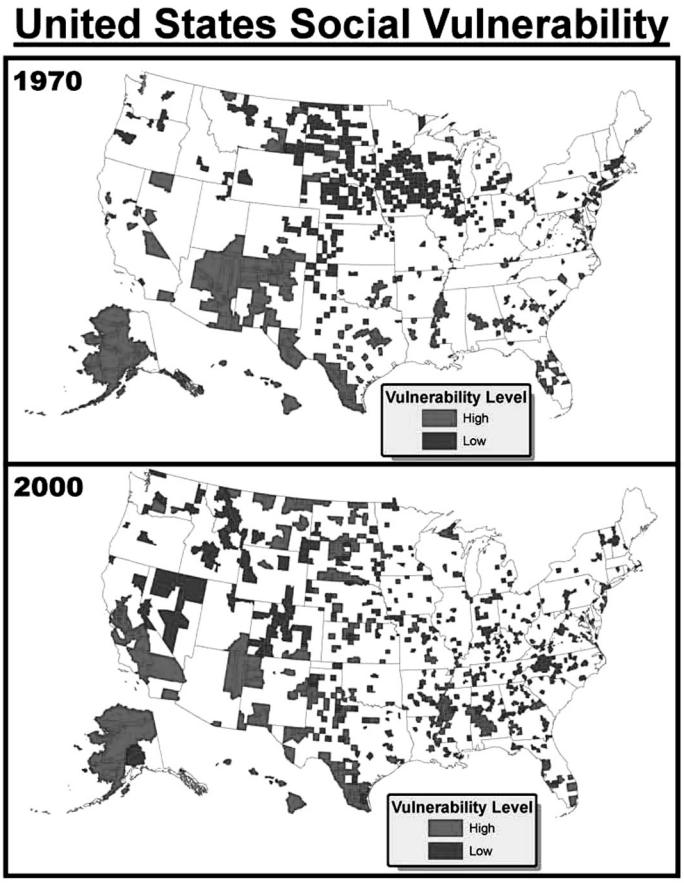


Figure 2 Hazard Vulnerability Assessments using the Hazards of Place Model. Incorporating hazard and social information allows us to determine which sub-areas within counties are the most vulnerable, and what is contributing to this, social or environmental factors. This example is from Richland County, South Carolina.

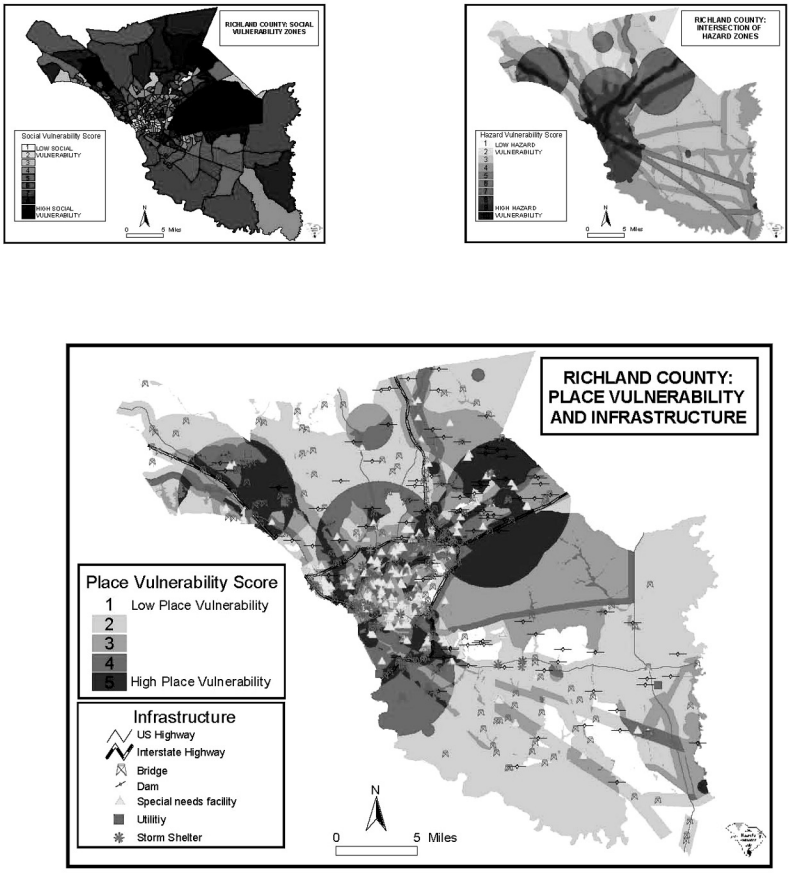


Figure 3 The Graniteville, SC train derailment and chlorine spill. Nearly all residents in the mandatory one-mile zone evacuated (98.4%). However, an additional 59% of residents in the 1-2 mile buffer also evacuated, adding an estimated 2,000 more people to the mandated evacuee population of 4,000, creating a sizeable evacuation shadow.

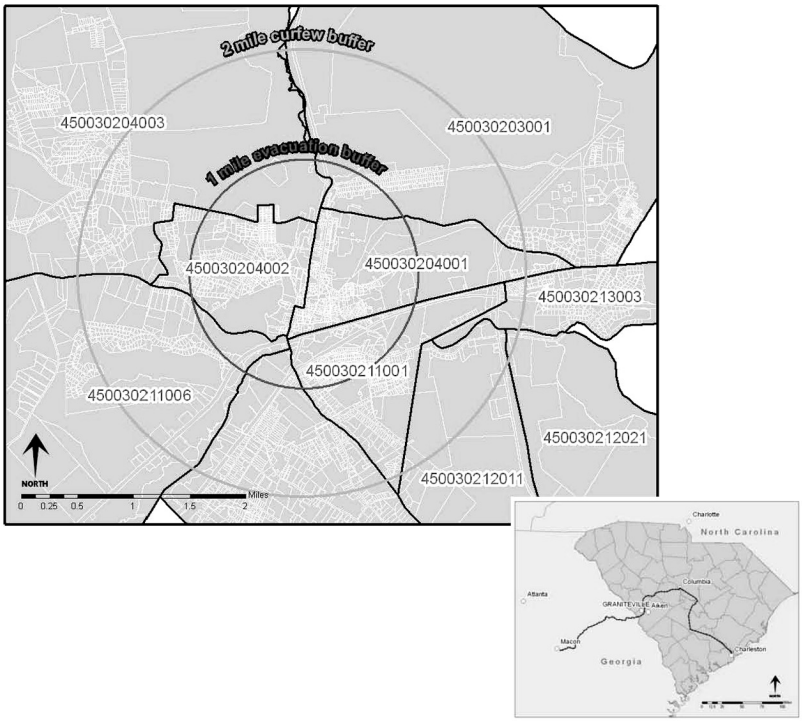


Figure 4 The increasing cost of natural disasters. There is an upward trend in dollar losses during the past 40 (1960-2003) years with weather related events producing more losses over time than geophysical events. Data are from SHELDUS (http://sheldus.org).

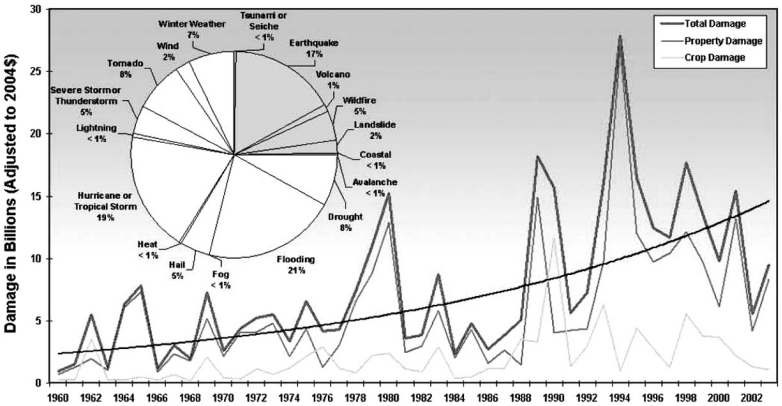
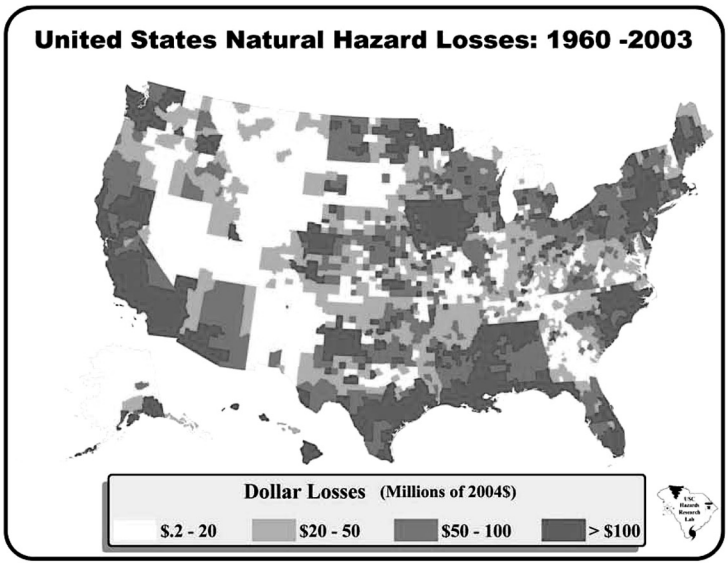


Figure 5 The distribution of hazard losses at the county level. Utilizing the Spatial Hazard Events and Losses Database for the U.S. (SHELDUS), we can see the regional variability in hazardousness and where the greatest losses have occurred.



BIOGRAPHY FOR SUSAN L. CUTTER

Dr. Susan Cutter is a Carolina Distinguished Professor of Geography at the University of South Carolina. She is also the Director of the Hazards Research Lab, a research and training center that integrates geographical information science with hazards analysis and management. She received her B.A. from California State University, Hayward and her M.A. and Ph.D. (1976) from the University of Chicago. Dr. Cutter has been working in the risk and hazards fields for more than twenty-five years and is a nationally and internationally recognized scholar in this field. Her primary research interests are in the area of vulnerability science—what makes people and the places where they live vulnerable to extreme events and how this is measured, monitored, and assessed. She has authored or edited twelve books and more than 85 peer-reviewed articles and book chapters.

She was the co-principal investigator on a National Science Foundation award to the Association of American Geographers to bring the Nation's geographic resources to bear on this important national and international priority. This agenda and supporting documents were published as *The Geographical Dimensions of Terrorism,* edited by S.L. Cutter, D. Richardson, and T. Wilbanks (editors) in 2003. She is a co-principal investigator and member of the Executive Committee of the National Consortium for the Study of Terrorism and Responses to Terrorism (START)(a Department of Homeland Security Center of Excellence focused on the social and behavioral sciences).

In response to the 9/11 terrorist attack, Dr. Cutter led a team of researchers who examined the use of geographical information science techniques (e.g., geographical information systems, remote sensing) in the World Trade Center rescue and relief efforts. Dr. Cutter has also led post-event field studies of evacuation behavior from the 2005 Graniteville, SC train derailment and chlorine spill, and the geographic extent of the storm surge inundation along the Mississippi and Alabama coastline after the 2005 hurricane Katrina.

In 1999, Dr. Cutter was elected as a Fellow of the American Association for the Advancement of Science (AAAS), a testimonial to her research accomplishments in the field. Her stature within the discipline of geography was recognized by her election as President of the Association of American Geographers in 1999–2000. She serves on many national advisory boards and committees including those of National Research Council, the AAAS, the National Science Foundation, the Natural Hazards Center, and the H. John Heinz III Center for Science, Economics, and the Environment.

November 8, 2005

DEPARTMENT OF GEOGRAPHY

The Honorable Sherwood Boehlert
Chairman, Science Committee
2320 Rayburn Office Building
Washington D.C. 20515

FAX: 202-225-7815

Dear Congressman Boehlert:

Thank you for the invitation to testify before the Committee on Science of the U.S. House of Representatives on November 10th for the hearing titled, "The Role of Social Science Research in Disaster Preparedness and Response." In accordance with the Rules Governing Testimony, this letter serves as formal notice of the federal funding I currently receive related to the hearing topic.

$ Amount	Grant Number	Federal Agency	Title	Year
2,415,126	Cooperative Agreement NCC13-03008	NASA	"Development of Remote Sensing-Assisted Natural and Technological Hazards Decision Support Systems"	2003
400,000	CMS6361719	NSF	"Collaborative Research: Place-Based Decision Support for Spatial and Temporal Transference of Risk and Hazards"	2004
62,275		SCEMD/FEMA/DHS	"South Carolina Hazards Assessment Geo-Information Support (SCHAGIS)"	2004
1,050,001	Z988505	DHS	"National Center for the Study of Terrorism and Responses to Terrorism (START)"	2005
30,000	Cooperative Agreement 03HQAG0018	USGS	"Multi-Hazard Vulnerability Assessment Decision Support"	2005

Sincerely,

Susan Cutter

Susan L. Cutter
Carolina Distinguished Professor
Director, Hazards Research Lab

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Chairman INGLIS. Thank you, Dr. Cutter. Dr. Laska.

STATEMENT OF DR. SHIRLEY LASKA, PROFESSOR, ENVIRONMENTAL SOCIOLOGY, DIRECTOR, CENTER FOR HAZARDS ASSESSMENT, RESPONSE AND TECHNOLOGY, UNIVERSITY OF NEW ORLEANS

Dr. LASKA. Thank you very much for permitting me to present my testimony today.

My responsibilities at the University of New Orleans include directing an applied social science research center focused on assisting coastal Louisiana communities in developing resiliency to natural disasters. I have spent the last 20 years involved in conducting research on natural disasters and the relationship between society and the environment.

CHART, the UNO project I represent, was developed specifically to apply social science research to natural threats. As a means of answering the questions posed to me by your staff, I will describe three CHART projects, one in each of the three Congressional districts that comprise southeast Louisiana. These three examples show how social sciences can partner with communities to understand risk, increase safety, and facilitate recovery from environmental hazards, including catastrophic events, such as Katrina and Rita. I will limit my oral comments to these three examples, because I think this is the unique contribution that I can make as a panel member, and will end with brief final thoughts about the need for funding and recognition of social science research. I apologize for not having a PowerPoint. We live with PowerPoint, but my office is sealed from entry because of the damage and the mold, and therefore, I was not able to do one.

The first project is in Congressman Jindal's district. FEMA has a program called repetitive flood loss. We have been asked by FEMA to maintain the files of the repeatedly flooded residential structures within the most flooded parishes within Louisiana, and to work with local officials and residents to assist them in using the data to reduce flood risks to their homes and their areas. The logic for the project is that social science research argues for having agency assistance that is locally situated, able to be involved over a significant period of time, and able to develop ongoing working relationships with community officials.

In addition, the project has expanded to demonstrate that the repeatedly flooded structures are found in clusters, due to sub-basin watershed problems. If the solutions to the repeated flooding of individual structures can be addressed in local areas, rather than for each individual home, then the integrity of the communities is maintained, and there is cost efficiency in the process. Urban sociology recognizes that neighborhoods are vulnerable to decline if vacant lots are created and not maintained, and the communities themselves become vulnerable without the tax base previously supported by those structures.

Considering approaching repetitive loss in a watershed manner, rather than by mitigating each individual structure, is new to FEMA. It is a neighborhood community response rather than an individual one. This project takes a community sociology approach supported by GIS, floodplain planners, civil engineers, and public

administration specialists. Needless to say, the data in this project, and the public portal developed for it, are being used as we meet to support the long-term recovery of the New Orleans area from hurricane Katrina.

While the repetitive flood loss project provided FEMA with a different lens to view the problem of repeatedly occurring flooded, the second project illustrates how scientific knowledge can be linked to the knowledge of the community. The second project is in Congressman Melancon's district. The National Science Foundation provided support for CHART to test a method of enhancing the capacity of marginalized communities to handle natural hazards, and this process is called the Participatory Action Research. This is a process of collaboration among academics, practitioners, and community residents to support improving capacity and resiliency of communities that are at risk.

The community with which the project researches are collaborating is a Native American community, Grand Bayou, that lives within the marsh outside of the levied area, and has done so for at least a century. During hurricanes, they lash their boats together in the lee of low lying ridges to protect themselves and their valuables. Because coastal subsidence has so reduced the elevation of the land, a group of the residents selected a canal next to a landfill hill to shelter for Katrina, because it was the highest protection they could find. Today, they are still living on the boats while seeking FEMA assistance.

The sociological findings beneficial to this project are the recognition that pre-disaster discrimination, be it economic, educational, or social, will exacerbate the impact of a disaster on a community. Sociological research also indicates that enhancing the capacity of a community to take responsibility, in partnership with government officials, for its own hazard and disaster planning, reduces vulnerability and contributes to a resiliency when future disasters occur.

Just last Saturday, I joined the community when they met with FEMA representatives to talk about how they might be able to place their FEMA trailers at their community center rather than to have to relocate a distance from their homes and boats. The way in which the community was negotiating their fate and expressing their needs in a forceful, informed manner, is a demonstration of their capacity that hopefully has been assisted in a small way by the Participatory Action Research process. The challenge to the community is the time that is required by it to overcome marginality. The challenge to the applied social scientist is to know what research indicates, and to find ways to implement it to the betterment of the community. Even though the Grand Bayou community is small, the partnership with a group of social and physical scientists strengthened their own capacity, and also provide new insights for application to other rural coastal communities.

The project in Grand Bayou shows the universal in the particular. The third project shows how traditional social science survey data can be transformed into building partnership with parish and state government, and empowering public officials. The third project encompasses all three of the Congressmen's districts, those of Melancon, Jindal, and Jefferson. It was a citizen hurricane evac-

uation behavior survey with a large enough sample to be confident of the applicability to each of the 12 southeast Louisiana parishes. The survey was accomplished by partnering with the parish and county emergency managers to create the survey instrument so that the information needs of their jurisdictions would be supported. They were included in every step of the data collection, and were the sponsors and conveners of the workshop where the data collectively presented and discussed.

Six weeks before Katrina struck, the data were also shared with the Louisiana Department of Homeland Security and the Louisiana Department of Transportation and Development, the latter group taking the lead on developing the hurricane traffic contra flow program. They used the findings to develop their evacuation campaign, and it was deemed a big success; 80 percent of the population who had automobiles and were able to do so evacuated.

The use of existing social science disaster research for this project is very evident. Dr. Susan Howell, Director of the University of New Orleans Survey Research Center, first drew upon the evacuation literature to develop the preliminary questions about evacuation, and prepared a draft instrument for review and modification by the emergency managers. With each parish's participation, there were improvements to the instrument, and unique questions that yielded evacuation information needed by specific parishes. Partnering with basic researchers, through their findings and phrasing of questions, along with the practitioners on the ground, resulted in a product and process with the most benefit. The emergency managers took ownership of the findings and trusted that they represented their residents' evacuation attitudes.

The rest of my written testimony reviews the importance of respecting and funding both applied social science research, such as I have described, and also, the basic research on which it stands. The benefits of the work CHART does are woefully incremental, because of the lack of respect by society for the work and findings of the basic social science research.

My written testimony reviews some of the important examples of such basic research about risks and organizational response. It ends with a description of how the research of both the social scientists and physical scientists went unheeded, as we predicted again and again the pending occurrence of a catastrophic hurricane that became Katrina. We must find a way to hear when scientists do good quality research that pertains to the success of our society, and we must hear the findings of the social scientists as much as that of the physical.

Thank you.

[The prepared statement of Dr. Laska follows:]

PREPARED STATEMENT OF SHIRLEY LASKA

Thank you very much for permitting me to present testimony today. My responsibilities at the University of New Orleans encompass directing an applied social science research center focused on assisting coastal Louisiana communities in developing resiliency to natural disasters.

I have spent the last 20 years involved in conducting research on natural disasters and the relationship between society and the environment. The Center for Hazards Assessment, Response and Technology (CHART), the center I currently direct, was damaged by hurricane Katrina. Due to the degree of virulent mold covering the offices and contents it has been sealed from access since the storm. The faculty asso-

ciates and graduate students are scattered around the U.S. and of those students who have been able to return to the area, almost all have been hired by FEMA because of the applied disaster research experiences that they have acquired at CHART. I have been asked to respond to two very relevant questions. I am going to address the second one and in so doing also answer the first.

Here are the questions:

> *What makes people and places vulnerable to natural hazards and disasters? How does the natural and built environment impact the perception of risk and subsequent behavior?*
>
> *How is social science research on disaster preparedness and response being translated into practice? What are the barriers to implementation of research findings and how can these barriers be overcome?*

Applied Social Science Research on Disasters

CHART, the UNO center that I represent, was developed specifically to apply social science research to natural hazard threats. It was created to do so when such a model was not present. CHART is the application of sociological research in partnership with communities, organizations and government agencies (see Appendix A for a full list of the current CHART projects). As a means of answering the questions I will describe three CHART projects, one in each of the three Congressional districts that comprise southeast Louisiana. Each of these projects, as with all of the CHART projects, have both a basic and applied component. These three examples show how social scientists can partner with communities to understand risk, increase safety and facilitate recovery from the catastrophic events of this fall.

Example #1: Repetitive Flood Loss

The first is in Congressman Jindal's district. FEMA has a program called Repetitive Flood Loss. We have been asked to maintain the files of the repetitively flooded residential structures within the most flooded parishes within Louisiana and to transfer the updated data to FEMA headquarters. We have been asked to do this so that CHART can work with local parishes and residents to assist them in using the data to reduce flood risk to their homes and to their areas. The logic for the project is that social science research argues for having agency assistance that is locally situated, able to be involved over a significant period of time and able to develop ongoing working relationships with community officials.

In addition, the project has expanded to demonstrate that the repeatedly flooded structures are found in clusters due to sub basin (watershed) drainage problems. If the solutions to the repeated flooding of individual structures can be addressed in *local* areas rather than for each individual home, then the integrity of the communities is maintained and there is cost efficiency in the process. Urban sociology recognizes that neighborhoods are vulnerable to decline if vacant lots are created and not maintained and the communities themselves become vulnerable without the tax base previously supported by those structures.

Considering approaching repetitive loss in a watershed manner rather than by mitigating each individual structure is new to FEMA. It is a neighborhood, community response rather than an individual one. By the reaction we received to the project when we were invited to demo it at FEMA headquarters, it is possible that the project may have national applications. This project takes a community sociology approach supported by GIS, floodplain planners, civil engineering and public administration specialists. Needless to say, the data in this project and the public portal developed for it are being used as we meet to support the long-term recovery of the New Orleans area from hurricane Katrina.

Example #2: Participatory Action Research

While the repetitive flood loss project provided FEMA with a different lens to view the problem of repeatedly-occurring flooding, the second project illustrates how scientific knowledge can be linked to the knowledge of the community. The second project is in Congressman Melancon's district. The National Science Foundation provided support for CHART to test a method of enhancing the capacity of marginalized communities to handle natural hazards entitled Participatory Action Research (PAR). This is the process of collaboration among academics, practitioners and community residents to support improving capacity and resiliency of communities that are at risk.

The community with which the project researchers are collaborating is a Native American community, Grand Bayou, that lives within the marsh outside of the levied area and has done so for at least a century. During hurricanes they lash their boats together in the lee of low lying ridges to protect them, themselves and their

valuables. Because coastal subsidence has so reduced the elevation of the land, a group of the residents selected a canal next to a land fill to shelter for Katrina as the hill created by the solid waste was the highest protection they could find. As the storm turned they pressed the boats into the bank by keeping the engines pushing forward. Today they are still living on the boats while seeking FEMA assistance.

The sociological findings beneficial to this project are the recognition that pre-disaster discrimination—be it economic, educational or social—will exacerbate the impact of a disaster on a community. Sociological research also indicates that enhancing the capacity of a community to take responsibility in partnership with government officials for its own hazard and disaster planning reduces vulnerability and contributes to a resiliency when future disasters occur.

Just last Saturday I joined the community when they met with FEMA representatives to talk about how they might be able to place their FEMA trailers at their community center rather than to have to relocate a distance from their homes and boats. The way in which the community was negotiating their fate and expressing their needs in a forceful, informed manner is a demonstration of their capacity that hopefully has been assisted in a small way by the Participant Action Research process. The challenge is the time that is required by a community to overcome the marginality while they must, of course, continue to occupy themselves with work—most combining several means of earning a living, child care, family and community obligations. The challenge to the applied social scientists is to know what the research indicates and to find ways to implement it to the betterment of a community. Even though the Grand Bayou community is small, the partnership with a group of social and physical scientists strengthened their own capacity and also provided new insights for application to other rural, coastal communities.

Example #3: Hurricane Evacuation Behavior

The project in Grand Bayou showed the universal in the particular; the third project shows how traditional social science survey data can be transformed into building partnership with parish and state government and empowering public officials. The third project encompasses all three of the Congressmen's districts, those of Melancon, Jindal and Jefferson. It was a citizen hurricane evacuation behavior survey with a large enough sample to be confident of its applicability to each of the 12 Southeast Louisiana parishes. The survey was accomplished by partnering with the parish (county) emergency managers to create the survey instrument so that the information needs of their jurisdictions would be supported. They were included them in every step of the data collection and were the sponsors and conveners of the workshop where the data was collectively presented and discussed.

Six weeks before Katrina struck the data was also shared with the La. Dept. of Homeland Security and the La. Department of Transportation and Development, the latter group taking the lead on developing the hurricane traffic contra flow plan. As each of these governmental units warned of the impending peak of the hurricane season and engaged in their part of the planning for an evacuation using contra flow, they were able to appreciate better how their residents saw the risk, what plans the residents were or were not making and what aspects of the residents' thinking ran contrary to what the scientists knew about safety and evacuation experiences. DOTD used the results in their "marketing" of the contra flow plan and map. However, our findings were so worrisome—two-thirds of the population felt safe in their homes in a Category 3 storm—that they were uncertain how strong to make the media advisory. Fortunately, Katrina approached as a Category 5 and thus overcame the resistance to evacuation. It is estimated that 80 percent of the population evacuated (See Appendix B for a report of this survey).

The use of existing social science disaster research for this project is very evident. Dr. Susan Howell, Director of the UNO Survey Research Center, first drew upon the evacuation literature to ask questions about evacuation after hurricane Georges. Her findings from that earlier study had some of the longest "shelf life" of any of the many surveys that she has completed. To complete the recent evacuation surveys she drew upon that same literature, prepared a draft instrument and then asked for modifications from the Emergency Managers. With each parish's participation there were improvements to the instrument and questions about unique evacuation information needs of each parish. Partnering with the basic researchers (through their findings and phrasing of questions) along with the practitioners "on the ground" resulted in a product and process with the most benefit. The emergency managers "took ownership" of the findings and trusted that they represented their residents' evacuation attitudes.

Research Needs

Applied research starts with basic scientific research and employs it in specific settings and/or to address practical problems. In the course of doing applied research, however, we expand on and make contributions not only to problem solving, but also to basic science. Thus, while the funding of basic scientific research is critical, it is not enough if we are to address the needs to understand and mitigate risks and disasters. We must take science into the field, test it, and modify it. This requires funding sources for applied research, especially as it relates to hazards and disasters. When I tried to expand the NSF Participatory Action Research Project (described above) reviewers questioned the appropriateness of NSF funding such applied research. Federal "mission" agencies such as EPA, NOAA, and FEMA are beginning to recognize the importance of such research but to date this has been minor and intermittent. FEMA pleaded "poverty" when asked by Senator Landrieu after hurricane Ivan to supplement the initial evacuation study with a follow up to examine evacuation fatigue after the near hit. Much more of a commitment from these agencies is necessary.

The reason for this lack of commitment is the past inability of the society to successfully prevent the catastrophic impacts of natural and technological disasters. We cannot stop a hurricane, but we can plan for evacuations, greater protection, greater resiliency and in general safer ways to live and work. **So, I believe that it is extremely important to fund the broader, more basic research questions of how to enable our society to embrace a more successful approach to natural disaster response.** A significant body of work has emerged but much more needs to be done. Examples of such extremely "useful" research include Charles Perrow 1980s work *(Normal Accidents: Living with High-Risk Technologies)* that considered the complexity of the cause of technological failure, Lee Clarke's work *(Mission Improbable: Using Fantasy Documents to Tame Disaster)* about the weaknesses in disaster response plans and his just released research, *Worst Cases* in which he challenges the use of probability instead of possibility in considering risk. Roger Pielke's work explores the importance of integrating social science research with the physical in his analysis of climate policy and the weather community not embracing the decision needs of users, i.e., the human dimensions of the challenge *(Prediction: Science Decision-Making and the Future of Nature* with William Hooke).

The usefulness of this research is exemplified by Diane Vaughn's research *The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA.* When the Shuttle *Columbia* crashed in 2003, the investigating commission adopted many of her recommendations in their proposal for the reorganization of NASA activities. Ongoing research like that of Bob Gramling and Bill Freudenburg on the "five disasters" of Katrina, all but one being social disasters rather than physical, is the type of work that is emerging from this current catastrophe which has potential to assist in adjusting the societal response to these events.

Much more of such quality research and implementation of the findings must be achieved. We no longer can delude ourselves that we have the resources as a society to accept another Katrina, a nuclear accident, or any other event of such magnitude when the means to mitigate these are emerging from social science research on risks and disasters. We must fund such research and keep it front and center as we address these critical issues.

Resistance to "hearing" the findings of such basic research as well as that of the applied work which we do is remarkable. I want to end my testimony with an example demonstrating the extreme resistance that must be overcome.

The Tale of the Hurricane Katrina "Whistle Blowers"

I was requested to give testimony to this committee for a few reasons—having disaster social science expertise, trying to apply the findings of social science research, being the Director of a research center that was the victim of hurricane Katrina, to name a few. More specifically, I was one of the scientists who predicted with unwavering accuracy that such an event as Katrina would happen and what the results would be when it did. *http://www.colorado.edu/hazards/o/nov04/nov04c.html*

My predictions were a compilation of the research findings of many scientists, physical as well as social. And they too were speaking about what their findings told them. I was not a lone voice, but rather was among a chorus of scientists from both physical and social science disciplines who predicted that it would happen and what the consequences would be. The specialties of the other scientists included coastal geologists, coastal hydrologists who do hurricane impact modeling, geographers, demographers, stratification and community sociologists, coastal ecologists, civil engineers, political science policy specialists and meteorologists. And the cases they made were not only in scientific journals but also in the popular media and applied

professional publications such as *Scientific American, National Geographic, Natural History,* the *Natural Hazards Observer,* the *New York Times, Washington Post* and *Los Angeles Times* and the prize-winning series in the *New Orleans Times Picayune.*

We also presented our conclusions at numerous professional gatherings. And when we did one could feel the audience inhale. A few would come up after the talk to tell us of their shock. Others would say we were exaggerating and dismiss us as "doomsayers." On occasion someone would follow up with an e-mail, phone call and take steps to broadcast in their own professional or even personal world what we predicted was going to happen.

The last example of this before Katrina was a lengthy phone conference call a CHART colleague and I had with a NOAA official four days before Katrina hit. He had been horrified by the content of the abstract of my June Hart Senate Bldg. presentation available on the American Meteorological Society web site predicting Katrina in which I described the incredible challenges that the poor would experience evacuating the city *(http://www.ametsoc.org/atmospolicy/documents/SeminarFlyer.pdf).*

Before the storm hit he prepared a nationwide letter to the Catholic bishops. That was an important personal act but given the enormous data available, why didn't the existing research matter enough to prevent, or at least, reduce the devastation that has occurred? To put it differently, how could it be that the society at all levels was not organized or prepared "to hear."

The Federal Government has been the sponsor of most of the research that has been conducted by social scientists on environmental disasters. Because of its role it is the prime level of government to be leading an effort to expand the research and to facilitate its use; I encourage it to take stronger responsibility for using the findings to the betterment of society.

It is imperative that social science research be seen as an equal contributor to the physical sciences in asking the most pertinent research questions about environmental disasters, in formulating powerful research questions and in receiving support to implement top quality research. But as that is accomplished we must find better ways for the organizations, the government agencies, the policy-makers to *value* the findings and to address the obligations of their positions more responsibly (a finding of Bill Freudenburg's research on risk and "recreancy," *Social Forces,* 1993) and that includes with recognition of the importance of using social science research findings.

Final thought. I was not participating in some abstract intellectual exercise during the last few years as I was drawing from my own and others' existing research to warn professional group after professional group of an impending Katrina. The result of those warnings not being heeded was the *end of my community.* And as our warnings were accurate, this doom assessment of the impact is not hyperbole. Recovery of coastal Louisiana from hurricanes Katrina and Rita is in my opinion uncertain. We do not yet know if we have the family, organizational and governmental resources, ability and energy to accomplish it. And the cost to the society is astronomical. This is the outcome of scientists not being heard. And it doesn't get any more personal for a scientist than Katrina has been for me.

Attachment A

Center for Hazards Assessment, Response & Technology (CHART)

University of New Orleans

Mission Statement

UNO CHART is an applied social science research center devoted to enhancing the resiliency of Louisiana communities in light of the natural/environmental hazards and technological and homeland security risks to which they are vulnerable.

Current Projects

Regional U.S. Response to Global warming: The Uses of Climate Change Science by Gulf Coast Stakeholders (EPA)

Social Impact Assessment (SIA) of Coastal Restoration Projects: Caenarvon, Third Delta, Bayou Lafourche, Port Fourchon, and Lake Catherine (La. DNR and Gov. Office of Coastal Affairs)

Region 6 Repetitive Flood Loss Data Base, GIS and Portal: Reducing Repetitive Flood Losses Through Individual and Local Area Measures (FEMA)

Hurricane Evacuation Behavior of Residents of Southeast Louisiana: Individual Parish Surveys Guided by Parish Officials' Response Needs (FEMA)

Neighborhood Local Emergency Response Capacity: Assessing Improvements from District of Columbia Neighborhood Cluster Plans & Drills (DC)

Enhancing Marginalized Community Resiliency towards Natural Hazards: The Use of Participatory Action Research (PAR) in Louisiana Coastal Communities (NSF)

Potential Effects of Climate Change and Variability on Transportation Infrastructure and Systems in the Central U.S. Gulf Coast (DOT)

Social/Community Aspects of Coastal Restoration (NOAA)

Disaster Resistant University Project (FEMA)

Hurricane Evacuation of Residents without Transportation: Faith-based/Community/Red Cross/University Collaboration to Develop a Cost-Sharing Program (BCM and Ghenes Foundations)

Coastal Community Resiliency in Context of Dramatic Coastal Land Loss from Global Climate Change and River Delta Deterioration (NOAA)

Attachment B

Citizen Hurricane Evacuation Behavior in Southeastern Louisiana: A Twelve Parish Survey

Released by
The Southeast Louisiana Hurricane Taskforce

UNIVERSITY *of* NEW ORLEANS

Survey Research Center

In Collaboration with the

Center for Hazards Assessment, Response and Technology (CHART)

and the Department of Geography

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View SRC surveys at uno.edu/~poli/unopoll

July, 2005

The Southeast Louisiana Hurricane Taskforce
(parishes participating in survey)

Parish	OEP Director
Assumption	John Boudreaux
Jefferson	Walter S. Maestri, III
Lafourche	Greg Serigny
Orleans	Joseph Matthews
Plaquemines	Jesse St. Amant, President
St. Bernard	Larry Ingargiola
St. Charles	Tab Troxler
St. James	Gerald Falgoust
St. John	Paul Oncale
St. Tammany	Dexter Accardo
Tangipahoa	John Ballard
Terrebonne	Michael Deroche

The UNO Research Team

Dr. Susan E. Howell	Director of the Survey Research Center
Dr. Shirley Laska	Director of the Center for Hazards, Assessment, Research and Technology (CHART)
Dean E. Bonner	Research Associate, Survey Research Center
Dr. Ronald Hagelman	Assistant Professor of Geography
John Adams	GIS Analyst

Introduction

Given the propensity for hurricanes to threaten southeast Louisiana and the importance of citizen response to these threats, Southeast Louisiana Hurricane Task Force and the University of New Orleans Survey Research Center (SRC), in collaboration with the Center for Hazards Assessment, Response and Technology (CHART) and the UNO Department of Geography, have conducted a study of citizen evacuation behavior in twelve parishes. The research was funded by FEMA through its Hazard Mitigation Grant Program.

Working with Office of Emergency Preparedness officials in the parishes of the Southeast Louisiana Hurricane Task Force, the UNO SRC designed and implemented a survey for each parish to determine citizen evacuation decision-making, obstacles to evacuation, and sources of information utilized when threatened by a hurricane.

The surveys were customized to each parish according to the recommendations of the OEP officer in that parish. Questions were included or excluded depending on the particular situation in each parish, and in some parishes certain geographic areas were targeted. A description of the geographic composition of each survey is in the Appendix.

At least 400 residents were interviewed in every parish, totaling to over 4,800 respondents. This summary report does not combine the twelve surveys because there are some clear differences in willingness to evacuate and hurricane risk perception from parish to parish, differences which would be masked if the surveys were pooled.

What follows is a summary of the key findings of the Citizen Hurricane Evacuation Behavior Surveys and the implications of these findings for public education and future evacuations.

Pre-Ivan and Post-Ivan Surveys

The study began in the spring of 2004, of course not knowing that a major evacuation would occur in September 2004 with Hurricane Ivan. As a result, eight parishes were surveyed prior to Ivan, one parish was split between pre- and post-Ivan surveys, and the remaining three parishes were surveyed following the Ivan evacuation. The pre- and post-Ivan results are noted when appropriate throughout this report.

Parishes Surveyed Before Ivan: Orleans, Jefferson, Plaquemines, St. Bernard, LaFourche, Assumption, Terrebonne, St. Tammany (south of I–12), St. James (half).

Parishes Surveyed After Ivan: St. John, St. Charles, Tangipahoa (south of I–12), St. James (half).

Risk Perception

The most remarkable finding in this study is the low perception of risk felt by most residents in southeast Louisiana. In nine of the twelve parishes, 60 percent or more of the respondents said they felt safe in their homes if a Category 3 hurricane came near.[1] Far fewer residents believe they would be safe in a Category 4 storm, indicating that the difference between Category 3 and Category 4 is the border at which most people believe they are at risk (Table 1). However, based on predictions about flooding from federal agencies, disaster officials in all of these parishes consider nearly everyone in the areas surveyed to be at risk in their home in a Category 3 hurricane.

Two factors summarize why people feel safe in their homes in a Category 3 hurricane: beliefs about the strength or location of their house and their past experiences. The following specific perceptions and experiences are at the root of this feeling of safety:

- Having lived in south Louisiana more than thirty years
- Never having lived in a home damaged by a hurricane
- A belief that one's home is strong, sturdy, brick, elevated, or some other factor that protects it
- A belief that one's home is on high ground/not in a flood zone.

People naturally rely on their past experiences to assess how safe they are. Many residents of southeast Louisiana have lived here all of their lives and never experienced hurricane damage to their home. In fact, an average of 40 percent of residents in these parishes have both lived in southern Louisiana more than thirty years *and* have never had hurricane damage to their home (Table 1). It is difficult for some

[1] Exceptions are Plaquemines—36 percent, Assumption—46 percent, and St. Charles—58 percent.

of these longtime residents to realize that the environment is much different today, and that past experiences are probably not relevant.

In eight of the twelve parishes,[2] high and middle income residents feel safer than lower income residents, which sounds reasonable on the surface because low income people are more likely to live in trailers, less sturdy houses, or in low lying areas. However, having a well-built house or living in an elevated subdivision does not mean you are safe in a Category 3 hurricane. Public education about the lack of protection in a Category 3 afforded by a "strong" house or a housing development that is higher than the surrounding area is needed.

There is no evidence that the Ivan experience affected citizens' perception of risk in a Category 3 hurricane. This makes sense when we remember that Ivan was a Category 4, the type of storm where many more people feel in danger, so there is no reason the Ivan experience would affect risk perception in a Category 3.

Willingness to Evacuate When Recommended

- Sixty percent or more of residents in all twelve parishes *say* they would leave their home for a safer place if evacuation were recommended by public officials (Table 2). Because these answers are exaggerated by social desirability bias, a more reliable estimate is those who responded that they would "definitely" evacuate, not those who merely said they would "probably" evacuate. Those who say "definitely" ranged from a low of 27 percent in Jefferson to a high of 52 percent in St. Charles, averaging 34 percent across the twelve parishes.
- **In all of the parishes the perception of risk in a Category 3 storm is the best predictor of intention to evacuate.** This may seem somewhat obvious, but it illustrates why educating citizens as to their risk is important. As long as so many residents do not perceive much risk, they will not be inclined to leave their homes in a Category 3 storm, even with an official recommendation.

Actual Evacuation in Last Recommended Evacuation

As we might expect, in nearly all of the parishes the number of people who actually leave their home after an official recommendation is much lower than the number who *say* they would leave.[3] In fact, the percentage that left their home in the last recommended evacuation varied considerably across these twelve parishes (Table 2) depending partly on actual risk (the location of the parish relative to the coast, parish elevation, the severity and direction of the storm), and the perception of risk.

- Among the four parishes where Lili was the last recommended evacuation, evacuation levels ranged from a low of 13 percent in southern St. Tammany to a high of 53 percent in Plaquemines. A similar pattern emerged in parishes where Georges was the last recommended evacuation; St. James had the lowest percent evacuating (21 percent), and Jefferson was the highest (46 percent). Again in the post-Ivan parishes the effect of geography was apparent with southern Tangipahoa having the lowest percent evacuating (17 percent) and St. Charles the highest (71 percent).
- Evacuation north of Lake Ponchartrain, in the areas south of I–12 in St. Tammany and Tangipahoa, is a relatively new phenomenon. As a result, these residents have felt protected by geography from hurricanes; 65 percent in St. Tammany south of I–12 and 74 percent in Tangipahoa south of I–12 say they are safe in their homes in a Category 3 storm. This perception is the primary barrier to evacuation.
- In ten of the twelve parishes, the perception of risk in a Category 3 storm is the single best predictor of actually leaving home in the last recommended evacuation.[4]

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[2] In three parishes income had no relationship to risk perception, and in Assumption, the non-poor (those with more than $25,000 annual income) feel less safe.

[3] The exception is St. Charles where 71 percent actually left their homes in Ivan.

[4] Exceptions are Jefferson, where the best predictor of evacuation in Georges is being female, and St. James where the best predictor of evacuation in Ivan is perceived risk in a Category 4.

Citizen Focus on Storm Category

- In every parish **citizens focus on the severity or category of the storm and how much threat they think it means in deciding whether or not to leave.** In open-ended questions about why people left in the last recommended evacuation, storm severity was always the first or second response (Table 3).
- Storm severity is also cited often as a reason not to leave, i.e., "it was not severe enough." This focus on storm category is why citizen cooperation with a recommended evacuation depends on their awareness of what category is dangerous for them.

Types of People Are Most/Least Likely to Evacuate (Table 4)

- In eight of the twelve parishes **females** are more likely than males to cooperate with an official recommendation to evacuate during a hurricane.[5] This pattern has been repeatedly found in studies of evacuation in other areas of the country. Females are more likely to take responsibility for children and the elderly, and generally more likely to be cautious. In no parish are males significantly more likely to evacuate.
- In six of the twelve parishes, **people who have lived in a home damaged by a hurricane** are more likely to heed the official recommendation to evacuate.[6] As mentioned above, they are more likely to feel they are at risk. In these six parishes, an average of less than half (42 percent) of the residents have ever experienced hurricane damage. In some ways southern Louisiana is now a victim of its past good luck; most residents have not experienced damage, and lack of prior hurricane experience promotes a feeling of safety and thus resistance to evacuation.
- In six of the twelve parishes, **people who have lived in southern Louisiana more than thirty years** are less likely to evacuate.[7] Long-term residents have lived through many hurricane threats, and since most of those hurricanes have not directly hit southern Louisiana, these residents are less likely to feel that they should leave their homes. An average of 74 percent of the residents in these six parishes have lived in southern Louisiana more than thirty years. In no parish were long-term residents significantly more likely to evacuate.

The Role of Income

- The role of income is not simple. If we are referring to *leaving one's home,* income has no consistent relationship to evacuation. In Lafourche, Plaquemines and southern Tangipahoa lower income residents were more likely to evacuate than higher income residents. But in Orleans, the higher income residents were more likely to evacuate, and in Assumption and St. James, the non-poor (over $25K income) were more likely to evacuate. Furthermore, in six parishes income bore no relationship to evacuation.
- **However, in six of the nine parishes surveyed prior to Ivan, residents with lower incomes were more likely than those with higher incomes to either evacuate within their parish or go to another nearby evacuating parish** (Table 5).[8] Many of these evacuees probably went to friends' or relatives homes, or to a place of employment, where they felt safer than in their own homes.
- In the stronger storm, Ivan, low income evacuees tended to go to safe areas.[9]
- Thus, although income is not related in any consistent way to leaving one's home during a recommended evacuation, income is related to the distance traveled, especially if the storm is below a Category 4.

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[5] Parishes in which males and females left their homes in nearly equal proportions are Orleans, Plaquemines, southern St. Tammany, and Tangipahoa.

[6] Parishes are Assumption, Lafourche, St. Bernard, St. James, Terrebonne, and St. John.

[7] Parishes are Assumption, Jefferson, Plaquemines, St. Charles, Terrebonne, and Tangipahoa.

[8] The exceptions to this pattern are Plaquemines where people went to a safe regardless of income, Terrebonne, where evacuees did not go to a safe place regardless of income, and St. Tammany where an evacuee could remain within their parish and still be safe.

[9] The exception is St. James in Ivan, where the low income residents were much less likely to go to a safe place.

- The number of low income residents who remain in harm's way illustrates the need for both education about the need to travel far enough and providing evacuation assistance to those without means.

The "Ivan Effect"?

- Ivan was the largest evacuation experienced by southeastern Louisiana, but from our research, there does not appear to be either a positive or negative effect on willingness to evacuate in the future.
  - Willingness to evacuate in the hypothetical evacuation scenario is nearly identical in the pre- and post-Ivan parishes.
  - Residents in the parishes surveyed after Ivan perceive no more or less risk in a Category 3 hurricane than residents in the parishes surveyed prior to Ivan.
  - An average of 86 percent of Ivan evacuees in the four post-Ivan parishes say they would do the same thing under similar circumstances. This is quite similar to the responses after Georges and Lili.
  - The percentage of people saying they have an evacuation plan is the same in the post-Ivan parishes and the pre-Ivan parishes.
  - Those who spent the most time on the road were no less willing to evacuate in the future.

The Role of Family and Friends

- The process of deciding to evacuate during a hurricane is not just a matter of waiting for the official recommendation. Friends and relatives play an important role in an individual's decision about what to do in two ways:
  - People receive advice from friends and relatives.
  - People evacuate due to concern for a friend or relative.
- In three of the four parishes surveyed after Ivan, one or both of the factors above were mentioned spontaneously second only to the severity of the storm as a response to the question, "What convinced you to go someplace else" (Table 3).[10]

Evacuation Planning

- In nine of the twelve parishes 41–49 percent say they have a definite evacuation plan (Table 1). These numbers are probably inflated by social desirability, but having a plan is related to actual evacuation in Ivan. Of course, planning is also a consequence of a person's intention to evacuate, so these two behaviors mutually reinforce each other.
- Having an evacuation plan, like evacuation itself, is related to risk perception. People who believe they are at risk in a Category 3 hurricane are more likely to have a definite plan. So we return full circle to the importance of knowing one's actual risk.

Sources of Information and Advice

- In every parish, the TV meteorologists are the most important source of information, which is not surprising given the saturating nature of weather coverage during a hurricane. However, the meteorologists are utilized more as sources of *information* about the category and projected path of the storm, rather than *advice about what to do.* Residents rely on their own perceptions of risk, past experiences, public officials, family, and friends in making an evacuation decision.

[10] We cite the post-Ivan parishes here because answers to questions about reasons for evacuation in Ivan are more reliable than answers about behavior in previous storms.

Table 1
Risk Perception, Past Experiences, and Having a Plan

Parish	% Feel Safe in a Category 3 Storm	% Feel Safe in a Category 4 Storm	% Living in South La. 30+ Years	% Never Having Lived in a Damaged Home	% Living in South La. 30+ Years *and* Never Having Lived in a Damaged home	% Having a Definite Plan
Pre-Ivan						
Assumption	46	---[a]	81	62	47	41
Jefferson	63	---	65	66	38	45
Lafourche	75	---	76	57	41	41
Orleans	62	---	61	65	36	48
Plaquemines	36	15	70	48	26	62
St. Bernard	65	---	74	52	36	43
St. James (half)	60	33	77	72	52	46
So. St. Tammany	65	30	57	60	26	49
Terrebonne (southern region)	60	---	81	47	40	58
Post-Ivan						
St. Charles	58	21	72	64	43	57
St. James (half)	63	35	77	70	50	41
St. John	65	27	62	72	42	46
So. Tangipahoa	74	40	73	68	49	42

[a] This question was not asked in these parishes.

Table 2
Evacuation Behavior

Parish	% that Would Evacuate in the Hypothetical Scenario[a]	% that Would Definitely Evacuate in the Hypothetical Scenario	% that Evacuated in the Last Recommended Evacuation	% of Evacuees who Evacuated to a Safe Area
		Pre-Ivan		
Assumption	80	41	35 (Lili)	52
Jefferson	70	27	46 (Georges)	80
Lafourche	69	31	28 (Georges)	42
Orleans	70	30	36 (Georges)	68
Plaquemines	80	41	53 (Lili)	85
St. Bernard	66	30	46 (Georges)	76
St. James (half)	73	43	21 (Georges)	37
So. St. Tammany	70	31	13 (Lili)	---[b]
Terrebonne (southern region)	73	41	42 (Lili)	31
		Post-Ivan		
St. Charles	78	52	71 (Ivan)	94
St. James (half)	73	30	32 (Ivan)	65
St. John	60	32	42 (Ivan)	93
So. Tangipahoa	67	28	17 (Ivan)	---[b]

[a] Includes "probably" and "definitely" would evacuate if recommended by public officials in parish.
[b] These figures are omitted because someone could evacuate within St. Tammany or Tangipahoa parish by going north and still be safe.

Table 3
Free Response Reasons for Leaving Home in Last Recommended Evacuation

Parish	#1 Reason Convincing People to Evacuate	#2 Reason Convincing People to Evacuate
	Pre-Ivan	
Assumption	Concern about Severity/ Category of Storm	Structure of Home not Safe
Jefferson	Concern about Severity/ Category of Storm	Concerned about Direction of Storm
Lafourche	Concern about Severity/ Category of Storm	Concern Regarding Family
Orleans	Concern about Severity/ Category of Storm	Advice from Friend or Relative
Plaquemines	Concern about Severity/ Category of Storm	Concern Flooding Would Cut Off Roads
St. Bernard	Concern about Severity/ Category of Storm	Advice from Friend or Relative
St. James (half)	Concern about Severity/ Category of Storm	Structure of Home not Safe
So. St. Tammany	Concern About Severity/ Category of Storm	Concern Flooding Would Cut Off Roads
Terrebonne (southern region)	Concern about Severity/ Category of Storm	Concern Flooding Would Cut Off Roads
	Post-Ivan	
St. Charles	Advice or Order by Elected Officials/ Mandatory Evacuation	Concern about Severity/ Category of Storm
St. James (half)	Concern about Severity/ Category of Storm	Advice from Friend or Relative
St. John	Concern about Severity/ Category of Storm	Concern Regarding Family or Friend
So. Tangipahoa	Concern about Severity/ Category of Storm	Concern Regarding Family or Friend

Table 4
Types of People Who Evacuated
(Entries are percent evacuating in last recommended evacuation)

Parish	Male	Female	Having Lived in a Damaged Home	Never Having Lived in a Damaged Home	Living in Southern Louisiana less than 30 Years	Living in Southern Louisiana more than 30 Years	Feeling Safe in a Category 3 Storm	Not Feeling Safe in a Category 3 Storm
				Pre-Ivan				
Assumption	29	44	46	31	59	31	17	57
Jefferson	46	56	50	52	60	47	49	55
Lafourche	23	38	40	24	34	30	23	59
Orleans	45	40	44	42	47	40	37	54
Plaquemines	53	60	58	54	67	51	31	72
St. Bernard	42	56	55	43	43	51	40	65
St. James (half)	22	23	30	19	29	20	12	42
So. St. Tammany	12	18	15	14	13	16	9	30
Terrebonne (southern region)	34	50	53	30	51	40	25	69
				Post-Ivan				
St. Charles	64	79	74	70	80	68	64	82
St. James (half)	24	41	30	33	36	31	18	60
St. John	38	48	52	39	45	41	38	50
So. Tangipahoa	15	21	20	17	26	15	10	41

Table 5
Percent Evacuating to a Safe Area by Income

Parish	Poor (Income below $25,000)	Non-Poor (Income above $25,000)
	Pre-Ivan	
Assumption	41	80
Jefferson	57	87
Lafourche	29	54
Orleans	58	74
Plaquemines	83	85
St. Bernard	67	78
St. James (half)	27	57
So. St. Tammany	---[a]	---[a]
Terrebonne (southern region)	25	34
	Post-Ivan	
St. Charles	89	96
St. James (half)	50	80
St. John	87	95
So. Tangipahoa	---[a]	---[a]

[a] These figures are omitted because someone could evacuate within St. Tammany or Tangipahoa parish by going north and still be safe.

Table 6
The Ivan Evacuees, Hours on the Road and When Left Home

	Hours on Road			When Left Home						
	0-5	6-10	10+	Monday or prior	Tuesday AM	Tuesday PM	Wednesday AM	Wednesday PM	Don't Know	N
St. Charles	44%	35	21	10%	22	31	19	9	9	283
St. James (half)	63%	24	13	4%	20	33	20	22	---	80
St. John	39%	32	29	7%	22	35	21	9	5	168
So. Tangipahoa	61%	29	10	11%	16	17	23	26	6	70

Appendix

Parish	Area of Parish Surveyed	Number of Interviews
Assumption	Entire Parish	401
Jefferson	Entire Parish	404
Lafourche	Entire Parish	406
Orleans	Entire Parish	400
Plaquemines	Entire Parish	401
St. Bernard	Entire Parish	405
St. Charles	Entire Parish	401
St. James	Entire Parish	223 pre-Ivan, 252 post, Ivan
St. John	Entire Parish	402
So. St. Tammany	Only Residents South of I-12	400
So. Tangipahoa	Only Residents South of I-12	400
Terrebonne	Parish divided into two regions, the Houma region and the southern region	149 from Houma region and 302 from the southern region

BIOGRAPHY FOR SHIRLEY LASKA

Dr. Shirley Laska is Director of the Center for Hazards Assessment, Response and Technology (CHART) and Professor of Sociology at the University of New Orleans. Prior to serving as the University's Vice Chancellor for Research from 1993–2001 she founded the Environmental Social Science Research Institute, precursor to CHART. Dr. Laska is an environmental and natural hazards sociologist with a focus on encouraging the application of social science to societal challenges engendered by these phenomena. For this effort in 2000 she received the Outstanding Contribution to Environment and Technology Award given by the American Sociological Association. For over 20 years she has been engaged in policy and applied research funded by federal agencies such as EPA, MMS, FEMA, NOAA, Sea Grant and HUD as well as State and local agencies. Her work has drawn attention to the need for more sub-regional analysis of hurricane evacuation behavior; more consideration of government support of self-protective homeowner flood mitigation responses; more attention to considering local area drainage solutions to repetitive flood loss rather than demolition of individual repeatedly flooded residences; inclusion of the human/social impacts of coastal restoration rather than only the ecological; and also improving hazard mitigation outcomes by including community members and stakeholders as full participants in efforts to reduce the human risk to hazards.

Dr. Laska received a BS degree in Communications at Boston University, 1966; a Ph.D. in Sociology at Tulane University, 1973; and was post-doctoral fellow at the International Center for Medical Research, Tulane University, School of Medicine, 1972–74. She is the author, co-author or editor of several books and book chapters, and has published numerous articles in the peer-reviewed literature.

Chairman INGLIS. Thank you, Dr. Laska. Dr. O'Hair.

STATEMENT OF DR. H. DAN O'HAIR, CHAIRMAN, DEPARTMENT OF COMMUNICATIONS, UNIVERSITY OF OKLAHOMA

Dr. O'HAIR. Chairman Inglis, Ranking Member Hooley, my home State Congressman Lucas, and Members of the Subcommittee, good morning. I want to thank you for inviting me to share my thoughts on the role of the social science research in disaster preparedness and response. It is a privilege to testify before you this morning.

You asked that I respond to four questions in my brief five-minute presentation, and I will address each one in turn.

First, how do individuals respond to warnings and other risk communication? Risk communication and crisis communication have been studied for a couple of decades on a formal basis, but after 9/11 and the anthrax crises in 2001, and now, more recently, with hurricane Katrina, the tsunami, and Rita, a renewed emphasis has been placed on understanding how public officials communicate risks and warnings to the public. The most recent iteration is President Bush communicating risk messages about the potential for an avian bird flu pandemic. In many ways, risk communication can cultivate a culture of awareness that Jay Wilson alluded to earlier this year at a hearing of the House Science Committee on the subject of tsunami preparedness. Slide.

Substantial research has been devoted to risk perception factors, that include an individual's perception of dread, their sense of control, whether the threat is manmade or natural, and whether it affects children. Sociopolitical factors, such as power, status, ethnicity, culture, education, and perhaps most importantly, trust, are known to influence people's perception and acceptance of risk. Slide.

[Slide]

What role does the media play in risk communication and the formation of public behaviors and views? People depend upon multiple sources of information for risk information, including TV, radio, newspapers, friends, and the Internet. Recent research indicates that some people first learn of disasters from others. For example, instant messaging was a prevalent means of warning during the tsunami disaster. Slide.

[Slide]

Often, the media operate from a sensationalism principle, where their interest is in casting the context of risk through political and human interest lenses, frequently omitting risk factors. This was particularly evident during the coverage of Katrina, where opinionated journalism became accepted among some of the more harsh media critics. It was difficult for journalists to separate their human emotions from their reporting. Slide.

[Slide]

However, in the aftermath of Katrina, the media provided much needed information, emotional support, and companionship to victims who felt isolated and alone. So, from these contrasting views, we have come to learn that journalistic and broadcast activities create what we have termed the paradox of media coverage. On the one hand, media serve a number of valuable, if not essential, functions for victims, consumers, government officials, and other organizations. Alternatively, the media often frame their messages in

ways that omit critical information, sensationalize the situation, and politicize the context of the disaster event. Slide.

[Slide]

What lessons have we learned from effective and ineffective risk communication about natural disasters and hazards? A GAO report citing extant risk communication research suggests that the most important principles for communicating risk and threat information involves the following: messages should be consistent, accurate, clear, provided repeatedly through multiple methods; two, information should be timely; and three, information should be specific about the threat, including the nature of the threat, when and where it is likely to occur, and directions on preventive measures or protective responses.

Another important issue is what we call the risk-source match. Do we have the right person communicating for the right crisis with the right message? We found through research that when the event is national, federal spokespersons are preferred. When the event is more localized, people want someone they know, someone from their community.

Trust is an all important goal of risk communication strategies. Earlier this year, the World Health Organization issued its long awaited guidelines for outbreak communication. Trust building is the first communication principle highlighted in their document. Research had also demonstrated that different government organizations elicit different expectations about trustworthy activities, and accordingly require different trust enhancing securities. Slide.

[Slide]

What are the top remaining research questions in this area? First, building a community based communication infrastructure. Risk and crisis communication programs must be designed, tailored, and executed at the community level. Through these processes, community specific communication infrastructures can be built to facilitate risk and crisis communication plans. Second, media use is often thought of as a moving target, with new services and tools rolled out on a continuous basis: alerting services, blogs, instant messaging, reverse 911, et cetera.

Given the expectation of emergent media and their use by individuals, which of these media are most recognized as trustworthy sources of information and advice during disaster conditions, and what conditions of media are utilized in various conditions? Additional research questions should focus on literacy and intercultural issues, as well as leveraging technology. Slide.

[Slide]

Let me summarize by stating how gratified I am that one of the organizations that this subcommittee oversees, the National Science Foundation, on multiple occasions has identified risk communication as an essential ingredient in a complex array of processes necessary for disaster preparedness, response, and management. Just about every GAO report on public response to emergencies places communication on the top of the list. I echo this sense of priority.

My colleagues and I from the social sciences welcome the challenge and opportunity to play an important role in building a communication infrastructure that addresses the essential components

of communicating effectively with our citizenry before, during, and after disasters.

This concludes my prepared statement. I would be happy to answer any questions that you may have.

[The prepared statement of Dr. O'Hair follows:]

PREPARED STATEMENT OF H. DAN O'HAIR

Chairman Inglis, Ranking Member Hooley, my home state Oklahoma Congressman Lucas, and Members of the Subcommittee, good morning. I want to thank you for inviting me to share my thoughts on the role of social science research in disaster preparedness and response. It is a privilege to testify before you this morning, not only as a research faculty member of the University of Oklahoma and incoming President of the National Communication Association, but also as a social scientist interested in the intersection of communication research and disaster preparedness and response.

You asked that I respond to four questions in my brief five minute presentation. I will address each one in turn. However, before doing so I want to comment on the status of research on risk and crisis communication. Our research group at the University of Oklahoma has discovered well over 120 different systemic bodies of work on risk and crisis communication. These are not single research projects but theories, concepts, and lines of thought pertaining specifically to risk and crisis communication. Like other scientific communities, varying opinions are common with occasional disagreement over fundamental issues; however, I find that level of contentiousness healthy, especially in light of how far communication science has progressed in the last ten years. In a briefing delivered to Congress last year, I termed this state of affairs as an "embarrassment of riches." Let me give you illustration of what I am referring to. The Figure One reflects the state of the field about a decade ago. The risk/crisis communication process was conceived of as relatively direct and linear. The Figure Two demonstrates the complexity of the field of risk and crisis communication today. As you can see, we have substantive theoretical research from which to work. In the time I have remaining allow me to unpack a few of these issues.

First, how do individuals respond to warnings and other risk communications? How important is the perception of risk—rather than a quantitative estimate of it—in determining individual or societal response to a natural hazard or disaster? And how do responses vary, based on individual cultural, economic and experiential differences?

Risk communication and crisis communication have been studied for a couple of decades but after the 9/11 and anthrax crises in 2001, and now more recently with the tsunami, Katrina, Wilma, and Rita, a renewed emphasis has been placed on understanding how public officials communicate risk and warnings to the public. The most recent iteration is President Bush communicating risk messages about the potential for an Avian Bird Flu Pandemic. In many ways, risk communication can cultivate a "culture of awareness" that Jay Wilson alluded to earlier this year at a hearing of your House Science Committee on the subject of tsunami preparedness.

Risk Perception

Substantial research has been devoted to risk perception factors (Ropeik & Slovic, 2003) that include an individual's perception of *dread* (the significance of the threat), their sense of *control* (the extent to which they feel they have some level of management over the threat), whether the threat is *man-made or natural.* Other issues pertinent to risk perceptions include: does it affect *children,* is the risk *novel or new,* and what is the risk *probability* (can it happen to me)? Additional factors weighing into the risk perception equation includes the *magnitude* of the perceived risk—people have a tendency to overestimate small risks and underestimate large risks (LaFoutain, 2004); *gender*—white males seem to perceive risks differently than other groups—on average, they perceive risks as much smaller and much more acceptable than do other people; and sociopolitical factors such as power, status, ethnicity, culture, education, and trust are known to influence people's perception and acceptance of risk (Flynn, Slovic, & Mertz, 1994).

A different line of research has demonstrated a "negativity bias" where people weigh negative information more strongly than positive information (Flynn et al., 2002), while other studies reveal an opposite pattern where people feel a sense of self-efficacy toward risks leading to an "optimistic bias." Given the varying perception levels among certain groups, it is concerning that the National Research Coun-

cil reports that much of the forecast delivery messages are designed for "the educated, the affluent, the cultural majority, and the people in power," with the least effective messages oriented for minorities, the elderly, and the poor (NRC, 1999, p. 86).

One of the more interesting and potentially frustrating perceptions that some individuals formulate is "intuitive epidemiology" (Kalichman & Cain, 2005). These lay-experts have been exposed to enough of risk message regarding the threat and have formulated their estimation of how serious and likely the threat is for them. If an individual from a non-metropolitan area is introduced to risk messages about the potential for an avian flu pandemic, s/he may deduce that since their exposure rate is minimal they are not really obligated to take the precautions offered by the risk communication. Risk communicators should take into account these intuitive epidemiologists as they design their messages for a potentially recalcitrant audience.

Perceptual Distance

What we call perceptual distance is the extent to which risk message recipients find a risk salient or important whenever they hear about it. Do their perceptions lead them to believe that the risk is going to have any impact on their lives? We conducted a study a few years ago of local television newscasts where we asked individuals to rank the importance or the saliency of various news items during a 6:00 p.m. newscast (Behnke, O'Hair, & Hardman, 1990). We found that high on the viewers list of most important items, those most salient to them, was an 18-wheeler turning over on I–10. Conversely, much lower on their list was an item focusing on the tragic deaths of U.S. servicemen that same day. They did not experience enough perceptual nearness to that particular news item, but they certainly perceived that an overturned 18-wheeler in their community could have implications for them. In other words, risk and crisis communicators oftentimes overestimate what the public is going to perceive as important simply because the communicators themselves think that an issue is salient.

Studies have been conducted at the University of Oklahoma on *temporal displacement.* Our interest was in determining the effect of time on specific events—the two events that we were focusing upon were the Oklahoma City bombing and the 9/11 crises. Study participants reported that the longer away they were from these particular events the less significant they found them to be in their lives. Temporal displacement reduced the saliency of these events in their lives. We are only beginning to understand the conceptual and practical implications of such findings.

How is risk communicated in an uncertain environment? What role does the media play in risk communication and the formation of public views and behavior?

Media Use

People depend on multiple sources of information for risk information including TV, radio, newspapers, friends, and the Internet (Rodriquez, 2004; Stempel & Hargrove, 2002). Previous research indicates that some people first learn of disasters from others (Greenberg, Hofschire, & Lachlan, 2002). For example, instant messaging was a prevalent means of warning during the tsunami disaster. Other research has revealed a "hierarchy of resort." Some people first turn to broadcast media, then to print, Internet, and interpersonal sources. These latter sources serve to confirm, reassure and get more in depth information. Alternatively, there are other groups of the isolated, impoverished, minority and rural segments who rely on interpersonal and community sources of information first (Glik, 2005). In other research, women were more likely than men to seek information from the media pertaining to family management needs; they appear to assume more responsibility for dealing with the adaptation to a crisis (Seeger, Vennette, Ulmer, & Sellnow, 2002). As media convergence continues to evolve, more individuals are likely to access media that offers multiple options for information acquisition (Greenberg, Hofschire, & Lachlan, 2002).

Uncertainty and Media Access

In the wake of multiple disasters in the last five years, most people assume they live in an uncertain if not risky environment. Multiple studies have demonstrated that people cope by blocking information from their awareness and strive for a "new normalcy." This phenomenon has motivated our research team to envision a Complacency-Curiosity-Immediacy-Criticality (C–C–I–C) Framework that integrates individual risk forecasting, information management processes, and media access (O'Hair, 2005). When risk probability is low, risk messages are unlikely to resonate with individuals who will have little motivation to seek or process information from media sources. When risk probability is heightened, individuals become curious,

process risk messages more directly, and may seek additional information from the media. As the threat of risk becomes more salient, individuals become more immediate in their desire for information and will intensify their media exposure. In the last stage, when threat seems imminent, the process of information seeking becomes acute and media access becomes vigorous if not frantic.

Sensationalizing Risk

It is obvious that the media construe risk information according to their own perspective. Often, their viewpoint operates from the "sensationalism principle," where their interest is not in perceiving risk information at face value, but rather casting the context through political and human interest lenses frequently omitting risk factors (LaFountain, 2004). This was particularly evident during coverage of Katrina where "opinionated journalism" become accepted even among many of the more harsh media critics. It was difficult for journalists to separate their human emotions from their reporting.

Message Framing

Message framing is a preeminent characteristic of risk communication. For example, the public does not want to be patronized. "Don't worry. We're from the government, we're here to help" (Rowan, 2004). Most of us here certainly know how to frame messages. We don't frame the same message to our spouses as we do with our children or with constituencies or colleagues. The media have become extraordinarily facile at message framing as have political campaign managers. Previous research indicates there are three ways that the media typically frame messages. The first type is a thematic frame, where general issues are relayed. Another framing strategy is episodic where the message emphasizes specific episodes, emphasizing specific people, specific perpetrators, and victims—a human element frame so to speak. The third type of frame is termed strategic, and this is where the story is slanted in a particular way, often negatively. Our research has demonstrated that taking the same basic message by framing it differently will evoke different cognitive and emotional responses in the receiver. The most recent instantiation of framing came during coverage of Hurricane Katrina where the media portrayed an America divided along racial lines. Following the coverage, an early September Pew survey, for example, demonstrated that two-thirds of African Americans, but fewer than one-in-five whites, said that the government warning and response would have been faster had most victims been white. Regardless of where your own opinions reside on this particular issue, it is important to understand the challenge of message framing as we manage risks.

Constructive Media

In the aftermath of Katrina reporters became interviewees rather than their normal role of interviewer. Media also provide emotional support and companionship to victims who feel isolated and alone. Another positive characteristic of the media in relations to their reporting on disasters involves their ability to impart helpful information to victims:

> "Effective warnings broadcast through the media are widely credited with reducing casualties from hurricanes, tornadoes, and floods. By reporting extensively on disasters and the damage they create, the media can help speed assistance to disaster-stricken areas, and post disaster reporting can provide reassurance to people who are concerned about the well-being of their loved ones" (Mileti, 1999, p. 225).

We have come to learn that journalistic and broadcast activities create what we have termed the "Paradox of Media Coverage" (O'Hair, 2005). On one hand, media serve a number of valuable if not essential functions for consumers, government officials and other organizations, as we have observed above. Alternatively, media often frame their messages in ways that omit critical information, overemphasize certain circumstantial features, sensationalize the situation, galvanize distrust among those whose job it is to mitigate the threat, and politicize the context of the disaster event (Covello & Sandman, 2001).

Media Preparedness

One last observation is in order that concerns the media. Media organizations and their members do not seem to be any better prepared for disasters and emergencies than other members of the risk community. The Disaster Research Center at the University of Delaware conducted a study of media organizations located in disaster-prone cities to determine their level of preparedness. The study discovered that only 33 percent of the radio stations, 54 percent of the television stations and only three of five newspapers reported disasters plans of any kind. Those media or-

ganizations with disasters plans had not given sufficient thought to critical issues and in many cases, the plans consisted of brief procedures and a list of phone numbers, although many of these lists did not include the most relevant local emergency agencies (Quarantelli, 2002). In a separate study focusing on journalists and their preparation for disaster conditions, researchers found that these media representatives were among the least prepared among those involved in local response and exhibited the greatest amount of fear and stress under simulated emergency conditions (DiGiovanni, Reynolds, Harwell, Stonecipher, & Burkle, 2003).

What lessons have we learned from effective—and ineffective—risk communications about natural hazards or disasters? How are these lessons being used to improve future risk communications?

Effective Messages

A synthesis of the public health research literature on risk messages revealed a hierarchy of successful message properties: (Glik, 2005)

- Survival first—tell people what to do, where to go, what to expect
- Provide meaning—tell people why they need these things
- Assurance—tell people that something is being done by someone or some organization.

A GAO report citing extant risk communication research suggests that the most important principles for communicating risk and threat information involves the following: (1) messages should be consistent, accurate, clear, and provided repeatedly through multiple methods, (2) information should be timely, and (3) information should be specific about the threat, including the nature of the threat, when and where it is likely to occur, and directions on preventive measures or protective responses (2004, p. 15).

Jargon, euphemisms, and acronyms do not always resonate with people. Do most people understand the difference between tornado warning and watch? What about terrorist's warnings green and yellow? Shelter-in-place means "go to a shelter" for some people. Research has shown that disaster warnings need to be clear, consistent, communicated over multiple media, by a variety of relevant and trusted sources; the messages should tell people specifically what to do and assist them with seeking additional information (Glik, 2005).

Risk/Crisis-Source Match

Another important issue is what we call the risk/crisis-source match (O'Hair, 2004). Do we have the right person communicating for the right crisis and the right risk? We found through research that the public has very definitive ideas about who ought to be delivering these risk and crisis messages. For example, when the event is national, federal spokespersons are preferred. When the event is more localized they want someone that they know, someone from their community. We also know whenever the risk or crisis is medical they want to hear from medical personnel, and if the medical crisis is perceived as national they want to hear from a spokesperson representing the CDC. At this point, we do know that the public does not accept messages at face value. They continuously make judgments about all facets of the message, its source, and the context in which it is delivered. This leads to the preeminent issue in risk communication—trust.

Trust

Trust is an all important goal of risk communication strategies. Earlier this year the World Health Organization (2005) issued its long awaited "guidelines for outbreak communication." Trust building is the first communication principle highlighted in their document. Research (Petts, 1998) has demonstrated that different governmental organizations elicit different expectations about 'trustworthy' activities, and accordingly require different 'trust enhancing' strategies. Different investigations have identified specific variables that influence trust: perceived openness; competence; objectivity; fairness; consistency; independence and care/altruism (e.g., Johnson, 1999; Petts, 1998; Renn & Levine, 1991). Trust is diminished when experts disagree, lack of coordination among risk management organizations, lack of sensitivity to the communication needs of the audience, lack of information access or disclosure, and lack of public participation in risk management plans (Covello, Peters, Wojtecki, & Hyde, 2001). There is a need to build a preparation mindset among the public through calculated, evolving, and cooperative activities using such venues as school programs, public education, public participation in planning processes, educating and training citizen's groups, and small personalized learning environments (Covello, et al., 2001; O'Hair & Averso, in press; O'Hair, Heath, & Becker, 2005).

What are the top remaining research questions in this area?

Building a Community-Based Communication Infrastructure

Risk and crisis communication programs must be designed, tailored, and executed at the community level (O'Hair, 2004; Rodriquez, Diaz, & Aguirre, 2004). The aim is to build upon innovative activities and programs of risk management by determining and verifying community-specific requirements and expectations. Through these processes community-specific communication infrastructures can be built to facilitate risk and crisis communication plans. Communities can vary considerably in terms of their desires and needs for risk communication. Take for example the research finding that urban communities possess less social capital than rural areas which are more socially connected. Rural households have more children, more traditional family systems, and stronger kinship relationships. According to Putnam, urban citizens belong to 10–15 percent fewer clubs and attend 10–15 percent fewer club meetings than other groups (Beaudoin & Thorson, 2004). Therefore a goal of community research should be determining if communication strategies vary among these community types. Geospatial analysis should be employed to provide visual representations of how communication infrastructure features can be represented within diverse communities. The most prudent approach would be to benchmark existing risk communication strategies and programs involving natural disasters or homeland security and test their utility under varying conditions and audience (community) characteristics. Recent advances in communication sciences should be incorporated into these models for testing. In addition, this project should include a program of research and development of communication strategies for educating schools, business and community leaders, first responders, policy-makers, and the media on risk perception and assessment. Studies should be designed that take existing and proposed systems and protocols and test their viability under experimental conditions.

Media

Research questions focused squarely on the media and their processes before, during, and after disasters must continue especially with regards to narrowcasting, specialized news content, and increasing reliance on interactive information sources (alerting services, blogs, IM, reverse 911, etc.). Media use is often thought of as a moving target with new services and tools rolled out on a continuous basis. Which media are most recognized as trustworthy sources of information and advice during disaster conditions? What combinations of media are utilized in various conditions? How prepared are various media organizations and their members for dealing with a variety of disasters?

Literacy and Intercultural Issues

An increasingly diverse citizenry will not respond to the same risk/crisis message in consistent ways. The United States is becoming an increasingly diverse culture or network of cultures. Most telephonic instructions from self-help desks now offer service for both Spanish and English speakers. Language diversity is an obvious issue for communication scientists, but literacy and cultural issues must also be recognized beyond the simple linguistic properties of messages. How can risk messages be designed for low literacy receivers? What intercultural variables are most prominent in communicating risk?

Inter-Organizational Communication

Much research has determined that serious shortcomings are evident at the community level in terms of constituent organizations failing to communicate effectively with one another. Future research should focus on the coordination of community response units. How do we manage adhocracies, jurisdictional conflict, and territoriality? The key is determining how to make sense of this complex system given the multiple players involved, all with their own politics, mindsets, perspectives, goals, fears, entrenched behavior, stakeholders, and obligations. There is a need for better metrics for understanding the patterns of communication among agencies, communities, and individuals. Research should study the structure of organizations responsible for managing risks/crises, optimal patterns of information management, and focus on the most effective methods for coordinating actions (both planned and self-correcting). Both structural and operational strategies should be developed and tested that lead to strategic communication models with the goal of improving inter-organizational and inter-agency cooperation and collaboration. Inherent in these processes is assessing community and organizational risk and crisis communication programs and strategies and developing standardized assessment tools (e.g., report cards, scorecards, communication audits) that determine areas of

organizational communication vulnerability. These programs could start with (a) the National Data Base of Incident Reports (National Incident Management System, 2004), and (b) the reported experiences of those who have first hand knowledge of preventing and responding to terrorists attacks (OKC; NYC). Possible outcomes include interactive, web-based tools developed for use at different levels—individuals/families, communities, organizations, and governmental agencies.

Developing Appropriate Metrics

A set of integrated metrics must be developed and used as a standard to assess risk and develop plans for disaster management and response. Key objectives in this project include:

- A set of integrated metrics for community disaster preparation, deterrence and response.
- Tying metrics to strategic and tactical goals. Metrics serve as benchmarks.
- Create community goals and objectives (that allow community based action planning based upon standardized metrics while incorporating the needs of communities.

One means of pursuing this strategy would be to leverage *The Community Terrorism Preparation, Deterrence and Response Model* (Ledlow, 2004) that structures a systematic approach to anti-terrorist planning and decision support. Its essential components include: Risk Assessment; Screening and Identification; Prevention; Training and Application; Activation and Response; and Leadership, Authority, and Communication. The information, systems, tools, and improvement plans of this project allows municipalities to assess their own preparedness plans, scenarios, and drills while maintaining a standard set of metrics, and thus expectations based on preparedness priorities. Inherent to the system is a scorecard that allows a community to evaluate each domain and dimension of the model based on various threat scenarios and engage training opportunities to improve performance.

Leveraging Technology

One issue looming large on the horizon is advances in science and technology and the promise they offer for disentangling the complexity of warning systems through **smart agents** (Bostrom, 2003). Smart agents are presumed to have the capacity for interacting with warning systems and other information sources including the media, while incorporating global positioning information, then making decisions for an individual in a certain location. Based on stored personal preferences data and the threat severity of the impending disaster, the smart agent would provide "intelligent" options for the individual including precise paths to safety. These smart agents will be small enough to wear or eventually they may be implanted making them seamless. A whole host of issues will require sorting before smart agents become common place, not the least of which is the ethics of consent and a further widening of the digital divide. A larger implication is that public agencies and officials may be removed from the warning system as we know it today. Social science research is a necessary partner in this research enterprise.

Conclusion

I am gratified that one of the organizations that this subcommittee oversees, the National Science Foundation, has identified risk communication as an essential ingredient in a complex array of processes necessary for disaster preparation, response, and management. Early this year, the Director of NSF, Dr. Bement, testified before the Senate Committee on Commerce, Science, and Transportation for the need to include risk communication in the research programs that it funds. A recent NSF report argues for greater interdisciplinary cooperation among basic natural sciences, human decision processes, economists, engineers, and communication scholars (NSF, 2002). The Government Accounting Office reported to Congress last year that risk communication theory and protocol must assume a greater role in threat mitigation plans (GAO–04–682, 2004). In a PCAST report referred to in testimony earlier this year before this subcommittee on combating terrorism, the authors highlight the important role of communication in mitigating, preventing, and responding to terrorist acts. Just about every GAO report on public response organizations and agencies places communication at the top of the list. I echo this sense of priority.

Chess et al. (1995) asked a number of meaningful questions: Is successful risk communication persuasion, transfer of information, public participation, or empowerment of citizens to make decisions? Should it produce an informed citizenry, a compliant citizenry, an alert citizenry, or an empowered citizenry? Should the goal be better decisions, fairer decisions, more consistent decisions, or, in the throes of

environmental gridlock, any decisions at all? Or are there "different motivating forces" and therefore different risk communication goals, for every "group, person, agency administrator, and middle manager"? These questions, in turn, have raised additional ones about the ethics and evaluation of risk communication. (p. 115)" (Heath & O'Hair, in press). These questions also suggest that we are far from drawing conclusions about risk communication during emergencies and disasters. However, and mostly importantly, in the last ten years we have made substantial inroads into how people perceive and respond to risk messages. Supporting the risk communication scientific community would help to narrow the gap between technological advances in warning systems and policy initiatives and our citizenry's ability to take advantage of those good faith efforts.

My colleagues and I from the social sciences welcome the challenge and opportunity to play an important role in building a communication infrastructure that addresses the essential components of communicating effectively with our citizenry before, during, and after disasters.

This completes my prepared statement. I would be happy to answer any questions you may have.

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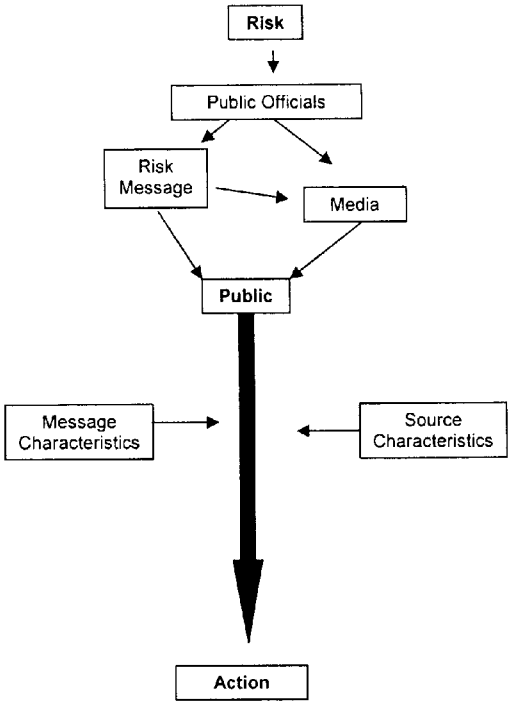
Risk
Public Officials
Risk Message
Media
Public
Message Characteristics
Source Characteristics
Action

Figure 1

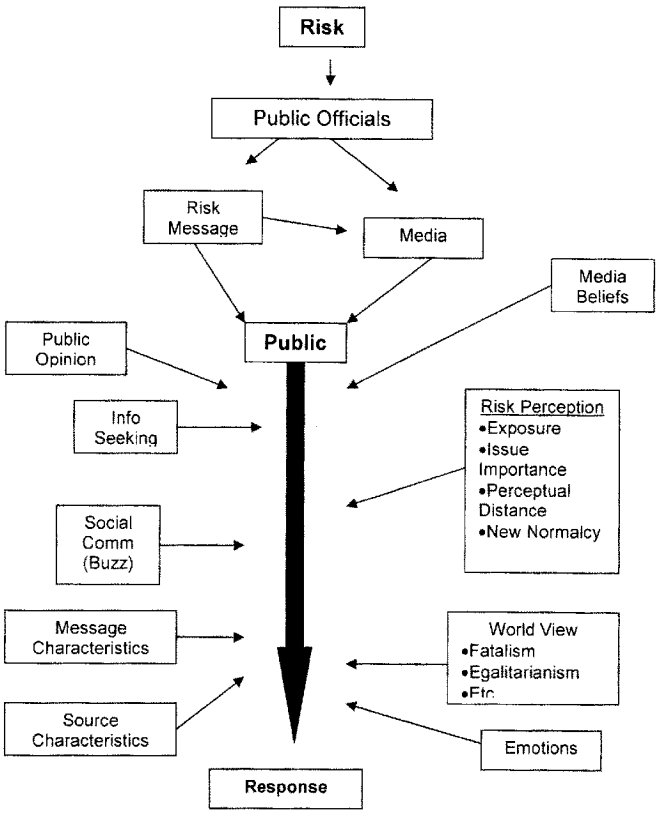

Figure 2

BIOGRAPHY FOR H. DAN O'HAIR

H. Dan O'Hair is Professor in the Department of Communication at the University of Oklahoma. His teaching and research interests include organizational communication, health systems, risk communication, and terrorism. He has published over seventy research articles and scholarly book chapters in communication, health, management, and psychology journals and volumes, and has authored and edited twelve books in the areas of communication, business, and health. His two most recent books, published by Praeger Publishing (2005) and Hampton Press (in press) focus on communication and terrorism. He also serves as the senior editor for the Handbook of Risk and Crisis Communication to be published by Erlbaum in 2007. He has supported his work with funding from government agencies, nonprofit organizations, and corporations totaling more than $3 million. He has served on the editorial boards of eighteen research journals and is the immediate past Editor of the *Journal of Applied Communication Research,* published by the National

Communication Association. In 2006, Dr. O'Hair will serve as President of the National Communication Association, the world's largest professional association devoted to the scholarly study of communication.

November 9, 2005

The Honorable Robert Inglis
Chairman, Research Subcommittee
Committee on Science
2320 Rayburn Office Building
Washington, DC 20515

Dear Congressman Inglis:

Thank you for the invitation to testify before the Research Subcommittee of the U.S. House of Representatives on November 10th for the hearing entitled ***"The Role of Social Science Research in Disaster Preparedness and Response."*** In accordance with the Rules Governing Testimony, this letter serves as formal notice of the potential federal funding I currently receive related to the hearing topic. I received no federal funding directly supporting the subject matter on which I testified, in the current fiscal year or either of the two proceeding fiscal years.

Sincerely,

H. Dan O'Hair, Ph.D.
Professor

Chairman INGLIS. Thank you, Dr. O'Hair. Dr. Silver.

STATEMENT OF DR. ROXANE COHEN SILVER, PROFESSOR, DEPARTMENT OF PSYCHOLOGY AND SOCIAL BEHAVIOR AND THE DEPARTMENT OF MEDICINE, UNIVERSITY OF CALIFORNIA, IRVINE

Dr. SILVER. Good morning, Mr. Chairman and Members of the Subcommittee. My name is Roxane Cohen Silver, and it is my pleasure to have the opportunity to appear before you today to testify on the critical role of social science research in disaster preparedness and response.

I am a Professor of Psychology and Social Behavior and Medicine at the University of California, Irvine, and for the past 25 years, I have studied how individuals adjust to stressful life experiences, such as loss of a spouse or child, divorce, childhood sexual abuse, and physical disability. But I have also studied the impact of natural and manmade community disasters over time. Almost all of my research over these years has been funded by the National Science Foundation, including my research on acute responses to spinal cord injury, on the impact of the Southern California firestorms, on the impact of the Columbine High School shootings, and most recently, on the impact of the September 11th terrorist attacks across the United States.

A few weeks prior to September 11, 2002, several people told me that they heard that the psychological problems as a result of the terrorist attacks were expected to peak around the one year anniversary of the event. Similarly, shortly after the recent Gulf Coast hurricanes, radio, TV, and cable broadcasts were filling the airwaves with predictions about how individuals and communities would fare psychologically over time.

People hold strong assumptions about how individuals will respond to traumatic events. Such assumptions are derived in part from clinical lore about coping with loss and about our cultural understanding of what we think the experience is going to be like. Yet many of our expectations about the coping process are wrong. How people are supposed to respond after a trauma often stands in sharp contrast to the research data. Much of my professional career has been spent collecting empirical data that has enabled me to identify and challenge what I have labeled the myths of coping with trauma. My goal has been to understand the variety of ways people cope, to go beyond the mere assumptions, and beyond the clinical lore, and after conducting studies on literally thousands of participants across a wide variety of victimizations, one conclusion that I can draw about how people respond to traumatic life events is that there is no one universal response. Some people will express less distress than outsiders might expect. Others will respond with prolonged distress, far longer that might be judged normal under the circumstances. Few individuals respond with an orderly sequence of stages of emotional response. Although stage models are quite popular, they aren't accurate.

Psychological responses are mistakenly assumed to be limited to those who are directly exposed to the trauma. Although we saw substantial psychological effects across the country after 9/11 among individuals who were only indirectly exposed to the attacks via the television. The degree of emotional response is mistakenly assumed to be proportional to the degree of exposure. It is mistakenly assumed to be proportional to the amount of loss, or to the proximity to the trauma, although we have found no evidence in our data that, as objective loss decreases, so will distress.

Finally, recovery from a trauma rarely occurs after a few weeks or months, yet many lose patience with individuals who are unable to get back on their feet quickly. At this point, the data provides little data for the notion that there are right or wrong ways to respond to a disaster, although there are clearly different ways. Although it is very challenging to conduct methodologically sophisti-

cated, valid research on coping with traumatic life events, obtaining such data is critical. Obtaining normative data concerning adjustment process following disasters can aid mental health providers to recognize potential risks, and can inform the design of psychological interventions.

Inaccurate information circulated among the public can be devastating for the victim of a trauma. It can lead to the self-perception that one isn't coping appropriately, that one is going crazy, and it can lead to ineffective support provision by one's social network. Methodologically rigorous social science research can help inform preparation for future disasters, including, as we just heard, how to communicate risk and evacuation orders effectively. Empirical data can also help identify factors that promote resilience and adjustment to prolonged stress, uncertainty, and loss. And finally, social science research can help policymakers understand how to shape planning and evacuation efforts, so that they optimize both short and long-term mental health outcomes.

The tragedies of 9/11 and the recent Gulf Coast hurricanes have had an enormous impact on life in the U.S. As a nation, we have an opportunity to draw lessons from these losses, so that they make us stronger, more flexible, and more effective as providers of support. Hopefully, one benefit of conducting research on such disasters will be more evidence-based predictions, and more informed, sensitive, and cost-effective recommendations for the future.

Thank you.

[The prepared statement of Dr. Silver follows:]

PREPARED STATEMENT OF ROXANE COHEN SILVER

Psychological Responses to Natural and Man-made Disasters

Mr. Chairman and Members of the Committee:

Good morning. My name is Roxane Cohen Silver and it is my pleasure to have the opportunity to appear before you today to testify on the critical role of social science research in disaster preparedness and response. I am a Professor of psychology and social behavior and medicine at the University of California, Irvine. For the past 25 years, I have studied how individuals adjust to stressful life experiences, such as loss of a spouse or child, divorce, childhood sexual abuse, and physical disability. I have also studied the impact of community disasters—both natural and man-made—on individuals' and communities' psychological responses over time. Almost all of my research over those years—on acute responses to spinal cord injury, on the impact of the Southern California firestorms, on the impact of the Columbine High School shootings, and most recently on the September 11th terrorist attacks—has been funded by the U.S. National Science Foundation.

A few weeks prior to September 11, 2002, several people told me that they "heard" that psychological problems as a result of the terrorist attacks of September 11th were expected to peak around the one-year anniversary after the event. These kinds of pronouncements appeared on the front page of a prominent newspaper, on national media telecasts, and from mental health "experts." Similarly, shortly after the recent Gulf Coast hurricanes, radio, television, and cable broadcasts were filling the airwaves with predictions about how individuals and communities would fare over time.

It is perhaps surprising that despite testimonials to the contrary, there is relatively little empirical data on which to base predictions about patterns of response over time following community or personal traumas. However, after having spent over two decades conducting research to explore how individuals cope with stressful life events, it is not difficult for me to understand why these data are lacking. Conducting methodologically rigorous studies of responses to traumatic experiences is extraordinarily challenging in several important ways. Research in the natural lab-

oratory is very expensive, labor intensive, and time-consuming. Obtaining external funding—particularly quick response funding following a national or community disaster—is often difficult, if not impossible. Obtaining samples of traumatized populations can be challenging, and research on entire groups of traumatized individuals is sometimes restricted. For example, governmental and community-based agencies may serve as gatekeepers to block access to potential respondents, even when those individuals are eager and willing to discuss their experiences with researchers. Institutional Review Boards are often appropriately (but sometimes inappropriately) uncomfortable with trauma-related research. As a result, studies tend to be conducted with small, non-representative samples of individuals who are willing to answer sensitive questions posed by a stranger. Many studies are conducted within clinical settings with individuals who seek professional help for their mental health symptoms. The conclusions drawn from these studies do not readily generalize to the broader population. Sometimes, causal inferences are inadvertently drawn from correlational results. Despite the array of methodological problems that plague much of this research, "Coping Do's and Don'ts" are frequently espoused in the media, without acknowledgement of the limitations of the research base from which they are drawn.

What we do know is that people hold strong assumptions about how individuals will respond to traumatic events. Such assumptions are derived in part from clinical "lore" about coping with loss and our cultural understanding of the experience. Yet many of our expectations about the coping process are wrong; how people are "supposed" to respond often stands in sharp contrast to the research data. Much of my professional career has been spent collecting empirical data that has enabled me to identify and challenge what I have labeled the "myths" of coping with trauma. My goal has been to understand the variety of ways people cope—to go beyond the assumptions and beyond the clinical "lore." After conducting studies on literally thousands of participants across a wide variety of victimizations, one conclusion I can draw about how people respond to traumatic life events is that there is no one, universal response. Some people will express less distress than outsiders might expect; others will respond with pronounced distress for far longer than might have been judged "normal" under the circumstances.

Few individuals respond with an orderly sequence of "stages" of emotional response. Many clinicians have suspected that if an individual does not have a negative response in the early aftermath of trauma, he or she would be at high risk for "delayed onset" of psychological problems, yet empirical support for such a position has rarely been obtained. Positive emotions are often ignored as a part of the response to highly stressful events, yet our own research suggests that positive emotions are quite prominent in the context of coping. Psychological responses are mistakenly assumed to be limited to those directly exposed to the trauma, and the degree of emotional response is mistakenly assumed to be proportional to the degree of exposure, amount of loss, or proximity to the trauma (e.g., as "objective" loss decreases, so will distress). "Recovery" from trauma rarely occurs after a few weeks or months, yet many lose patience with individuals who are unable to get back on their feet quickly. At this point, the data provide little support for the notion that there are "right" or "wrong" ways to respond to a stressful life event—although there are clearly "different" ways. Through my research and writing, I have maintained that we need to recognize and respect people's need to respond to trauma in their own ways and with their own timetables.

For the past four years, I have served as the Principal Investigator of an NSF-funded study on the September 11th terrorist attacks on the U.S. In fact, our research team conducted the only large-scale national longitudinal investigation of emotional, cognitive, and social responses to the attacks. We interviewed several thousand people repeatedly—from about two weeks after the attacks until three years later. Our results demonstrate quite clearly that the September 11th attacks had widespread impact across the country; results we have obtained in our longitudinal investigation strongly suggest that the effects of these terror attacks were not limited to communities directly affected. In fact, we have seen fascinating cross-community differences in response, although we are still exploring the reasons why residents of Littleton, Colorado might have responded so differently to the attacks when compared to residents of Miami. Although post-traumatic stress symptoms clearly declined over the years after the attacks, the degree of individual response was not explained simply by the degree of exposure to or loss from the trauma. Indeed, we have found great variability in acute and post-traumatic response among individuals who observed the attacks directly or lived within the directly affected communities. Moreover, a substantial number of individuals with indirect exposure (e.g., watched the attacks on live television or learned about them afterwards) reported symptoms

both acutely and over the year afterwards at levels that were comparable to individuals who experienced the attacks proximally and directly.

It is also clear that one must examine other factors beyond exposure and loss that may help explain post-traumatic distress in response to national disasters such as the September 11th attacks. In particular, we have found that those who had been diagnosed with mental health difficulties (anxiety disorders, depression) *prior to* 9/11 were more likely to respond to the attacks with post-traumatic stress symptoms and higher levels of distress over time, controlling for their levels of exposure to and loss from the attacks. The strategies people employed to cope with the attacks and their aftermath, their prior traumatic life experiences, and the traumas they experienced in the intervening year post 9/11 are other important factors to help account for the variability in response. Finally, we found that the acute stress response to 9/11, as well as the post-traumatic stress symptom trajectory over the year post 9/11, was a strong predictor of acute stress response to a subsequent national stressor: the Iraq War. Thus, our findings indicate that responses to one stressful event may be strongly related to responses to a prior traumatic event, and suggest that those who responded with acute distress following the 9/11 attacks may be particularly vulnerable psychologically to subsequent terror attacks.

We have also found effects beyond the post-traumatic stress symptoms that are the typical focus of investigations. Many people have reported finding unexpected positive consequences in the wake of the attacks, such as closer relationships with family members and a greater appreciation of the freedoms our country offers its residents. Positive emotions and life satisfaction have also been impacted. We believe that a narrow focus on clinical outcomes, ignoring sub-clinical levels of reactions and decrements in positive emotions, can paint a distorted picture of people's responses to negative events. A comprehensive understanding of the impact of traumatic events requires considering both negative and positive outcomes.

As I have described, conducting methodologically sophisticated, externally valid research on coping following traumatic events is challenging at best. However, obtaining such data is critical. Obtaining normative information concerning the adjustment process following trauma can aid mental health providers by pointing to potential risk factors, and can inform the design of effective interventions. Inaccurate information circulated in the public domain can be devastating for the victim of a trauma—it cannot only lead to a self-perception that one is not coping appropriately, but it can also lead to ineffective support provision by members of one's social network. Methodologically rigorous social science research can help inform preparation for future disasters, including how to communicate risk and evacuation orders effectively. Empirical data can also help identify factors that promote resilience and adjustment to prolonged stress, uncertainty, and loss. Finally, social science research can help policy-makers understand how to shape planning and evacuation efforts so that they optimize both short- and long-term mental health outcomes of affected communities. The tragedies of 9/11 and the recent Gulf Coast disasters have had an enormous impact on life in the United States. Hopefully, one benefit of conducting research on such disasters will be more evidence-based predictions and more informed, sensitive, and cost-effective recommendations for the future.

This concludes my testimony. Thank you.

For Additional Information:

Silver, R.L., & Wortman, C.B. (1980). Coping with undesirable life events. In J. Garber & M.E.P. Seligman (Eds.), *Human Helplessness: Theory and Applications* (pp. 279–340). New York: Academic Press.

Silver, R.C. (2002, August). *Thinking Critically About Coping With Life's Traumas.* G. Stanley Hall Lecture delivered at the American Psychological Association Annual Convention, Chicago, IL.

Silver, R.C., Holman, E.A., McIntosh, D.N., Poulin, M., & Gil-Rivas, V. (2002). Nationwide longitudinal study of psychological responses to September 11. *JAMA: Journal of the American Medical Association,* 288, 1235–1244.

Silver, R.C., Holman, E.A., McIntosh, D.N., Poulin, M., Gil-Rivas, V., & Pizarro, J. (in press). Coping with a national trauma: A nationwide longitudinal study of responses to the terrorist attacks of September 11th. In Y. Neria, R. Gross, R. Marshall, & E. Susser (Eds.), *September 11, 2001: Treatment, Research and Public Mental Health in the Wake of a Terrorist Attack.* New York: Cambridge University Press.

Silver, R.C., Poulin, M., Holman, E.A., McIntosh, D.N., Gil-Rivas, V., & Pizarro, J. (2005). Exploring the myths of coping with a national trauma: A longitudinal study of responses to the September 11th terrorist attacks. *Journal of Aggression, Maltreatment & Trauma,* 9, 129–141. Also appeared in Y. Danieli, D. Brom, & J. Sills (Eds.), *The Trauma of Terrorism: An International Handbook*

of Sharing Knowledge and Shared Care (pp. 129–141). Binghamton, NY: Haworth Press.

Wortman, C.B., & Silver, R.C. (1989). The myths of coping with loss. *Journal of Consulting and Clinical Psychology,* 57, 349–357.

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BIOGRAPHY FOR ROXANE COHEN SILVER

Roxane Cohen Silver, Ph.D. is a Professor in the Department of Psychology and Social Behavior and the Department of Medicine at the University of California, Irvine. She completed her undergraduate and graduate training in Social Psychology at Northwestern University, Evanston, Illinois, and was on the faculty at the University of Waterloo, Ontario, Canada, before relocating to UC Irvine in 1989. A national expert in the field of stress and coping, Dr. Silver is a Fellow of both the American Psychological Association and the American Psychological Society. In December 2003, Professor Silver was appointed by U.S. Department of Homeland Security Secretary Tom Ridge to the nine-member Academe and Policy Research Senior Advisory Committee of the Homeland Security Advisory Council. Professor Silver also serves as Director of Graduate Affairs for the Department of Psychology and Social Behavior, the coordinator of its doctoral program in Health Psychology, and the co-Director of her department's NIMH Institutional Training Grant in Social and Environmental Contexts of Adaptation. Previously, Dr. Silver served as the Associate Dean for Research and the Faculty Chair in the School of Social Ecology, as well as the Associate Director of UC Irvine's Newkirk Center for Science and Society.

For the past 25 years, Dr. Silver has studied acute and long-term psychological and physical reactions to stressful life events such as physical disability, death of a spouse or child, childhood sexual victimization, divorce, family violence, war, natural disaster, and human-caused disasters, including the Columbine High School shootings and the September 11, 2001 terrorist attacks. Dr. Silver was recently principal investigator of the only national longitudinal study of responses to the September 11th attacks. The 7th wave of data collection, marking the 3rd anniversary, was completed in fall, 2004; the first report of this study appeared as the lead article in *JAMA: The Journal of the American Medical Association* in September 2002. In her research, which has been funded by the National Science Foundation, the National Institute of Mental Health, and the U.S. Public Health Service (Bureau of Maternal and Child Health), Dr. Silver seeks to identify factors that facilitate successful adjustment to stressful life events. Her work also explores the long-term effects of traumatic experiences, and considers how beliefs and expectations of one's social network impact on the coping process.

Professor Silver is also a dedicated teacher and active mentor of predoctoral and postdoctoral students. In recognition of her efforts toward graduate and undergraduate education at UC Irvine, she has received a number of teaching awards, including UC Irvine's 2001 Distinguished Faculty Lectureship Award for Teaching, the 1999 Chancellor's Award for Excellence in Fostering Undergraduate Research (the 16th recipient in UCI's history), UC Irvine's Award for Special Distinction in Promotion of Undergraduate Research and Scholarship, UC Irvine's "In Celebration of Teaching" Awards for Excellence in Teaching and for Undergraduate Mentoring, the Outstanding Professor Award from the graduating Senior class on two occasions, Professor of the Year from the Social Ecology Student Association, and several Excellence in Teaching Awards from UC Irvine's Order of Omega Panhellenic and Interfraternity Council.

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November 8, 2005

The Honorable Sherwood Boehlert
Chairman, Science Committee
2320 Rayburn Office Building
Washington, DC 20515

Dear Congressman Boehlert:

Thank you for the invitation to testify before the Research Subcommittee of the U.S. House of Representative's Committee on Science on November 10th for the hearing entitled *The Role of Social Science Research in Disaster Preparedness and Response*. In accordance with the Rules Governing Testimony, this letter serves as formal notice of the federal funding I recently received related to the hearing topic.

BCS-0215937 Silver (PI)
National Science Foundation
Coping with Community-based and Personal Trauma: National Response following September 11th.
Project period: 09/02– 08/05; $589,987 total award

BCS-0211039 Silver (PI)
National Science Foundation
Coping with Community-based Traumatic Events: National Response to September 11, 2001.
Project period: 02/02 – 01/03; $68,571 total award.

BCS-9910223 Silver (PI)
National Science Foundation
Coping with Community-based Traumatic Events: The Columbine High School Shootings and the 9/11 Terrorist Attacks.
Project period: 08/99 – 07/03; $72,000 total award.

Sincerely,

Roxane Cohen Silver, Ph.D.
Professor of Psychology and Social Behavior
Director, Department of Psychology and Social Behavior Graduate Program
Professor of Medicine

DISCUSSION

Chairman INGLIS. Thank you, Dr. Silver. Thank you all for your testimony here this morning. Dr. O'Hair, I was very interested in your comments about the paradox of media coverage. It is, in particular, your reference to how fairly quickly there was a focus on political ramifications of Katrina. I wonder whether part of it is driven by a 24-hour news cycle, where they have got to have something to say.

Dr. O'HAIR. The CNN syndrome.

Chairman INGLIS. Right. That is it. They are going all the time, so you have got to add something new, so let us talk about the political ramifications now. The consequences, I would think, and this would be interesting to hear what the rest of the panel would think about this, the consequences, it seemed to me, would be to drive cynicism, especially if your house has been blown away, or your life has been blown away, and people are talking about such small things as whether so-and-so is going to get reelected or not. It must be quite devastating to somebody whose, literally, life has been blown away to start talking about things like that.

But I also wonder if it is something deeper, maybe you all can comment on this, whether it challenges our illusion of control, that we really think we are in control, and we think our government is in control, and then comes something bigger than our government, and there is a real blow to our self esteem or something, when we figure out that, you know, we can do hurricane construction standards and things like that, we can do evacuations, but in the end, if we have a storm surge like Katrina, it is overwhelming, and we can have earthquake preparations in California, and construction standards, but in the end, when the Earth starts shaking, then there is no government big enough to help you with the Earth shaking. And so, there is an illusion of control, I suppose, that we realize we don't have control at that point.

So, just see if anybody wants to comment on either the paradox of media coverage that Dr. O'Hair was talking about, or perhaps, this illusion of control that gets blown away with a huge event like Katrina.

Dr. O'HAIR. Often, part of the issue has to do with the trust factor that I was talking about earlier. I mean, there is going to be a certain level of background trust that individuals have about a particular government entity that is expected to have control after a disaster like that.

The threshold level of that control is going to probably dictate to a great extent the perceptions of individuals about the control that the government entities have, and so, that is why we constantly reinforce the idea of building trust prior to disasters like this, so that we raise that threshold level, and perhaps engender more of a sense of control when it actually happens.

Chairman INGLIS. Someone else want to comment on that, those elements?

Dr. LASKA. I had written a different presentation, then decided to stop what I was doing, and write what I have just presented, but what it was going to be about was the degree to which we believe we have control of nature, that it is a flexing of human power that

really is not true, so that natural disasters are not natural. They are social, because they expose the vulnerabilities of the society, and those vulnerabilities are human-caused. As Dr. Cutter said, you know, when you place large concentrations of population in places that are at risk, surprise, you are going to get an impact that is tremendous.

So, we have to be, as a society, thinking about how we live with the environment, not how we challenge it or control it, and I think that is where we get into our binds, that you have just described, Congressman.

Chairman INGLIS. Dr. Cutter, you mentioned support from the NSF, and I am very happy that yesterday, on the floor, we, in the conference report for Science, Commerce, Justice, State approved an increase in NSF funding. We got $5.6 billion for next year, and that is, of course, the jurisdiction of this committee and subcommittees. We are very thankful about that.

Tell me how the NSF funding has been helpful to you?

Dr. CUTTER. NSF has been very supportive of the research that I have done, and in my lab. The majority of my research from NSF, however, does not come from SBE. It actually comes through the Engineering Directorate, and it has, in fact, been the Engineering Directorate within NSF that has supported a large volume of social science research in this nation, and they were the ones who provided the impetus for the second assessment of social science research.

Now, that is not to say that SBE doesn't fund social science research and disasters, but the majority of those in the community are actually funded through Civil and Mechanical Systems, as well as other programs throughout NSF, and increasingly, the multidisciplinary programs at NSF, particularly those that involve coupled natural and human systems, for example, are trying to bring in the social science element.

So, we are doing much better, I think, in the foundation, moving beyond just SBE, but also Foundation-wide.

Chairman INGLIS. My time is up. Ms. Hooley is recognized for five minutes.

Ms. HOOLEY. Thank you, Mr. Chairman.

For any of the panelists that want to answer this. How do we improve the translation of research results into action by organizations with responsibilities for disaster planning? I mean, you talked about the press. You talked about, you know, and every community or every state, there is a disaster planning organization. How much do they use of the research that is available out there? Any one of you.

Dr. O'HAIR. My colleague, Dr. Mike MacDonald, who has set up the Disaster Knowledge Management System, it is basically a collaboratory, and he is assimilating as much information as he can from experts that range from media relations experts to GIS experts and so forth. All of this information goes into a collaboratory that is available for public use.

It is being targeted for specific communities that are probably most likely going to experience the first wave of what potentially could be a flu pandemic. And through a knowledge management system, what he is able to do is to take otherwise research that

may be buried in journals and technical reports, and putting it into a place that is highly searchable and highly relevant for communities that would need to access that type of information.

Ms. HOOLEY. Anyone else want to take a—Dr. Silver.

Dr. SILVER. Yeah, I would like to just speak on a little bit of a different issue, which is that in the psychological community, and in particular, in the intervention, the psychological intervention community, we have a competition between the researchers and the data that the researchers collect, and what I would like to call the for-profit trauma industry, and there was a great deal of controversy after 9/11. The for-profit trauma went in to companies and schools, and said we need to do some psychological intervention right now. A large number of researchers stood up and said there is really no evidence for that, and so what you see is the challenge because the researchers are often not for-profit entities, you have the challenge of competing with individuals who are trying to make money off of the trauma.

So, from the psychological intervention question, I would say that there hasn't been an immediate use of the research, but the researchers then get active and push back the non-research-based interventions. And I think over the last five or six years, the researchers have been very effective in conveying what the research is all about. But it requires individuals to write letters to the editor, call media sources, and try to correct misrepresentations of how things are, and part of the research that I do on myths about coping and myths about psychological responses is geared toward trying to correct these misperceptions that may be perpetuated by the media.

Ms. HOOLEY. Okay.

Dr. LASKA. Yes, I wanted to comment with regard to what you would call the mission agencies, EPA, NOAA, HUD, the Department of Transportation. They are starting to appreciate the importance of the social science research on the work that they are doing, and I would say that it costs resources, it costs money to do this kind of research, just as it does the basic research that Dr. Cutter was talking about. And so, I encourage you to encourage them to have in their budgets programs funding this kind of work, so that we can develop better the know-how, and also, just actually do the work.

An example would be your regional EPA climate change projects that have been funded, to examine how the stakeholders in the different parts of the country are considering the impacts that climate change may have on the issues that they are dealing with.

Ms. HOOLEY. Dr. Cutter.

Dr. CUTTER. Yes, ma'am. Also, there has been some transfer of knowledge from the research to the practitioner community, particularly in the emergency management community, and this has been facilitated by an annual workshop that occurs every July at the University of Colorado in Boulder, that brings together the research community, State and local governments, and federal agency personnel to talk about hazards and disasters, and there has been quite a bit of give and take among that small community in transferring the results of the research into practice, but it takes a lot of effort on the part of individual researchers who are really

committed to influencing public policy and influencing practice, and so, it is not universally done, but those people in the community that have an interest in doing that work very closely.

And in my case, for example, we work very closely with the South Carolina Emergency Management Division, and assist them in any way that we can, both with our research and practice.

Ms. HOOLEY. But that doesn't always happen?

Dr. CUTTER. That is correct.

Ms. HOOLEY. Okay. Thank you.

Chairman INGLIS. Mr. Gutknecht is recognized for five minutes.

Mr. GUTKNECHT. Well, thank you, Mr. Chairman. I want to thank you and the staff for bringing together this really excellent panel. This has been just fascinating for me to listen to this, because in some respects, it just sort of fills in some of the blanks that I have sort of been thinking about myself.

I was down in New Orleans a few weeks ago, and one of the questions, and I can't remember, Dr. Cutter, it may have been you that mentioned this, one of the things that just seemed imponderable, why so many people decided to stay in their homes. And you mentioned their pets, which sounds a bit funny, but when you talk to some of the folks down there, that really is one of the reasons they didn't want to leave.

Have you explored other reasons why people chose to wait it out? Was it a bit of machismo, or anybody want to comment on that?

Dr. CUTTER. In New Orleans specifically, or in evacuations more generally?

Mr. GUTKNECHT. In evacuations more generally, or New Orleans specifically.

Dr. CUTTER. I can speak to evacuations more generally, and then I will defer to my colleague, Dr. Laska, who can tell you about New Orleans.

After every major hurricane evacuation, there are post-event evacuation studies that are conducted, largely through the Army Corps of Engineers, among others, and consistently, we find a number of reasons why people are reluctant to evacuate. One is clearly pets. Pets are not able to go to public shelters, and pets are part of the family. They are not this thing, and so, if you can't take your pet to a public shelter, and you can't find a hotel room, and you don't have family and friends in the area, you will stay.

Another reason is the perception of the risk, and along the hurricane coasts, in particular, which is where most of my work is done, people in the community are pretty savvy about hurricanes, and they know the difference between a tropical storm, a Category One hurricane, and a Category Two hurricane, and if they don't feel that they are threatened, they are going to stay, irrespective of the guidance that is coming out from State and local officials.

So, a couple of additional ideas are the pets and the perception of the threat. Dr. Laska, you want to——

Mr. GUTKNECHT. Well, if I could just say, it sounds to me like people make much more rational decisions than sometimes, again, the media gives them credit for.

Dr. CUTTER. It seems so in hindsight. Now, at the time that the evacuation decisions are made, we have imperfect knowledge, because we don't know where the storm track is going, and we don't

know where landfall is going to occur, and we don't know the strength of that storm. And so, the National Weather Service gives us very, very good guidance, and state and local emergency managers have a certain window when they can evacuate the area, and normally that anywhere from 12 to 36 or more hours in advance of those tropical force winds. And depending on the size of the storm, you would be in a position of having to order an evacuation 72 hours or three days before the storm, and it is perfectly sunny outside, and you are telling people to get out of harm's way. And so, it is a combination of the uncertainty in the forecasting of the storm, as well as how crowded an area is, and how long it takes it to actually get people out of harm's way, that add to it.

In hindsight, it looks like they may have made good decisions, but from an emergency management perspective, they operate with a precautionary principle, and that is it is better to be safe than it is to be sorry.

Mr. GUTKNECHT. Anyone else want to add to that?

Dr. LASKA. Yes, I would like to. The survey that I referred to in my presentation demonstrated that two-thirds of the respondents feel safe in their homes in a Category Three hurricane. Well, that is no longer the case in New Orleans, given the loss of the coast, and at first we, of course, said oh, shame on them, and then we realized that for 20 years, they have been told that, that they were safe in a Category Three in their homes, but that we now needed to have a new education program to point out to them that that was no longer the case, and they had to change their thinking. So, as you pointed out, they were wise in their conclusions.

The group that I would like to mention that are of extreme concern are those who do not have automobiles, and many of the people who did not evacuate were that group. There are 57,000 households in Orleans Parish who do not have cars. If you average, the two to two and a half persons per household, you have about 125,000 people. So, it goes back to the presentation that Dr. Cutter has made and myself on vulnerability, because they did not have a way to evacuate individually or family-wise, and the efforts were working toward accomplishing that, but had not been fully accomplished to the point of the hurricane.

Mr. GUTKNECHT. Could I just add to that, because I talked to one woman down there in New Orleans, one of her elderly neighbors had been killed in the storm, and she was almost angry with him, because she tried on at least two separate occasions to get him to come with them, but he said no, no, he said I am going to be fine, and so, you know, I don't know if it was pride or stubbornness or whatever, but as I say, I mean her reaction was she was almost angry with him, that things turned out the way they did.

Again, Mr. Chairman, I want to thank you for this hearing, and I only hope that if anything, we can get some national media exposure for these four witnesses, because I think frankly, they are the kind of people that Americans need to hear from in these kinds of circumstances.

So, thank you. I yield back the balance of my time.

Chairman INGLIS. Thank you, Mr. Gutknecht. We now call on our very own social scientist, Dr. Lipinski.

Mr. LIPINSKI. Thank you, Mr. Chairman. I was going to first thank the witnesses for their testimony, and thank the Chairman for bringing social scientists up here. I used to teach political science, as a Professor of Political Science, so I, you know, I could go on all day asking questions, and I think we only have five minutes, so maybe I should probably get into them.

All right. Well, I will start with Dr. O'Hair. Political communications was actually one of the areas that I studied. We may have met, actually, at the Carl Albert Center when I came to speak there.

This is a question that I have wondered a lot about. Now, I have an expert here to sort of fill this in. The problem of crying wolf by the news media. Have you studied this? Have you looked at that? Because it seems that everything now, in order to, of course, gain ratings, get people to watch, there is a crisis every day. Have you looked at this? Is that a problem? Do people say, not look at real potential hazards as being that hazardous, because they say, well, we hear this every day? We have heard this before. There is a tenseness, and that, you know, surprise in the voice every day.

Dr. O'HAIR. There is that going on in the cognitions of receivers of news. Part of it is the repetitiveness of disasters, threats, and so forth. The second part of this has to do with the extent to which people take for granted the advances in technology, assuming that they are going to be warned in time, and that they will have ample response time.

One of my colleagues at the National Disaster Research Center at the University of Delaware has done some research where they have gone to, they have gone into the field, and ask individuals what do you do when you hear that there is a tornado about a quarter of a mile from your home? They go outside and look for it.

Mr. LIPINSKI. I hate to admit it, but that is certainly what I do.

Dr. O'HAIR. And why do you do that? Because you know that you can probably dodge it, you want to confirm what the technology has told you, and all of this is in the background of their cognition that they formulate over a period of time. So, one of the things that I think we have to do as communicators is, and when I talk about building a community communication infrastructure, we have to understand what a particular community is likely to respond to. That local media is going to be different from the community next to them, and so, we need to develop a very specific, what I call an audience profile. What is it that they are likely to respond to? How often have they been warned? What do they say about the crying wolf syndrome? And so forth, and then from there, you develop very specific message maps that you then apply, and prior to disasters, during disasters, and then post-disaster.

Mr. LIPINSKI. Thank you. A more general question, Dr. Laska. I will start with you. That the CHART, the Center, how did that originally begin, because a lot of this is about funding, and I know as a social scientist how much pressure is on funding, and that research tends to go where the funding is. First of all, how did CHART begin, and are there other, similar centers at other places?

Dr. LASKA. I have been Vice Chancellor for Research for the University for eight years, and decided that I wanted to have a center that really tried to do what we are talking about here, tried to

apply, and I had had successes in funding. So I looked to, as I pointed out, the mission agencies for that base of funding, not for NSF, although I do think NSF should be encouraged to have more programs of applied funding, in addition to the basic. So, it is a matter of learning how to do that draftsmanship, and we are—what we are short on, and I think Mr. Inglis mentioned this—is that the state of the discipline is lacking in ways to really grow the new generation, and also, to grow research administrators. Because as you know, you have to have people who have, who are trained to manage centers and to find funding, and so on. And so, we really have to work better at doing that part of the work, as well as doing the research, once funded.

Mr. LIPINSKI. Well, I always want to praise the NSF, and all the great work they do. And also, because I applied for one NSF grant, and I received it, so I always have good things to say about NSF. But who else is out there? Are there many other sources that are funding this type of research, that can be applied research, which just can really be significant to our society?

Dr. LASKA. The mission agencies, EPA, FEMA, NOAA. NOAA is growing quite strongly in that. There is the Coastal Center in Charleston——

Mr. LIPINSKI. Are they non-governmental?

Dr. LASKA. Some foundations will do so, yes, but that is our second choice, because we have been so accustomed to applying for government grants. Also State agencies. I have several spots of funding from the state. I assume you do, too.

Dr. CUTTER. NASA as well is another——

Dr. LASKA. That is right.

Dr. CUTTER.—another mission agency that is increasingly getting into hazards and disasters.

Mr. LIPINSKI. Anyone else have, Dr. O'Hair or Dr. Silver? Okay, thank you.

Chairman INGLIS. Mr. Sodrel is recognized for questions for five minutes.

Mr. SODREL. Thank you, Mr. Chairman, and thanks to the witnesses here today. I have, I guess, a rather mundane question, but I would like to understand the graph that I am looking at. Dr. Cutter, are these numbers prepared in constant dollars? In other words, have we accounted for inflation in the line graph, or——

Dr. CUTTER. You are looking at Figure 4, on the increase in costs of natural disasters?

Mr. SODREL. Yes, ma'am.

Dr. CUTTER. These are adjusted to 2004 dollars, and it reflects the period from 1960 to 2003, so it doesn't include 2004, which was a very costly year for the Florida hurricanes.

Mr. SODREL. So, it is stated in constant dollars, then.

Dr. CUTTER. Uh-huh.

Mr. SODREL. It appears that the crop damage is a lot more constant than property damage. Could that have something to do with just population growth in the areas that are most susceptible to hurricanes, I mean, for example, Florida has grown a lot since 1960. The physical possibilities may exist the same as they did in 1960, but the number of structures and infrastructure and people has grown considerably.

Dr. CUTTER. That is exactly what is going on, that you have, in many ways, the same level of risk or heightened level of risk, but you have an increasing vulnerability of the population, because you have more and more people moving into these high hazard zones, and living close to storm inundation areas, living in housing that is really not sufficient in high wind conditions, such as manufactured housing, and so, your losses are going up, as more and more people are moving into these coastal areas.

Mr. SODREL. Now, we had a tornado the other, well, early morning hours, came through Indiana the other day, and unfortunately, we don't get 72 hours notice when tornados are coming. It is not a flood or a hurricane, where you can accurately predict and track. When everybody went to bed, there was no real reason to believe that the conditions favorable to tornado creation were present. And two in the morning is about the worst time. You can't go out and see if it is a quarter mile away, and the first warning went off 10 minutes ahead. I don't know if it is an appropriate question to ask here, but I have often thought, because that is the biggest challenge in our part of the country, is tornados, and it is not as difficult for people if it is daytime, weekday. The real serious problem is when it is early hours of the morning, as this happened, about 2:00 a.m., in Vanderburgh County. I know we have alarm clocks today that you can plug the clock in, that will automatically figure out which time zone it is in, and receives a signal from an offsite location. If the technology were available where you could access a person's alarm clock, basically turn the alarm on, and give them an audible signal, if they could buy an alarm clock had that built into it, you know, where you could access it from an offsite location. And if anybody in the sciences is looking at that as an option. Because it, then, is always the problem in our area. It is the 2:00 a.m., 1:30 a.m., 3:00 a.m., it is dark, nobody sees it coming. You know, people are basically not awake, and they don't have any real warning.

Dr. CUTTER. The technology actually does exist, with NOAA weather radios. If everyone in your community had a NOAA weather radio, that would go on. The alert would go out, and it would wake people up, and they would get out of their homes into safer shelters. The question is making sure that everyone has a NOAA weather radio.

Mr. SODREL. And making sure everybody knows that, because if I didn't know that, I am confident there are a lot of constituents in southern Indiana that don't know that, either. You know, so disseminating the information would be very helpful.

Thank you. Thank you, Mr. Chairman. I yield back the balance of my time.

Chairman INGLIS. The gentleman yields back. Mr. Melancon is recognized for five minutes.

Mr. MELANCON. I didn't really have any questions. I was here more to listen, because I am closer to it. Dr. Laska is from New Orleans, and I wanted to welcome her here, and I guess if I do have a question, is where do you live in the New Orleans area?

Dr. LASKA. I live behind an earthen levy, not a flood wall, and therefore, my house was saved.

Mr. MELANCON. You in——

Dr. LASKA. No, on the lakefront.

Mr. MELANCON. On the lakefront.

Dr. LASKA. Uh-huh.

Mr. MELANCON. Oh.

Dr. LASKA. I expected my house would be the first to go, but the lakefront levees were not overtopped. The canals.

Mr. MELANCON. Came through the sides, correct.

Dr. LASKA. Uh-huh.

Mr. MELANCON. Now, I appreciate you taking the time to come up here, as I do all the rest of you, but from the State of Louisiana—and I know the trauma that everybody in Louisiana has gone through, so the insight that you bring is really welcomed here.

Thank you. That is all I have, Mr. Chairman.

Dr. LASKA. Thank you.

Chairman INGLIS. The gentleman yields back. Ms. Johnson is recognized for five minutes.

Ms. JOHNSON. Thank you very much, Mr. Chairman. And I apologize for being here late. I had to testify over on the Senate side this morning. And I ask unanimous consent to put my entire testimony into the record. I want——

Chairman INGLIS. Without objection.

Ms. JOHNSON. Thank you. Dr. Laska, you worked at the University of New Orleans, and I think it was severely damaged. Is it?

Dr. LASKA. That is correct.

Ms. JOHNSON. Did your background come into play, and assist many of the people that were also affected by the hurricane?

Dr. LASKA. Yes, we have a FEMA-funded project called the Disaster Resistant University, and that is one, if you were asking questions of where sources of funding are. And we were in the process of developing a mitigation plan for the university. So now, of course, we have shifted gears, and we are assisting them with making an assessment of their disaster impact, so that they can apply for mitigation funding, as part of the HMGP.

We also offered the faculty and staff of the university and students to ask us questions with regard to their damaged homes, so that they would know more about FEMA and how they should respond. So, those are two activities that the Center did do for the university.

Ms. JOHNSON. Will you now see—I guess a lot of people you have not seen. I see a lot of them in Dallas, Texas, and it is clear that psychological support is needed. Has that been made available to people who are now in New Orleans?

Dr. LASKA. Dr. Silver, would you like to comment on that?

Dr. SILVER. I don't know what is going on in New Orleans right now. I know that the Red Cross was involved immediately after, but I don't know what psychological services are going on right now in New Orleans.

Dr. LASKA. Not only the Red Cross, but also FEMA has mental health specialists who are provided to communities post-disaster, to assist. I trust that that is the case. I do not have any personal experiences with that.

Ms. JOHNSON. Yes, we received quite a few in Dallas, and medical schools paired up with the FEMA people. FEMA got there a few days late, but they incorporated that into the other approaches

that they had to make. But some of the support is needed for a very long time to come, and has that been taken into consideration with your research, that it might be emphasized, the long-term nature of some of that support, even on an outpatient basis?

Dr. LASKA. We are very concerned with that, with regard to the rebuilding of this community, because each family must grapple—they are displaced, as you point out. They are far and wide. Their home is totally just destroyed. They are having to try to make decisions as to whether to rebuild it back. People are living—my associate director has nine family members in her home. They have been together, nine people through seven weeks, and how one can cope with that, and still be thinking about their employment, and be thinking about the larger picture of the city's recovery, to me is just going to be a remarkable feat. And it will require strong mental condition, and as you point out, it is going to be very challenging for people to be able to think clearly about all these challenges that they face.

Dr. SILVER. Can I just speak to that one issue? The challenge is that there has not been a lot of research on long-term effects. What happens is that if there is research, it—the funding ends relatively soon after the trauma. So, for example, I followed individuals for three years after 9/11, but we know that three years is not quite long enough for most individuals. These kinds of traumas will impact them for the rest of their lives. So, to some degree, we are operating without the research base.

Nonetheless, we do know that these kinds of events impact individuals really for the rest of their lives in all sorts of ways. The challenge really is to figure out what is the most effective and appropriate intervention, and whether or not it should occur six weeks later, 18 weeks later, six months later.

One other point I want to make. You say seven weeks, and I think, as a psychologist, I understand seven weeks is a very short period of time. But frankly, our country does not really acknowledge how long things take to adjust to. And so, you know, to some degree, Katrina is old news, in terms of the impact in the media. We have moved on to the flu pandemic. We move on, and individuals point out that they need services. They want to talk a lot longer than other people want to listen, and that these events have impact a lot longer than others acknowledge.

Ms. JOHNSON. Thank you. You are right. We have not accepted the mental health as any other aspect of health, and we are still struggling with trying to get that recognized here. And I would hope that your research would undergird some of the need to see mental health and psychological effects of disasters and what have you, need as much attention, perhaps even more attention, than physical health.

Thank you.

Chairman INGLIS. The gentlelady's time has expired. Mr. Lucas is recognized for five minutes.

Mr. LUCAS. Thank you, Mr. Chairman.

Dr. O'Hair, let us step back for a moment to the paradox issue you have brought up in the media. In your observations down through the years, has this paradox situation, both the good and the bad side, has this become—has the paradox become more pro-

nounced, less pronounced? How would you, as a social scientist, of course, you look at long-term periods of time. How would you describe the paradox?

Dr. O'HAIR. In 2005, you mean?

Mr. LUCAS. Compared to 9/11, compared to the Murrah Building in 1995, compared to Jack Kennedy's assassination in 1963. I mean, how has the media in recent decades, how has this paradox become more pronounced, less pronounced, does it vary from tragedy to tragedy?

Dr. O'HAIR. I think there is a great deal of variability. What was—what struck some media critics so profoundly about the other side of this, the side where they are actually providing support and comfort and companionship, is that it was very pronounced. People were surprised that the media would get that involved in the personal lives of individuals. They became caught up in the emotionality of the situation.

So, whether or not we can track whether or not this, that side of it has actually increased. It is probably difficult to know and to understand, and this may be the place that we benchmark it, and begin to understand whether or not they are serving both those roles. Also, one other thing about the media. It is in my written statement. I didn't have time to talk about it here, that surprisingly, the media are some of the most unprepared members of the disaster response array of members. There was a simulation done a few years ago just after 9/11, of putting them into a simulated environment, along with other first responders and so forth, these individuals of the team were the most fearful, the most stressed, and the most unprepared going into the simulation. So, that is why we argue that the media needs lots of education, and they need lots of training, and they need to be folded into the team that is going to be responding and mitigating to these crises, and I think if we do that, you will find the paradox to actually increase.

I don't think there is anything we are going to be able to do about the cynicism. What I would hope to see is that we will begin to see that they are humans after all, and that they are performing that very important function of comforting and companionship.

Mr. LUCAS. Thank you, Dr. O'Hair. Dr. Silver, you commented on the unique psychological nature of each and everyone, and how we all respond to these kind of events, and before 9/11, before the hurricanes, a decade ago now, when the Murrah Building in Oklahoma City was bombed, Dr. O'Hair, in territory, my district office was, at that time, a block and a half away. Redistricting has taken me out of Oklahoma County, so I am not in the community any more, that wondrous thing that is redistricting, but I still work with, and I have contacts with my fellow federal employees, people who were in the area, and even a decade after, clearly there is still a huge impact on the people who were affected by the loss of loved ones, co-workers who were there that day. I suppose some would say in Oklahoma City, because of the nursery and the loss of infants, because of a variety of other issues, perhaps it just might have been more stressful, but a decade out, we still face challenges.

Based on your comments and my observations, these challenges may last for the rest of the lives of some of my fellow Oklahomans?

Dr. SILVER. I believe that negative life events impact individuals, in many cases, for the rest of their lives. That does not mean that they don't continue on with their lives. It doesn't mean that they don't go forward effectively functioning, in many cases, can experience joy, positive emotions. It just means that our notions of what recovery from these events is has been very narrow. It is not that people just forget the loss of their loved ones. It is not that people close the event and forget about it, and so, I think to the extent to which we can reevaluate what it means to psychologically adjust to these kinds of traumas, it does require some education, some realignment of what it means to experience these events, and continue on with one's life.

We will see after Katrina, there will be tens of thousands of individuals who will be affected for the rest of their lives. Will they shut down? Will they be ineffective contributors to their world? No, I don't think so. Individuals are far more resilient than we give them credit for, and in fact, what we saw after 9/11 was that there was not enormous psychopathology. It is just that the normal response to an abnormal stressor needs to be reevaluated, and we need to realize that going on with life means experiencing these kinds of traumas and dealing with them, adjusting to them.

Mr. LUCAS. Thank you, Doctor. Thank you, Mr. Chairman.

Chairman INGLIS. I would be happy to recognize Ms. Hooley for an additional question.

Ms. HOOLEY. Thank you, Mr. Chairman. Dr. Silver, we just had a plan put out for the threat of pandemic flu. Do you think there was enough attention paid to the social and behavioral sciences in that plan, and do you think there should be, if there hasn't been enough attention paid to that? Because I think there will be, I mean, I think this will be a situation that we are going to need all the help we can get.

Dr. SILVER. I do know that there are a handful of individuals, social scientists, who have been involved, and their opinions have been solicited on these programs. In fact, I know that there is a meeting going on, I believe it is today, in San Francisco, where social scientists are working on the issues of the avian flu. But I certainly think that the challenge is identifying who the real experts are, and involving them in a way that makes, that facilitates their contributions. I think that social science has been underappreciated and under-recognized and underfunded on these kinds of experiences.

Terrorism is a psychological event, and yet, most of the funding since 9/11 has not been on the psychological aspects of terrorism. It has been on figuring out better ways to screen people at an airport, or to screen containers as they come in, and yet, the psychological effects of terrorism have been acknowledged but underfunded, in terms of the research.

Ms. HOOLEY. Anyone else want to comment on this?

Dr. SILVER. Let me state one other issue, aside from being underfunded. The mechanism for getting research funding out to researchers quickly has been a big problem. I think one of the reasons why the National Science Foundation has been such—why we have seen individuals here who have had their funding from the National Science Foundation, is because they have a mechanism

for quick response funding, but very few other federal agencies have such a mechanism. For example, the National Institute of Mental Health does not have the ability to provide funding to researchers quickly after a trauma, or after a disaster. And that would be something that I think should be enhanced.

Ms. HOOLEY. Do you know of any money specifically for research for this issue?

Dr. SILVER. For which issue, for——

Ms. HOOLEY. For a pandemic.

Dr. SILVER. On the flu?

Ms. HOOLEY. Yeah. Okay.

Dr. SILVER. Should there be?

Ms. HOOLEY. Thank you very much for taking your time. I appreciate it.

Chairman INGLIS. One last question for you. Any advice on how to avoid an over-response? In the 2001 anthrax attacks here in Washington, as I understand it, they were, in one emergency, 1,100 people, 1,100 false reports from people turned out to be checked out, 1,100 of them, they were all false reports. I am not sure you call those false reports, negative, in other words, they tested negative, they were not exposed to anthrax. Maybe that is an over-response. I suppose it is an over-response. It is sort of like from Graniteville, you know, people leaving beyond where the chlorine was going. Any thoughts about how the people involved in emergency response can contain the response, so that it doesn't become an over-response?

Dr. SILVER. I would like to speak to that. I see these events as communications failures, rather than seeing the individuals who have responded in this way as somehow crazy or not getting it, I would rather indicate that there was something about the way in which the risk was communicated that was inaccurate, and that those kinds of communications, if delivered properly, from individuals who are trusted, would have led to lack of what you would call overreaction.

There is a notion that some people call it "the worried well," and I don't like that term, because it implies that there is something psychologically inappropriate about the way they are responding. In many ways, they may be responding quite accurately, by virtue of the fact that the information that they have been given has been confusing or has been inaccurately delivered.

Dr. O'HAIR. That is one of the reasons why we continue to push for a more idiosyncratic approach to communities, because you have to understand this was right after 9/11, and there was a heightened sensitivity to this context. As a result of that, the message should have matched the sensitivity that was in that environment at the time, but instead, it was probably just a normal kind of risk message that was sent out. Had 9/11 not preceded this particular situation, you might have seen a very different kind of response.

Dr. SILVER. And that was actually in Washington. Let me say that in Irvine, California, which is quite far from any problem, the police department indicated that they were getting between five and ten calls a day from individuals who wanted their mail checked out, because they feared anthrax. So again, I see this as

a communication failure, as opposed to something wrong with the individuals who were experiencing that anxiety.

Dr. LASKA. I would connect your question to Mr. Lucas: We have environmental journalists. They have their own organization. I am sure it is part of the subgroup that Dr. O'Hair is affiliated with, but we don't have disaster journalists, because disasters are scattered, so you don't have on staff someone who is your disaster specialist. Now, in Louisiana, we do, because we have so many, but in general, it means that a general reporter has to come up to speed, and it is a challenge. It is a challenge for a newspaper to have someone be able to do so. We have some journalists who come to Boulder when we are there talking about these things, but I really think that it is the challenge that when this happened, we got calls and calls and calls, to the point where we had to say, no, stop. But most of them were very lengthy conversations, because the reporter knew almost nothing about the topic, and therefore, had to use our time, you know, before they had a grasp of it. So, that is, to support Dr. Silver and Dr. O'Hair, the same kind of issue as the lack of knowledge on the part of the media, and therefore, they participate in a way that is not constructive.

Dr. CUTTER. There is also an issue with personal experience, and a person's individual experience with threat agents makes a difference in their response. Very few people have experience with a chlorine spill. Very few people have experience with potential, or a nuclear power plant accident, with a bombing at the Murrah Building, with anthrax. And so, in the absence of that experience, they rely on the risk information that they are getting, so it becomes a communication problem. People living in coastal areas, by and large, have some experience with natural events, floods and hurricanes, and so, they rely more on their ability to synthesize the array of information they are getting, and in many ways, they become their own little individual decision makers, and don't necessarily rely on a lot of the risk information that is coming out from public officials. So, personal experience is also a big factor.

Chairman INGLIS. Thank you to the panel. I appreciate your comments, Dr. Cutter, Dr. Laska, Dr. O'Hair, and Dr. Silver. I appreciate you being here, and I appreciate the Members of the Subcommittee participating. The hearing is adjourned.

[Whereupon, at 11:30 a.m., the Subcommittee was adjourned.]

Appendix:

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by Susan L. Cutter, Carolina Distinguished Professor and Director, Hazards Research Lab, University of South Carolina

Questions submitted by Representative Darlene Hooley

Q1. From the Federal Civil Defense Act of 1950 *through the creation and evolution of FEMA, the top-down, command and control approach has been the model used in crafting emergency plans. What has social science research revealed about the effectiveness of top-down, command and control paradigm in meeting the challenges posed by disasters? Is there a better approach, and how might it work?*

A1. The command and control works well in military applications and less well in civil emergencies as pointed out by many social scientists.[1] The top-down approach ignores two fundamental premises of civilian emergencies: 1) People are individual decision-makers and will take actions that they perceive are in the best interests of their family; and 2) All disasters are local and it is the local first responders who are most familiar with the community and closest to the response. First responders have the knowledge of local resources, community structures, transportation, and what needs to be done. Local plans need to be nested within larger state plans that are then nested within the Federal Response Plan. Command and control is useful as an organizing and reporting principle and certainly important in terms of communications. However, when the disaster occurs, organizational structures that are flexible and adaptive and accommodate the actions of residents, rather than completely rigid or hierarchical organizations like command and control work best during the response phase.

Q2. Some have argued that FEMA, as part of the Department of Homeland Security, is hamstrung by a command and control mentality that is ill-suited to the realities of disasters. Do you agree with this assessment? Does social science research support the view that there is a fundamental problem in the way the federal government is organized for dealing with disasters?

A2. Yes. During the 1990s, FEMA made significant organization advances in integrating preparedness, response, recovery, and mitigation (the phases of the disaster cycle) in all its activities. After September 11th and with its organizational move into DHS, the focus had dramatically shifted to command and control (the military and law-enforcement model) and the development and distribution of surveillance and protective technologies to thwart the impacts of terrorist events. This was due to two factors: 1) most of the leadership at DHS comes out of the law enforcement community as well as the National Laboratories and lack formal training and experience in emergency management; and 2) a fundamental lack of understanding about how people, communities, and organizations prepare for and respond to disasters. Preparedness resources for local communities were equipment-driven and specific to one threat agent, not planning oriented for "all hazards." Vulnerability reduction was oriented toward hardening the infrastructure, not helping communities to develop mitigation strategies to reduce their vulnerabilities and improve their resiliency before the event occurred. In fact, mitigation has almost disappeared within the agency.

Response to disasters requires partnerships and cooperation across all levels of government with everyone pulling in the same direction. Flexibility and the ability to adapt to changing conditions during the response are essential. The current administrative structure is not conducive to that approach. FEMA needs to be an independent cabinet level-agency charged with coordinating the Federal Response to disasters. It needs to have oversight on all phases of the emergency management system (preparedness, response, recovery, mitigation). The social science research supports this conclusion.

Q3. A significant share of federal support for disaster related behavioral and social science research comes from the National Earthquake Hazards Reduction Program. Does this distort the research priorities in these fields in an inappropriate way?

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[1] Dynes, R.R., E.L. Quarantelli, and G.A. Kreps. 1981. *A Perspective on Disaster Planning.* Newark, DE: University of Delaware, Disaster Research Center (3rd ed., originally published in 1972); Dynes, R.R., 1994. "Community emergency planning: False assumptions and inappropriate analogies," *International Journal of Mass Emergencies and Disasters* 12: 141–158.

A3. Yes, I believe it has. While much of the research funded under NEHRP has not been earthquake-specific, but more broadly based in an "all hazards" perspective, it has driven the research priorities in the community for more than forty years. There are many unanswered scientific questions in the disasters field that would benefit from a broader base of funding and support. The forthcoming National Research Council report, "Disasters Research in the Social Sciences," provides recommendations, which if implemented, will go a long way towards enhancing social and behavioral science research in "all hazards."

Questions submitted by Representative Eddie Bernice Johnson

Q1. The 2003 Office of Science and Technology report, "Reducing Disaster Vulnerability Through Science and Technology," identified six important areas for attention, including "expand[ing] risk communication capabilities, especially public warning systems and techniques." The report recommends investment in social and behavioral science dimensions of public response to information and education campaigns. Are you aware of any increases in federal funding to address this recommendation? Is adequate research underway in this area?

A1. I am not aware of any increases in federal funding to address this recommendation, or any other recommendation from that report. There is considerable social science expertise on risk communication and public response to warnings, but it is diffuse and chronically under funded. For example, there is a substantial body of research on how the public responds to various types of hazards warning advisories, but we know very little about how risk perceptions and response vary among minority and ethnic populations in the country, especially those living in urban areas. More research is also needed on how the media frame risk information and communicate threats and warning to the public and the public's perception of the credibility of the source and the information they receive.

In June 2005, the Subcommittee on Disaster Reduction published their "Grand Challenges for Disaster Research."[2] This provides the blueprint for federal investments in disaster vulnerability through improvements in community resilience. The six grand challenges are: provide hazard and disaster information where and when it is needed; understand the natural processes that produce hazards, develop hazard mitigation strategies and technologies; recognize and reduce vulnerability of interdependent critical infrastructure; assess disaster resilience using standard methods; and promote risk-wise behavior. I'm not aware of increases in funding, and in fact, many of the mission agencies have received cuts in their budgets, precluding any new initiatives for the near future.

Q2. The Administration last week released a plan to respond to the threat of pandemic flu. Do you believe the Administration's plan reflects sufficient attention to the social/behavioral factors that would be associated with public reaction to a pandemic situation and that should be incorporated into preparedness and response plans? Are you aware of whether behavioral and social scientists had a substantial role in developing this pandemic strategy? What areas of behavioral and social science research associated with other types of disasters would have particular relevance to this strategy. An specifically, in what areas do you feel the plan is deficient with regard to social science research or any other research activities?

A2. I have not read the plan so I can't comment on it. I also don't know whether behavioral and social scientists had any substantial role in developing the pandemic strategy, or whether any social or behavioral science research was used.

[2] Subcommittee on Disaster Reduction, 2005. *Grand Challenges for Disaster Reduction.* National Science and Technology Council, Committee on Environment and Natural Resources. June 2005, 21 pp.

ANSWERS TO POST-HEARING QUESTIONS

Responses by Shirley Laska, Professor, Environmental Sociology; Director, Center for Hazards Assessment, Response and Technology, University of New Orleans

Questions submitted by Representative Darlene Hooley

Q1. From the Federal Civil Defense Act of 1950 *through the creation and evolution of FEMA, the top-down, command and control approach has been the model used in crafting emergency plans. What has social science research revealed about the effectiveness of the top-down, command and control paradigm in meeting the challenges posed by disasters? Is there a better approach, and how might it work?*

A1. Social science research has revealed that the Command and Control approach has several "problems" that prevent it from being as beneficial as all of the investment in it suggests. First, such an approach of tight control is not one with which most agencies are accustomed; it is not what is used on a daily basis. Thus, the procedures are unfamiliar and require training and drilling in hypothetical cases in order for the organizations to implement it well. What has been found in the FEMA implementation experience with regard to mitigation is that anything (processes, procedures) that are only done occasionally are not done well. Funding and time commitment to drill organizational procedures wane after any new management principle is introduced and thus the benefits that were identified when the idea was fresh and new diminish.

The other finding that is relevant goes back to the military in WWII as well as has been found in disaster research up to and including 9/11: Much of the initial response to a catastrophe is done "informally" by those who are at the scene immediately when the event occurs, i.e., victims helping victims. The response is ad lib, informal and benefits from multiple person capacity to "think on one's feet" rather than to merely take orders bureaucratically. We have been told that such ability on the part of the American forces on D–Day brought the more rigid German "command and control" system down. The same positive outcome is being studied in depth right now with NSF funding that occurred in 9/11 with the "boat brigade" going back and forth across the Hudson River rescuing people and taking supplies. It was a remarkable response that did not benefit from command and control structure.

I personally appreciate the utility of a clear decision-making process supported by quality expertise in the various roles required. It is just another "stretch" to a format that is so tightly in a military format when the uncertain, unanticipated factors cannot be specifically drilled for in that structure. The opposite model is a generalist who can multi-task, or considering the definition of "resiliency," have the ability to adapt in small increments in different ways as the situation warrants. This approach, even with well trained experts, may be the better way to respond.

Q2. Some have argued that FEMA, as part of the Department of Homeland Security, is hamstrung by a command and control mentality that is ill-suited to the realities of disasters. Do you agree with this assessment? Does social science research support the view that there is a fundamental problem in the way the Federal Government is organized for dealing with disasters?

A2. I have already answered the first part of the question in #1. My answer to the second follows. I have worked with FEMA for 20 years on numerous projects. I would not say that command and control is the most significant problem. The core of the problem is that Homeland Security issues have overtaken other risks. I believe that they have done so for ideological and economic benefit reasons, just as I have described in the following question about earthquakes. The risks are seen as very real and threatening because they are "fresh" in the minds of the society; and, there are opportunities to develop technologies, training skills and research to support the society's ability to respond, i.e., to profit from the event. While there is no doubt that there is a homeland security risk, other risks continue to exist and they cannot be ignored as if in doing so they will go away. FEMA has been emasculated because of the lack of appreciation of the Homeland Security specialists about natural hazards and thus their inability to appreciate the potential impact that a catastrophic natural disaster can have on the American society. *There needs to be a balance in responding to the risks of the society. There also needs to be a recognition that the society must commit to reduce risks through mitigation (one of FEMA's key roles before it was eliminated from their charge) rather than merely to respond if the catastrophe occurs.* Our society can no longer stridently allow our citi-

zens and our organizations to challenge nature rather than adapt our behavior to nature. We do not have the economic surplus to continue to do so. For these reasons we need a robust FEMA. Since Katrina we have not seen movement by the administration to improve this situation. It is imperative that we do so.

Q3. A significant share of federal support for disaster related behavioral and social science research comes from the National Earthquake Hazards Reduction Program. Does this distort the research priorities in these fields in an inappropriate way?

A3. Yes, and that happened in the same way that the Homeland Security "over" emphasis happened. After the Northridge earthquake, the political process and the tendency for our society to hop from the risk of previous concern to the most recent one, pushed funds that way. It also happens because the event opens up business, research and bureaucratic opportunities and the political process facilitates this push. The NEHRP requires interdisciplinary research. I wholeheartedly endorse interdisciplinary research and believe that the only way to push researchers to learn how to do it is to require it, but only when it makes sense. There are differences among disaster drivers that require different research questions that should be asked in one research discipline at a time, not always in an interdisciplinary way.

Q4. In your testimony, you point to articles you and others published prior to Hurricane Katrina that accurately predicted many of the outcomes from that disaster. Why do you believe this prior knowledge was not acted upon? What are the barriers to, as you put it in your statement, having such research findings "valued" by organizations and policy-makers?

A4. Whew, I wish I had the research completed to answer you fully. Thank you for asking. Environmental/risk sociologists Lee Clarke at Rutgers (new book on worst cases) and Steve Kroll-Smith at the University of North Carolina–Greensboro (several books on environmental risk response) are joining me on the research project which asks that question. My quick answers from the preliminary research findings include: competing interests in society (other activities more important to leaders to spend $$$ on); belief that the event won't happen on "my watch"; ability of culture to dismiss risks that have lower probabilities; ability in general for human psyches to dismiss risk; Louisiana being low on the national "totem pole" of states and thus its risks not attended to; technical jargon of warnings "going over the heads" of those who needed to hear; belief that scientists were giving the warnings in order to receive more research funding. I hope in about a year to have completed research that will contribute to answering this question.

Given the threat of climate change/global warming, it is imperative that we learn the answer to this question and find ways to overcome the resistance because the Gulf Stream may turn south (converting the northeast U.S. and Europe into another Ice Age) before we get a grip on this challenge. What amazes me as a social scientist is that our society is so good, advanced, at doing some things but others are a challenge way beyond what we would expect given our "modern" organizational capacity. Katrina certainly was (is). Remarkable failure and the decisions that led to it were simple, everyday ones, nothing monumental, like Chuck Perrow's work on "Normal Accidents" describes. Dismissal of Vicksburg Corps office's challenge about the soft soils into which the flood walls were driven and no communication between the local agency and the Corps when residents reported the flood walls leaking i.e., no attentiveness to risk impacts.

Questions submitted by Representative Eddie Bernice Johnson

Q1. The 2003 Office of Science and Technology Policy report, "Reducing Disaster Vulnerability Through Science and Technology," identified six important areas for attention, including "expanding risk communication capabilities, especially public warning systems and techniques." The report recommends investment in social and behavioral science dimensions of public response to information and education campaigns. Are you aware of any increases in federal funding to address this recommendation? Is adequate research underway in this area?

A1. I'm sorry I don't have an answer to this question. I believe it was answered in the testimony by the specialist on risk communication.

Q2. The Administration last week released a plan to respond to the threat of pandemic flu. Do you believe the Administration's plan reflects sufficient attention to the social/behavioral factors that would be associated with public reaction to a pandemic situation and that should be incorporated into preparedness and response plans? Are you aware of whether behavioral and social scientists had a

substantial role in developing this pandemic strategy? What areas of behavioral and social science research associated with other types of disasters would have particular relevance to this strategy? And specifically, in what areas do you feel the plan is deficient with regard to social science research or any other research activities?

A2. I can only address the one aspect of generalizability of findings from other research: to the prospect of the pandemic flu. While each risk/hazard has its unique qualities, none is so unique as to not be informed by research on others. The uncertainty of occurrence, the quickness with which we will have to respond if the event does occur, the reluctance of the society (world) to take necessary steps because it might not happen (like reluctance to evacuate because it could be a false alarm) are all similar to other hazards.

Thank you for inviting me to comment further on this topic.

ANSWERS TO POST-HEARING QUESTIONS

Responses by H. Dan O'Hair, Chairman, Department of Communications, University of Oklahoma

Questions submitted by Representative Darlene Hooley

Q1. From the Federal Civil Defense Act of 1950 *through the creation and evolution of FEMA, the top-down, command and control approach has been the model used in crafting emergency plans. What has social science research revealed about the effectiveness of the top-down, command and control paradigm in meeting the challenges posed by disasters? Is there a better approach, and how might it work?*

A1. A substantial number of social science researchers challenge the notion of a top-down command and control approach to disasters. A notable exception to this assertion is the 9/11 Commission Report suggesting that this type of approach operated somewhat effectively at the Pentagon on that fateful day primarily due to the Incident Command System that overcame difficulties in coordinating the response efforts of local, State and federal agencies. Beyond that example, most reports by government and independent organizations have taken issue with a command and control paradigm that pervades many response agencies, FEMA being the most visible. The federal approach to disaster prevention, preparation, response and mitigation faces a number of challenges that are becoming more salient each year. First, disaster response scrutiny by the public reached a fever pitch following Katrina. The public has expressed its concern with the ineffectiveness of command and control approaches that lack competent inter-organizational communication. Second, media coverage and editorializing before, during, and after disasters will only become more prominent. Response organizations must engage in strategic relationship management with the media prior to disasters to develop the type of working relationships so necessary during these catastrophic events. The command and control approach offers less of chance for making that type of partnership work. Third, information and communication management will become more complex as advances in technology outstrip human capacity to assimilate information. Information overload is difficult to manage from a command and control perspective. Fourth, the convolution of preparedness and response organizations and especially networks of organizations that join the disaster response will only grow in numbers resulting in a complex array of meta-networks. A top-down approach has a tendency to isolate organizations and networks, especially NGOs who do not perceive and recognize all jurisdictional policies. So, yes, there is a fundamental problem in the way the Federal Government is organized for dealing with disasters. The GAO has issued numerous reports recommending approaches that are more localized and efficient. Based on social scientific research we have our own ideas about how disasters can be more effectively managed that will be outlined in the following sections.

As to the alternatives, the social and behavioral sciences are documenting the utility of several social and behavioral phenomenon that provide us with significant emerging models to supplement, if not replace entirely command and control. We have a bias toward a Community-Communication Infrastructure Model that was briefly outlined in my testimony and prepared statement and mentioned again in the response to Congressman Johnson's first question. Other alternatives we prefer have now been demonstrated as improving outcomes in several natural disasters as "emergent phenomenon." By emergent phenomenon, we mean that they emerged seemly spontaneously by people as best they could with new technologies to successful address the situation at hand. In many cases, "smartswarms" (or in other words, non-controlled, non-hierarchical social networks) have outperformed command and control models and then were successfully replicated, where command and control systems continued to fail.

The key attributes of these self-emergent alternatives that make them superior to a solely centrally-designed, top down, command and control model, are the following:

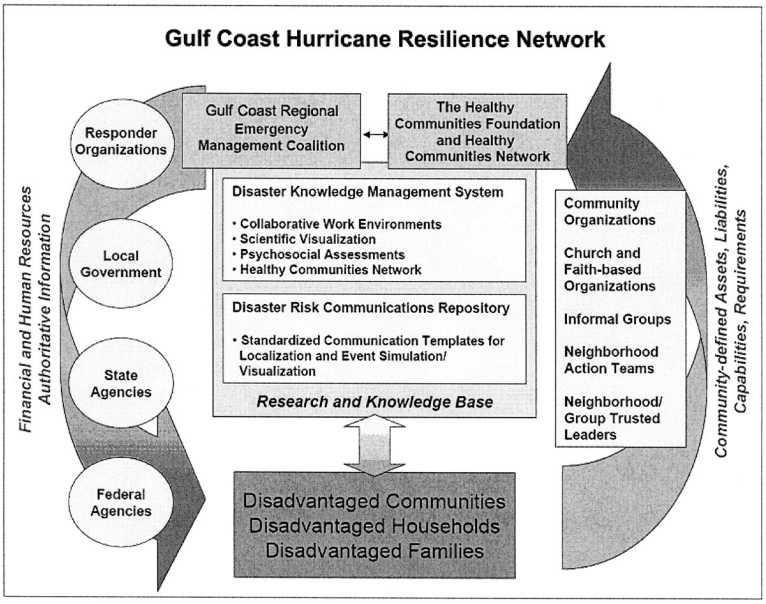
1) Flexibility through a massively parallel system of action, data collection and democratization of the production of knowledge (in some ways mimicking the non-controlled system characteristics of a free market economy or the Internet),
2) Better open knowledge sharing, especially regarding mission critical failures and the most vulnerable parts of the community and emergency management system;

3) Rapid response enabled by robust advanced communication resilient during disaster conditions;
4) Encourage situational awareness for all members of the society;
5) Encourage informed collective response by all members of the society, including but not limited to professional responders;
6) Overcome innate or institutionalized helplessness;
7) Engage early to partner with the most vulnerable portions of the society to ensure their health and safety by engaging local advocates well-prepared to act on behalf of those who can not help themselves under emergency conditions;
8) Create a common operating picture shared among all members of the society;
9) Constantly strive for more effective communication and operational effectiveness across sectoral and intergovernmental boundaries, even when bureaucracies seemly dictate institutional inaction and conflict;
10) Focus on rapidly addressing mission critical gaps between need and service delivery;

To illustrate these characteristics in the context of newly emerging systems, I will focus on one initiative's efforts to innovate beyond traditional command and control systems. The National Disaster Risk Communication Initiative (NDRCI), an ad hoc coalition of top risk communicators, technologists and social and behavioral scientists from key federal agencies, State agencies, private sector, universities, and large national non-profits, has debriefed on the mission critical failures in all large emergent events since 9/11. The NDRCI has built an alternative model to be incorporated in the characteristics above. It is built around a free, open source Disaster Knowledge Management System platform with an inter-operable systems architecture that is far more flexible, scalable, extensible, and rapidly replicable than any currently being used by Federal Governments, with the possible exception of experimental systems in the Department of Defense and the intelligence community. The NDRCI's Disaster Knowledge Management System is more a self-evolving social network that incorporates an upgraded, more flexible, better informed command and control model as a portion of a non-controlled Resilience Network system. Rather than replacing FEMA's command and control system in its entirety, it is wrapped into a more comprehensive model, better adapted to the kinds of emergent, large-scale social crises we anticipate potentially challenging our society in the early to mid-part of the 21th Century.

The all hazards Disaster Knowledge Management System platform was originally designed as a rapidly replicable model to specifically address the shortcomings identified in Florida hurricanes of 2004. It then was packaged into a proposal for FEMA to be piloted as a rapidly replicable National model field tested as "MAHRN"—Mid-Atlantic Hurricane Resilience Network. There was no uptake by FEMA during 2005, even though MARHN would have been perfectly adapted to prepare for and respond to conditions caused by Hurricane Katrina and Rita. Although FEMA did not fund it, some of its ideas were incorporated into NOAA and FEMA social and behavioral research plans for year 2006. It addition, its model was then funded by the Jonas Salk Foundation and an insurance company called CSA and developed as a feasibility pilot in the Indian Ocean tsunami disaster areas following the Boxing Day earthquake.

The Disaster Knowledge Management System (DKMS) is now in a phase II experimental pilot phase, partially sponsored by Global Health Initiatives, the United Nations University, and small non-profit organizations. Its spin-off Resilience Networks *(http://ResilienceNetworks.info/)* are now being architected for rapid replication in many metropolitan and rural areas (e.g., Gulf Coast communities, New Orleans, San Francisco Bay Area, National Capital Region, Southwestern Pennsylvania, Boston, San Diego, Hawaii, Miami, Chicago) in a series of experiments to test the model in different conditions around the country. Below is a simple schematic that describes the current hurricane centric model proposed for the post-Katrina Gulf Coast disaster areas, with a special emphasis on the most impacted and vulnerable portions of the Gulf Coast communities and New Orleans.



Q2. Some have argued that FEMA, as part of the Department of Homeland Security, is hamstrung by a command and control mentality that is ill-suited to the realities of disasters. Do you agree with this assessment? Does social science research support the view that there is a fundamental problem in the way the federal government is organized for dealing with disasters?

A2. Unfortunately, we have had a series of natural experiments recently, with emergent conditions likely to reoccur, which demonstrated that FEMA failed to meet our current societal expectations of federal emergency response. Although perhaps living up to the parameters for which it was originally institutionalized in the 1950s, FEMA is no longer meeting the preparedness, response, and recovery expectations of the American people a half century later. This should not be a surprise in a nation that has in the meantime put a man on the Moon and birthed the computer revolution. The United States is a culture of innovation that strives toward excellence and engages evolutionary improvements to fix problems where societal institutions are sub-optimizing. It is now being demanded that our nation's concept of emergency management live up to the challenges that we are likely to face in the 21st century, which are already proving to be quite different in nature, scope and scale than what FEMA is currently designed to address.

It is not so much that FEMA's command and control system has to be replaced in entirety by something else. FEMA's command and control system, in fact, accomplishes tremendous feats of rapidly moving federal financial resources, human resources and material in emergencies in ways that remain pertinent going forward. It is more the case, that we now know, that in itself FEMA's current command and control model is insufficient. From the schematic above we can see that in addition to its command and control system, FEMA (or some other entity that incorporates FEMA, such as DHS) needs to continue FEMA's command and control activities within a more complete system of societal resilience. This means that in addition to a constant iterative improvement of the command and control function, the larger resilience system enables all levels of society to prepare, respond, relieve, recover, and mitigate in a massively parallel and flexible manner that cannot be done by a federally directed top down command and control system. The Resilience Network model incorporating FEMA command and control enlivens the capacities of the American people and their communities. The DKMS/Resilience Networks model optimizes the ability of natural social networks with deep roots at the local level to

engage with FEMA and State emergency management agencies in meeting the Nation's emergent needs in a far more responsive system with the capacities to operate with the characteristics noted under my answer to Question 1.

Q3. A significant share of federal support for disaster related behavioral and social science research comes from the National Earthquake Hazards Reduction Program. Does this distort the research priorities in these fields in an inappropriate way?

A3. This is a more difficult question to answer. If the question were asked, "is a significant share of what is appropriated for NEHRP research actually devoted to SBE projects, the response would be less equivocal and certainly pessimistic. Analyses of funding portfolios or reports from each of the agencies composing NEHRP (FEMA, USGS, NIST, NSF) make it difficult to determine if SBE is a relative priority. However, if I am reading your question correctly, it implicates another concern, namely does the allocation of funds intended for SBE research through NEHRP redirect research priorities for disaster preparedness and mitigation in general? The simple answer is yes. Researchers follow the money. A more complex response would focus on the generalizability of SBE research which has the potential for application in multiple threat and disaster contexts. In other words, is the research being supported by NEHRP funds applicable across multiple disaster contexts, including terrorism? This is perhaps an issue that only Congress, the GAO, or perhaps specialized knowledge management experts can address.

The more generic issue of whether behavioral and social science is adequately funded to enable our society to address its current and emerging vulnerabilities, the answer is clearly, "No, it is not." We need look no further than the preparedness, response and recovery to Katrina to know this is the case. However, it is also being clearly demonstrated again in the President's and Congressional pandemic flu budget. For three to five years, while our nation will have insufficient stockpiles of vaccine and anti-virals, risk communication, social distance management, and resilience initiatives will be essential for our nation to establish behavioral and social immunity to pandemic flu transmission. Yet, there is essentially no budget to apply emerging behavioral and social science to this and other pending threats to the health of Americans and to our national security.

Q4. The 2003 Office of Science and Technology Policy report, "Reducing Disaster Vulnerability Through Science and Technology," identified six important areas for attention, including "expand[ing] risk communication capabilities, especially public warning systems and techniques." The report recommends investment in social and behavioral science dimensions of public response to information and education campaigns. Are you aware of any increases in federal funding to address this recommendation? Is adequate research underway in this area?

A4. You are correct about the 2003 Office of Science and Technology Policy report, "Reducing Disaster Vulnerability Through Science and Technology," making risk communication a priority for risk and threat preparedness. Numerous other organizations such as the National Science Foundation have identified risk communication as an essential ingredient in a complex array of processes necessary for disaster preparation, response, and management. As I mentioned in my testimony in November, the Director of NSF, Dr. Bement, testified before the Senate Committee on Commerce, Science, and Transportation for the need to include risk communication in the research programs that it funds. A recent NSF report argues for greater interdisciplinary cooperation among basic natural sciences, human decision processes, economists, engineers, and communication scholars (NSF, 2002). The Government Accounting Office reported to Congress last year that risk communication theory and protocol must assume a greater role in threat mitigation plans (GAO–04–682, 2004). In a PCAST report referred to in testimony earlier this year before your subcommittee on combating terrorism, the authors highlight the important role of communication in mitigating, preventing, and responding to terrorist acts. Just about every GAO report on public response organizations and agencies places communication at the top of the list. NSF has attempted to address this need with new programs focusing on decisions making, risk, and uncertainty. For instance, the Human and Social Dynamics priority area is currently soliciting small grant proposals ($750,000 over three years) in these specific areas. However, the proportion devoted to social and behavioral sciences for basic and applied research, particularly in risk communication, is woefully inadequate not only from a general funding perspective, but especially in a relative sense compared to other scientific funding priorities. A lack of priority for social and behavioral research from other agencies in the area of risk, crises, and emergencies will continue to expose fundamental weakness

in preparedness and response strategies so vividly illustrated by disasters such as Hurricane Katrina.

Questions submitted by Representative Eddie Bernice Johnson

Q1. In your testimony you point out the importance of trust and public participation in risk and crisis communication programs because the characteristics of communities vary widely. Do you have recommendations on how to achieve this type of community involvement in planning? Is it possible with the currently dominant top-down approach to planning?

A1. Our research group strongly favors a Community-Communication Infrastructure Model (C–CIM) approach for enhancing trust among community members. In my written statement for your committee, I proposed such a model for community preparedness and briefly outline the parameters for improving risk communication at the community level. Our research group is prepared to provide additional detail for the C–CIM should you request it. Risk communication, trust, and community involvement are not new phenomena; recently a National Research Council committee (Stoto, Abel, & Dievler, 1997) recommended that deliberative and participative community processes should be engaged to inform public policy choices. The committee argued that these processes lead to a more informed public and more support for decisions. *Project Impact,* established in 1997 by FEMA, was meant to actively engage communities in the process of disaster resistance. Research from *Project Impact* discovered that communities were better able to secure resources from support organizations and were better positioned to understand their community's relative risk and plan for managing these risks. In essence, these communities became more resilient as a result (Rodriguez, 2004). Several subsequent studies have verified the positive effect of community involvement during risk policy decision making in a variety of contexts (McDaniels, Gregory, & Fields, 1999; Gregory, Arvai, & McDaniels, 2001; Arvai, Gregory, & McDaniels, 2001). Even community members who do not directly participate in the planning and deliberating process have more positive views of the policy decision based on their perception that the process was fair and inclusive of community members' viewpoints (Arvai, 2003). In sum, public meetings that genuinely involve citizens in dialogue and stress the importance of interactive exchange have greater chances of success. These types of meetings not only increase perceptions of participation, but build relationships important in the trust credibility areas (McComas, 2003).

A strong body of research demonstrates that organizations can play a pivotal role in communication campaigns (Stephens, Rimal, & Flora, 2004). Results from the Stanford Five City Project revealed that organizations outside of the media have the potential of reaching about half of a community's households (Flora, Jatilus, Jackson, & Fortmann, 1993). Community organizations also serve an audience segmentation function primarily because of the communication infrastructure in place (bulletin boards, listservs, newsletters, etc.). One advantage of community organizations is that membership is voluntary and messages originating from them are usually viewed with greater levels of trust. A key strategy for communication campaign managers is to enlist the support of key organizational leaders who would then serve as opinion leaders and promote the messages of the campaign (Stephens, et al., 2004). There is little doubt that enlisting the support of community organizations can increase the reach of communication campaigns.

Increasing community involvement and participation in terrorism spawns positive civic and social effects often referred to as resilience. *Resilience* is a community building idea promulgated by Grotberg (2002) that refers to the thoughts, feelings, and even the spirit of individuals toward their community and its members. It is perceived as an ideal state where communities and its members posses an optimistic, pliable, and hardy perspective toward both normal and crisis conditions. Resilient communities are those that enjoy strong relationships within and outside the family, understand the need for vibrant community services (such as education, health, social, welfare), and are energetic in developing a community climate that is compassionate, empathic, respectful, and communicative. Research has discovered that resilient communities possess four common characteristics (Grotberg, 2002): Collective self-esteem, cultural identity, social humor, and collective honesty. It is through resilient acts that communities and their members construct strategies that discourage terrorism. Building resilient, socially networked communities where stores of communication capital reside offer greater comfort and security than disconnected communities. One of the centerpieces of the C–CIM is enhancing community resilience. *Because of the top-down, command and control structure of planning*

processes in the status quo, additional resources must be specifically earmarked and funded directly for state and community use.

Q2. The Administration last week released a plan to respond to the threat of pandemic flu. Do you believe the Administration's plan reflects sufficient attention to the social/behavioral factors that would be associated with public reaction to a pandemic situation and that should be incorporated into preparedness and response plans? Are you aware of whether behavioral and social scientists had a substantial role in developing this pandemic strategy? What areas of behavioral and social science research associated with other types of disasters would have particular relevance to this strategy? And specifically, in what areas do you feel the plan is deficient with regard to social science research or any other research activities?

A2. It is our impression, and that of others we have consulted, that few if any behavioral/social scientists were actively involved in the development of the Administration's pandemic strategy. The original plan outlined by the Bush Administration recommended $583 million for pandemic preparedness, $100 million of which is to be employed in assisting states to complete and exercise their pandemic plans prior to an outbreak. However, in a Congressional Briefing sponsored by the House Science Committee on December 14th, it was revealed that very few funds were intended for behavioral and social dimensions, and that Congress will now cut the pandemic flu budget in half with almost all of it focused on vaccines. $120 million was removed to fund various other initiatives included $60 million for Viagra.

While the Administration's plan is vague with regard to specific recommendations for risk communication strategies, it does encourage states and localities to consider several tactics that are likely to facilitate a pandemic response. For example, the plan suggests strategies for travel restrictions, quarantines, and isolation in the event of a pandemic, all of which will be necessary to restrict the spread of infection. However, where the Administration's plan requires additional breadth and depth is in addressing the behavioral and social dimensions of social distancing. Previous research on "sheltering-in-place" reveal that robust risk and threat communication plans must be developed and deployed in order to realize substantial compliance with behavioral proxemic patterns desired by social isolation.

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ANSWERS TO POST-HEARING QUESTIONS

Responses by Roxane Cohen Silver, Professor, Department of Psychology and Social Behavior and the Department of Medicine, University of California, Irvine

Questions submitted by Representative Darlene Hooley

Q1. From the Federal Civil Defense Act of 1950 *through the creation and evolution of FEMA, the top-down, command and control approach has been the model used in crafting emergency plans. What has social science research revealed about the effectiveness of the top-down, command and control paradigm in meeting the challenges posed by disasters? Is there a better approach, and how might it work?*

A1. Research in the social and behavioral sciences suggests that community-based organizations are likely to be more effective, and more efficient, in developing response plans in advance of, and implementing them following, community disasters. In fact, pre-existing social relationships and community organizations often already have experience working together, and thus will have more capacity to effectively mobilize (in terms of both resources, experience, and inter-group trust) in response to disaster. Nonetheless, while no formal survey has measured the make-up of these groups, anecdotal evidence suggests that very few formal efforts toward disaster preparedness have included contributions from the social sciences. If they have, their recommendations are too often ignored, as evidenced by the consequences of the activation of the response plans in the wake of a disaster.

Q2. Some have argued that FEMA, as part of the Department of Homeland Security, is hamstrung by a command and control mentality that is ill-suited to the realities of disasters. Do you agree with this assessment? Does social science research support the view that there is a fundamental problem in the way the Federal Government is organized for dealing with disasters?

A2. It is difficult to maintain that the problem with current disaster preparation and response is merely attributable to a failure in the organization of federal entities to address this topic. In addition to the Federal Government, municipalities, states and non-governmental organizations like universities and businesses often have crisis management teams or emergency response plans. The typical such team includes the mayor, police and fire chief, hospital representative, Red Cross chapter director, local college or National Guard and perhaps a handful of active community members representing other sectors. Effective response plans must involve the cooperation across all federal, State, and local entities. The social sciences can contribute recommendations as to how to maximize trust and cooperation across these groups, and how to minimize conflicts and territorial posturing between them. As noted above, with few exceptions, very few formal efforts toward disaster preparedness and response have incorporated the myriad of contributions from the social sciences that can facilitate effective response to disasters.

Q3. A significant share of federal support for disaster related behavioral and social science research comes from the National Earthquake Hazards Reduction Program. Does this distort the research priorities in these fields in an inappropriate way?

A3. While extremely important work has been, and continues to be conducted by the National Earthquake Hazards Reduction Program, all disasters are not the same in terms of their individual and community impact. In fact, there is a great deal of research in the social and behavioral sciences that has identified both similarities and differences between human-caused and natural disasters, and among disasters for which one has some warning (e.g., hurricanes) as compared to those that occur suddenly (e.g., tornadoes). In addition, man-made disasters, such as the September 11 terrorist attacks, or the Columbine High School Shootings (both on which I have conducted research) differ from natural disasters in meaningful ways in terms of the victim's ability to identify perpetrators and seek justice from them. What seems crucial, in my opinion, is to enhance research funding beyond the study of earthquakes. As I mentioned in my testimony, there is currently no mechanism for researchers to obtain social science funding for such work in the immediate aftermath of a natural or man-made disaster, as well as too little funding for the study of the impact of these community disasters over time.

Questions submitted by Representative Eddie Bernice Johnson

Q1. You describe in your testimony the prevalence of misconceptions about what research has found about psychological responses to disasters. This is another aspect of failure to apply existing knowledge derived from behavioral and social science research. What are the responsibilities of scientists who conduct disaster related research for transferring knowledge derived from that research to the general public and to organizations that develop public policy?

A1. A cadre of social scientists invests their research efforts and resources in the empirical study of the progression, psychological effects, responses and social consequences of disaster. Admittedly, we tend to publish the results of our investigations in professional peer-reviewed journal articles and books. It is also true that, in general, our opinions are not solicited by policy-makers (although the Research Subcommittee Hearing addressing this topic is a welcome exception). Nonetheless, many of us also invest a great deal of time preparing articles for non-professional publications, give public lectures, and serve as pro bono consultants to community and government organizations. Many of us also frequently avail ourselves to the media to correct misconceptions and to educate the public about our findings. In addition, professional organizations such as the American Psychological Association (APA) advises congressional decision-makers on a wide range of legislative and regulatory issues by communicating the results of social science research and introducing social scientists to policy-makers. For example, beginning shortly after the September 11 terrorist attacks, I was invited by the APA Science Policy Office to present my work and its implications on Capitol Hill. In numerous trips to Washington, I was asked to convey concisely the results of my research to congressional staff, and to describe how these results could be directly applied to public policies. In addition, in early 2002 I was introduced by members of the APA's Science Policy Office to staff in the White House's Office of Homeland Security (which subsequently became the Department of Homeland Security). On the basis of that introduction, I was appointed by former Secretary Ridge to the Academe and Policy Research Senior Advisory Committee of DHS to provide advice, guidance and recommendations to the Homeland Security Advisory Council, which reports directly to the Secretary. Nonetheless, after two years of active involvement on that committee, including preparing numerous presentations on crisis communications and the psychological impact of terrorism, after attending dozens of briefings, and preparing several reports and recommendations, I would suggest that there appears to be no one in place who can hear these empirically-based recommendations and effectively *act* on them. Despite this fact, my colleagues and I continue to be committed to doing whatever we can to bring our important policy-relevant social science research findings into the public domain. I was pleased when a member of the Subcommittee recommended that the messages delivered by the social scientists that attended the Hearing be made available to the media and others on Capitol Hill. I, personally, would welcome additional opportunities to present my research and its implications more broadly.

Q2. The 2003 Office of Science and Technology Policy report, "Reducing Disaster Vulnerability Through Science and Technology," identified six important areas for attention, including "expand[ing] risk communication capabilities, especially public warning systems and techniques." The report recommends investment in social and behavioral science dimensions of public response to information and education campaigns. Are you aware of any increases in federal funding to address this recommendation? Is adequate research underway in this area?

A2. The 2003 Office of Science and Technology Policy report, "Reducing Disaster Vulnerability Through Science and Technology," did indeed recommend investment in social and behavioral science dimensions of risk communications. Unfortunately, I am not aware of any increases in federal funding in response to this report's recommendation. This is extremely unfortunate, because while there are researchers who are poised to conduct such research at universities across the country, their efforts are severely hampered by the difficulties in obtaining funding to support it.

In addition, the report missed an opportunity to specify specific behavioral and social scientific opportunities, including those that would go well beyond risk communication and public response to warning programs. Risk communication, effective messaging, source credibility and public response to warnings are, of course, critical areas for social and behavioral research. Beyond this focus, however, the importance of studying individual and community resilience, as well as collective and individual response to disaster and loss, cannot be overemphasized. Our empirical research offers ample evidence that strategies for reducing vulnerability to disaster can and should incorporate scientific understanding of how individuals, and the communities

within which they reside, respond to stress and loss. I would suggest that although some research, including my own, is underway in these areas, a robust scientific approach to reducing our nation's vulnerability to disaster demands greater financial investment in its investigation. Methodologically rigorous scientific research is necessary to understand how human beings respond individually and socially to natural and man-made disasters. As my testimony suggests, we cannot afford to accept reigning misconceptions and anecdotal or media-generated expectations about human behavior as we anticipate and plan for future disasters. The collection of data, analysis, description and prediction of human behavior is integral to an adequate national scientific and engineering approach to disaster preparedness and response.

Q3. The Administration last week released a plan to respond to the threat of pandemic flu. Do you believe the Administration's plan reflects sufficient attention to the social/behavioral factors that would be associated with public reaction to a pandemic situation and that should be incorporated into preparedness and response plans? Are you aware of whether behavioral and social scientists had a substantial role in developing this pandemic strategy? What areas of behavioral and social science research associated with other types of disasters would have particular relevance to this strategy? And specifically, in what areas do you feel the plan is deficient with regard to social science research or any other research activities?

A3. In my opinion, the plan unfortunately does not reflect sufficient attention to the social/behavioral factors that would be associated with public reaction to a possible pandemic and that I believe should be incorporated into preparedness and response plans. I am not aware of the active involvement of behavioral and social scientists in the development of this pandemic strategy, nor in the solicitation of their opinions. Social and behavioral scientists have conducted a great deal of research that could be directly applicable to development of this strategy. Research on risk and crisis communication is directly relevant. Research on community response to disasters can provide great insights into preparedness and response plans. Research on how individuals and communities cope with stressful life events, of which mine is but one example, is also crucially relevant. Unfortunately, this work is not adequately represented in the current plans.

You ask in what areas I specifically see deficiencies in the plan with regard to social science research or other research activities. First, the plan offers very little funding to achieve its goals. Moreover, while the plan includes is a statement of commitment to providing public information, there is unfortunately no mention of empirical research to ensure its realization or evaluate its achievement. The plan offers a brief reference to avoiding panic and a reference to the public's beliefs about the food supply, but neither is informed by the social science research on these topics (e.g., panic is a rare response to emergencies, and the assumption that it will occur is a myth without any empirical support). In general, the plan is severely deficient in its attention to decades of relevant social science research. Unfortunately, without the development of adequate preparation and response plans, and without clear communication of authoritative information, the current situation has the potential to undermine public morale and facilitate media hype and the spread of misinformation, even without a pandemic striking.

Thank you again for providing me the opportunity to share my additional opinions with the members of the Research Subcommittee. I welcome further requests to provide information that can assist in the achievement of your important goals.