



UNIVERSITY OF DELAWARE

# DRC

Disaster Research Center



2008 ANNUAL REPORT

# **DISASTER RESEARCH CENTER**

**OFFICE OF THE VICE PROVOST  
FOR RESEARCH AND GRADUATE STUDIES**

**UNIVERSITY OF DELAWARE**

## **2008 ANNUAL REPORT**

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# Table of Contents

	<b>Page</b>
<i>DRC Background</i> . . . . .	5
<i>Director's Message</i> . . . . .	7
<i>Feature Article: EERI-UD Student Chapter</i> . . . . .	9
<i>Research</i> . . . . .	11
<i>Project Descriptions</i> . . . . .	11
• <i>Active Projects</i> . . . . .	12
• <i>Recently Completed Projects</i> . . . . .	21
<i>DRC Field Studies</i> . . . . .	23
<i>Education / Mentoring</i> . . . . .	25
<i>Master's Thesis / Doctoral Dissertation</i> . . . . .	25
<i>DRC Salon Series</i> . . . . .	25
<i>DRC Training Series</i> . . . . .	26
<i>Undergraduate Student Achievements</i> . . . . .	26
<i>Research Experience for Undergraduates (REU)</i> . . . . .	27
<i>Outreach / Dissemination</i> . . . . .	31
<i>Peer Reviewed Publications</i> . . . . .	31
• <i>Articles</i> . . . . .	31
• <i>Book Chapters</i> . . . . .	33
• <i>DRC Preliminary Paper Series</i> . . . . .	33
<i>Other Publications</i> . . . . .	34
• <i>Miscellaneous Reports</i> . . . . .	34
• <i>Working Papers</i> . . . . .	35
<i>Presentations at Professional Conferences</i> . . . . .	35
• <i>Paper Presentations</i> . . . . .	35
• <i>Poster Presentations</i> . . . . .	39
• <i>Invited Presentations</i> . . . . .	40
• <i>Sessions Organized or Moderated</i> . . . . .	41
<i>Faculty and Student Recognitions</i> . . . . .	43
<i>DRC in University News</i> . . . . .	45
<i>Visitors to DRC</i> . . . . .	47
<i>Other Disaster Related Activities</i> . . . . .	49
<i>The E. L. Quarantelli Resource Collection — Report of Activities</i> . . . . .	53

# ***Disaster Research Center (DRC)***

Established at Ohio State University in 1963 by Professors E. L. Quarantelli, Russell Dynes, and Eugene Haas, and moved to its current location at the University of Delaware in 1985, DRC was the first Center in the world devoted to the social scientific study of disasters. Historically, the Center has conducted field interviews and extended research projects on group, organizational, and community preparation for, response to, and recovery from natural and technological disasters and other community-wide crises for both academic and practical development of the field of disaster research and mitigation.

Recognizing the broader research interests in disasters across the campus and the interdisciplinary nature of the research, the Center moved from the Department of Sociology and Criminal Justice to the College of Arts and Sciences in the summer of 2006 and in June 2007 the Center moved again to come under the oversight of Research and Graduate Studies in the Office of the Provost. While much of the research at DRC has been interdisciplinary throughout its existence, the Center is now embarking on a new era as it builds on and maintains its foundation in social science while broadening its activities to more explicitly embrace interdisciplinary, multidisciplinary and cross disciplinary research.

Graduate and undergraduate training has been an integral component of DRC's mission. Faculty members from the University of Delaware's Department of Sociology and Criminal Justice oversee DRC projects and teach classes in the department's graduate concentration in Collective Behavior, Social Movements, and Disasters as well as the newly formalized undergraduate concentration in Emergency and Environmental Management. Graduate researchers from DRC have gone on to careers at leading universities, prominent research centers, key disaster-oriented government agencies, and private sector organizations that deal with disaster and risk issues.

Researchers at DRC have conducted over 675 field studies since the Center's inception, traveling to communities throughout the United States and to a number of foreign countries. DRC researchers have carried out systematic studies on a broad range of disaster types, including but not limited to hurricanes, floods, earthquakes, tornadoes, hazardous chemical incidents, plane crashes, and civil disturbances. Past DRC studies have focused on such topics as emergency medical and mental health service delivery in disasters, community responses to acute chemical hazards, mass evacuation and sheltering, preparations of and responses to major community disasters by lifeline organizations, community earthquake mitigation and emergency preparedness in the Central U.S. and the San Francisco Bay Area, disaster recovery in Charleston, South Carolina and Santa Cruz, California, a large-scale multiyear study on the implementation of FEMA's Project Impact initiative, and the utilization of earth science information in earthquake risk decision making.

Since its founding over four decades ago, DRC's activities have been supported by diverse sources, including the National Institute of Mental Health, the Federal Emergency Management Agency (FEMA) and its preceding agencies, the NOAA Sea Grant Program, and the U.S. Geological Survey. Major research funding is currently provided by grants from the National



Science Foundation (NSF), FEMA, the Multidisciplinary Center for Earthquake Engineering Research (MCEER), and the Public Entity Risk Institute (PERI).

In addition to maintaining its own databases, DRC serves as a repository for materials collected by other agencies and researchers. DRC's specialized library, the E. L. Quarantelli Resource Collection, contains the world's most complete collection on the social and behavioral aspects of disasters — now numbering more than 55,000 items. It is open to both interested scholars and agencies involved in emergency management.

The Center has its own book, monograph, and report series with over 1,000 publications including preliminary papers and published articles. The DRC maintains ongoing contact with scholars from throughout the United States, Asia, Europe, and Mexico, some of whom have been visiting research associates at the Center for periods of up to a year. In recent years, the DRC has also organized several multinational research conferences focusing on disasters issues in Central America, Southern Asia, Europe, Japan, Russia, and the former Soviet Union.

For more information, consult the DRC's home page at: <http://www.udel.edu/DRC>



Delft Waterboard staff members (Delft, Netherlands) and DRC staff members join together to observe the “Waterproof” exercise. Left to right: Rob van Woudenberg (Delft Waterboard), Joseph Trainor (Disaster Research Center), Karen Engle (COT), Greg Shaw (George Washington University), Sue McNeil (Disaster Research Center), Sanne Ebbinkhuijsen (COT), Martijn Korpel (Delft Waterboard).

*(photo by Waterboard staff.)*

## ***Director's Message***

The Disaster Research Center (DRC) at the University of Delaware is pleased to present our 2008 Annual Report. In addition to the activities and accomplishments documented in the report, we have worked to settle into our new role as a University-wide Center and to understand the impact of the changing global economy, the proposed new budget model at the University, and the opportunities presented by the University's strategic plan, "Path to Prominence." We were pleased that President Harker recognized the role DRC plays as part of the engaged University when he said, "Our Disaster Research Center is helping the world better understand and prepare to meet disasters such as hurricanes, floods, earthquakes, and tornadoes." In addition, our unique role in social science research related to disasters, the proposed professional program in Disaster Science and Management and global initiatives at DRC are all part of the "Path to Prominence."

Over the summer some administrative changes occurred and DRC now reports to Senior Vice Provost Mark Barteau in the Office of Research. Our thanks go to Carolyn Thoroughgood in seeing us through the initial transition to a University-wide center. We look forward to working with Vice Provost Barteau to become a model for interdisciplinary research on campus.

Professor Tricia Wachtendorf assumed the role of the Center's Associate Director, and Dr. Joseph Trainor, upon completion of his doctorate, transitioned from an appointment as Limited Term Researcher to Research Assistant Professor. Congratulations to both Tricia and Joe!

We continue to strengthen our international connections. Once again, we had the pleasure of hosting several international visitors for times as short as a day and as long as several weeks. Visitors came from Canada, China, Japan, and Puerto Rico. University of Delaware Vice Provost and DRC Core Faculty Member Havidán Rodríguez and I made several international trips and we now have agreements in place with Mid Sweden University, Nanjing University, and Kyoto University. Joe Trainor and I also had the opportunity to observe a weeklong exercise relating to preparedness, response and recovery due to flooding in the Netherlands and look forward to continued collaborations. Last August, Professor Wachtendorf participated in an interdisciplinary team assembled by the Earthquake Engineering Research Center to visit sites in southwest China. In the Fall we welcomed back Professor Aguirre from sabbatical in Chile and Portugal. Tales of his experiences have been enjoyed by everyone at DRC and his research has benefited from the fresh perspectives and new avenues.

DRC had the honor of hosting the presentation of the E.L. Quarantelli Award for Theory in the Social Scientific Study of Disasters in July. The award is made annually by the International Research Committee on Disasters (IRCD), affiliated with the International Sociological Association. Professor Gary Kreps from College of William and Mary received the award and the presentation was made by Professor Russell Dynes of DRC. Professor Kreps presented an engaging seminar title "Social Structure and Disaster: Questions, Answers and Research Vision" and this year's REU students were then able to enjoy the chance to meet with him at a reception.

This 2008 Annual Report also documents the accomplishments of our faculty, staff, graduate students and undergraduate students this past year. Highlights include:

- Active engagement of our students in our research. The publications listed reflect this involvement.
  - 16 graduate and 14 undergraduate students worked at DRC throughout 2008 as research assistants. These students have been instrumental in the growth and development of our Center. Funding for these students has been possible through a number of externally funded research projects.
- The Research Experience for Undergraduates (REU) Program funded by the National Science Foundation continued in a slightly different form. The 10 undergraduate social science researchers were joined by two civil engineering students, one sophomore and one junior, and two Master's degree students from the Tata Institute in India. The diversity of disciplines and cultures added to the richness of the experience. The individual projects are documented in this report. It was a pleasure to work with these 14 talented, motivated and energetic young researchers.

Two new multi-year NSF funded projects were awarded. Rachel Davidson and Tricia Wachtendorf are co-Principle Investigators on a project titled "Infrastructure Security and Emergency Preparedness" and Ben Aguirre is Principle Investigator with Sherif El-Tawil from University of Michigan on a project titled "Interaction between Building and Occupant Responses during Collapse (IBORC)".

We continue with our Salon Series, implementing and updating our 2007 strategic plan, moving the proposed new interdisciplinary graduate program in Disaster Science and Management forward, and educating our students. Please come and visit, use the Resource Collection, or attend one of our Salon Series seminars.

We look forward to a productive 2009 and welcome your comments and suggestions.

Sue McNeil, Ph.D., P.E.  
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## ***Feature Article: EERI-UD Student Chapter***

The Earthquake Engineering Research Institute (EERI) is a national, nonprofit, technical society of engineers, geoscientists, architects, planners, public officials, and social scientists. EERI members include researchers, practicing professionals, educators, government officials, and building code regulators.

The objective of EERI is to reduce risk by (1) advancing the science and practice of earthquake engineering, (2) improving understanding of the impact of earthquakes and other hazards on the physical, social, economic, political, and cultural environment, and (3) advocating comprehensive and realistic measures for reducing the harmful effects of earthquakes and other hazards.

EERI encourages the establishment of student chapters to engage students, to provide context to research and education, and to afford students networking opportunities with professionals in their field. Student members of EERI also gain the valuable experience of interacting with a professional organization, which is an important part of their future as professionals. Active chapters have specific characteristics that help them achieve these goals.

The EERI Student Chapter at the University of Delaware was established in 2007. This chapter is innovative within EERI since it adopts a multi-disciplinary focus rather than solely an engineering focus. Moreover, it is the first student chapter established by students in the social sciences. The small but very active multi-disciplinary group of students has arduously worked towards their common goal — creating awareness of the intersection between hazards and vulnerable communities to promote disaster reduction. For the past two years the group has organized a series of student and community oriented activities, including the Disaster Awareness Day, a school outreach activity in which we visited Delcastle Technical High School, movie nights, and lectures.

The 2008–2009 Executive Board is as follows:

Jenniffer M. Santos-Hernández – President and DRC Graduate Student

Kimberly Gill – Vice-president and DRC Graduate Student

Spencer Schargorodski - Outreach coordinator and DRC Undergraduate Student

Cristina Dalton - Secretary and DRC Undergraduate Student

DRC is especially proud of its affiliation with this student led organization. The activities of this group strongly support the Center's focuses on education, mentoring, outreach and education.

# Research

DRC has a well-established research tradition built on its foundations in the social sciences, a proven capacity for quick response field research, and a culture of collaboration between faculty, staff, graduate students, and undergraduate students. In particular, the increase in focus on issues related to disasters, the multidisciplinary funding climate, emerging collaborations between DRC and external agencies, the many unfunded mandates related to disaster planning that have been imposed on governmental agencies, and DRC's University-level administrative location under Research and Graduate Studies have created not only an increased demand for DRC's traditional expertise, but have also provided motivation to go beyond multidisciplinary work to develop a sustainable interdisciplinary program. In developing such an environment, DRC plans to draw on the core research areas current DRC faculty engage in, all of which are prime for interdisciplinary collaboration, including:

- The identification of the social, physical and environmental factors/conditions that influence vulnerability and resiliency of social and physical systems
- Individual and collective threat perception and behavior
- Organizational and inter-organizational dynamics
- Development and disasters
- Social and political dynamics that enhance the development of public policy for disaster reduction
- Analysis and management of infrastructure systems

In developing and conducting research projects, DRC aims to act as a catalyst for and serve as the intellectual home for interdisciplinary disaster related research. We focus on team-conducted projects that are more fruitful than independent research on the same topic, that leverage the interests and capacities of other disciplines on campus, that balance quantitative and qualitative approaches to research, that demonstrate systems-level thinking, that employ the broadest possible set of methodologies and analytic techniques, and that nurture a culture which values the integration of disciplinary insights and thinking.

## Project Descriptions

This section provides short descriptions of active and recently completed projects involving faculty from the Disaster Research Center at the University of Delaware. Although by no means an exclusive list of capabilities, these projects demonstrate the Center's expertise and our current agenda.

## **Active Projects**

### ***Collaborative Research Proposal on Improvisation and Sensemaking in Sudden Crisis***

Principal Investigators: Tricia Wachtendorf and James M. Kendra, University of North Texas

Senior Personnel: Jasmin Ruback, Ruback & Associates

Graduate Research Assistants: Lynn Letukas, Disaster Research Center, and Brandi Lea, University of North Texas

Undergraduate Research Assistants: Jeff Engle, and Brittany Scott

Funding Agencies: National Science Foundation, University of Delaware Research Foundation

This project examines organizational improvisation and sensemaking under conditions of rapid change and urgent needs for decision and action. The project studies the unplanned waterborne evacuation of hundreds of thousands of commuters from Lower Manhattan after the September 11, 2001 attack on the World Trade Center, and the subsequent improvised boat-lift of supplies and equipment into the city. Focus is on sensemaking and improvisation across multiple organizations that are geographically dispersed yet neverthe-

less able to “make sense” with each other regarding swiftly developing emergency needs and to coordinate their actions responsively and productively. Analytical methods include an inductive qualitative approach to interview and documentary data as well as a social network analysis of pre- and post-attack relationships among participants and geographically referenced to points in the New York-New Jersey-Staten Island area. This is a collaborative project with James Kendra (PI) at the University of North Texas.

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### ***Contending with Materiel Convergence: Optimal Control, Coordination, and Delivery of Critical Supplies to the Site of Extreme Events***

Principal Investigators: Jose Holguin-Veras, Rensselaer Polytechnic Institute, Tricia Wachtendorf, Disaster Research Center, Havidán Rodríguez, Disaster Research Center, Satish V. Ukkusuri, Rensselaer Polytechnic Institute, and Didier M. Valdes, University of Puerto Rico-Mayagüez

Graduate Research Assistants: Lauren Barsky Bethany Brown, and Lynn Letukas

Undergraduate Research Assistants: Jeffrey Engle, Chris Colindres, and Brittany Scott

Funding Agency: National Science Foundation

The overall goal is to develop methodologies and tools to foster an accelerated convergence between the dynamic needs and supplies of critical resources (e.g., blood, water) to the site of an extreme event. These methodologies will be based on state-of-the-art concepts from the social sciences, control theory, and robust stochastic optimization of dynamic supply chains with the aim of reducing adverse impacts of convergent low priority goods, while expediting the flow of high priority supplies to various response related sites. This topic was identified as a critical research issue by Mr. Joe Picciano, Acting Director

of FEMA Region II at the time of the 9/11 attacks, who highlighted that such techniques are of critical importance to “... improve the distribution of critical assets and goods in a catastrophic event ...” This was again emphasized by many of those handling supplies in the aftermath of Hurricane Katrina when interviewed by team members. These methodologies could help: (a) ensure that emergency workers and support staff have the critical resources they need for an efficient rescue operation; (b) prioritize the incoming flows of donations; and (c) distribute the critical supplies efficiently to impacted areas.

### ***Integrated Optimization of Evacuation and Sheltering for Hurricanes***

Principal Investigators: Rachel Davidson, Tricia Wachtendorf, Disaster Research Center and Linda Nozick, Cornell University

Post-doctoral Research Associate: Pruttipong Apivatanagul

Funding Agency: National Science Foundation-HSD

This project seeks to improve understanding of and decision support for evacuation and mass case sheltering in hurricanes. In the past, math modeling in this application has been limited to estimating the time required to clear a region, assuming many characteristics of the problem are uncontrollable input (e.g., where shelters are located). Instead, we will expand the decision frame and use optimization models to support the full range of strategic and operational evacuation and sheltering decisions, with higher-level objectives such as minimizing life loss, cost, and inequity. These models will be developed through a tight interaction between sociologists and engineers to ensure that they are firmly grounded in the reality of people's behavior. For the first time, the models will be based on individual hurricane scenarios instead of conservative aggregations of many events, and they will be dynamic,

accounting for the fact that officials can update their decisions as an event unfolds and information about the situation changes. The project has 5 main steps: (1) determine a suite of hurricane scenarios for use in evacuation and shelter models such that they probabilistically represent the full range of possible events, but are limited in number enough to allow detailed analysis with each; (2) conduct focus groups of key decision makers and stakeholders to identify and characterize key decision making elements; (3) using the focus group input, develop two mathematical optimization models—one long-term strategic and one short-term operational—for evacuation and sheltering decisions; (4) conduct surveys of affected citizens to test the validity of the optimization model assumptions and results; and (5) demonstrate the models with case study applications in North Carolina and Florida.

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### ***Infrastructure Security and Emergency Preparedness***

Principal Investigators: Sue McNeil, Rachel Davidson, Joseph Trainor, and Tricia Wachtendorf

Graduate Research Assistants: Gabriella Wasileski and Laura Black

Undergraduate Research Assistants: Charles Mitchell III and Sarah Dalton

Funding Agencies: US Department of Transportation, Research and Innovative Technology Administration, University Transportation Centers Program, and Delaware Department of Transportation

Transportation infrastructure security and emergency preparedness presents an enormous challenge for both the State of Delaware and for the major transportation corridors that run through the state. DelDOT and its extensive network of partner organizations have a strong coalition in place to plan, train, and run exercises related to regional evacuation issues. Most notably the state's Transportation Management Team is charged with jointly making decisions on how an incident or an event that impacts the transporta-

tion system will be handled. Given the complexity of this task and the many intersecting areas of interest, it is vital that relevant engineering and social sciences be brought to bear on the planning processes already underway. The objective of this project is to review the current state of practice for Delaware, review external research and apply insights from state-of-the-art social science and engineering, and develop a plan for integrating research insights into practice.

### ***Interaction between Building and Occupant Responses during Collapse (IBORC)***

Principal Investigators: Benigno E. Aguirre, Disaster Research Center and Sherif El-Tawil, University of Michigan

Graduate Research Assistant: Kimberly Gill

Funding Agency: National Science Foundation

The primary goal of this project is to contribute to the state of art of urban search and rescue (USAR) preparedness by developing a better understanding of how buildings partially or fully collapse; to examine factors (social, structural and ecological) which impact survival of lives when formal emergency response occurs to structural collapse; as well as to understand survival of civilians in structural fires where search and rescue occur. Building collapse is a pressing concern in structural fire; this project analyzes how the presence of formal emergency responders impacts the survival of civilians in such a context. Using a sociological approach, this project seeks to understand the social components which influence civilian death and injury in structural fires where collapse may occur.

Recent Developments:

- Completed statistical analyses for a paper examining factors that impact civilian survival in structural fires utilizing the National Fire Incident Reporting System (NFIRS) data set.

- Created and submitted an annotated bibliography of fire science which is currently under review at Disaster Medicine and Public Health Preparedness a Journal of the American Medical Association.
- Reviewing witness statements, grand jury testimony and newspaper articles from The Providence Journal of individuals impacted by the Station (Rhode Island) night club fire (February 20, 2003) for developing a quantitative database for statistical analyses that will inform researchers on social bonds during the event.
- Commencing preliminary statistical analyses.
- Meeting regularly with team from Computer and Information Sciences to develop computer simulation and agent-based model of the Station Nightclub and patrons within the club.
- Developing response to NSF proposal review comments.

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### ***Investment Planning for Regional Natural Disaster Mitigation***

Principal Investigators: Rachel Davidson, Disaster Research Center, and Linda Nozick, Cornell University

Graduate Research Assistants: Meredith Legg, Cornell University and Pantea Vaziri, Cornell University

Funding Agency: National Science Foundation

In this project, we are developing a set of mathematical models to help guide an optimal expenditure of regional natural disaster mitigation funds, and provide insight into the many factors that interact to determine the best mix of mitigation strategies. Focusing on earthquakes and hurricanes, the regional natural disaster mitigation analysis models will help an at-risk region with a limited budget decide how much to spend on pre-event mitigation that aims to reduce future losses versus post-event recovery, and which of

the many possible pre-event mitigation activities to fund so as to meet the region's objectives. The proposed set of models will advance knowledge about natural disaster risk management and the simultaneous planning for multiple hazards. While it is widely thought that pre-disaster mitigation is desirable, and a lot has been done to develop structural and other techniques for disaster mitigation, the circumstances in which it is desirable to implement different mitigation measures are not well understood. This project



will merge optimization and loss estimation modeling to provide new insights into resource allocation decisions for mitigation. The findings

may be generalizable to other hazards and to risk managers in other contexts.

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### ***Learning from a Large Scale Flood Exercise in the Netherlands***

Principal Investigators: Sue McNeil and Joseph Trainor

Undergraduate Research Assistant: Ashley Horan

Funding Agency: COT Institute for Safety, Security and Crisis Management

In response to a request from the Directorate General of the Ministry of Public Works, Transport and Water Management in the Netherlands COT assembled a network of institutions with expertise in emergency management, risk and disasters. The project is focused around Dutch flood-exercise week, organized by the Flood Management Taskforce (TMO, Taskforce Management Overstromingen) in November 2008. COT along with researchers from the University of Delaware, and George Washington University documented background information, participated as observers in the exercise, and developed lessons learned. The objectives of this project are to:

- Exchange information regarding key processes, best practices, and complexities of flood disaster management identified from the literature and U.S. experience that are validated (or refuted) during the exercise with emergency management. Such information is particularly valuable for emergency planning and future exercises.
- Identify areas throughout which additional research is necessary, particularly those areas in which results of the literature study were not validated by the case study.

A final report will be completed early in 2009 and plans for continued collaboration are being developed.

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### ***Modeling Post-earthquake Fire Spread***

Principal Investigator: Rachel Davidson

Graduate Research Assistant: Selina Lee, Cornell University

In the aftermath of an earthquake, many fires may ignite simultaneously, and at the same time that a region's suppression capabilities are severely diminished due to damaged water supply, transportation, and communication systems, and increased demands on fire service personnel. The result can be conflagrations that cause losses exceeding those caused by ground shaking. In this project, we are developing a new simulation model of post-earthquake fire spread and applying it to a case study area in Los Angeles. The model is designed to have several desirable features: (1) to be physics-based, representing the various modes of fire spread separately (e.g., radiation, branding); (2) to be computationally tractable so that it can be applied to

an entire urban area; (3) to provide many types of detailed results, including for example, total area burned, spatial description of spread, and relative importance of different modes of spread, so that it can provide insight into the relative importance of different contributors to fire spread; (4) to quantify uncertainty in the results, and (5) to be flexible to allow easy modification. The new post-earthquake fire spread model is designed to be used to: (1) improve estimation of fire damage for a specified earthquake scenario, (2) provide new insight into the relative importance of factors that contribute to post-earthquake fire spread, and (3) help future evaluation of potential long- and short-term post-earthquake fire risk reduction strategies.

### ***Multi-Organizational Collaborative Leadership***

Principal Investigators: Tricia Wachtendorf, Disaster Research Center and William Waugh, Georgia State University

Funding Agency: Department of Homeland Security Center of Excellence

Collaboration is one of the principles of emergency management. In an environment in which authority is shared and nongovernmental resources and involvement are critical, the development of better collaborative skills is essential. This is particularly true when considering high consequence events that span a wide geographic area where many of the principal responders may have had limited, if any, pre-event interaction. External assistance will be required if local capacities are exceeded, yet it is often local organizations that are most familiar with the area's vulnerabilities and capabilities. At the same time,

organizations have very different cultures, operating procedures, traditions of authority, and experiences with disasters. The goal of this project is to help officials do a better job of coordinating incidents that are multi-organizational and/or multi-jurisdictional. For example, how can NIMS/ICS be better enabled? What mechanisms and structures support integration? What are the barriers to integration and how can these barriers be removed? The project is part of the larger Center of Excellence for the study of Natural Disasters, Coastal Infrastructure and Emergency Management at University of North Carolina-Chapel Hill.

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### ***NEES-SG. NEESWood: Development of a Performance-Based Seismic Design Philosophy for Mid-Rise Woodframe Construction***

Principal Investigators: John van de Lindt, Colorado State University, Rachel Davidson, Disaster Research Center, Andre Filiatrault, University of Buffalo, David Rosowsky, Texas A&M University, and Michael Symans, Rensselaer Polytechnic Institute

Graduate Research Assistant: Greg Black

Undergraduate Research Assistant: Stephanie Karas

Funding Agency: National Science Foundation, Network for Earthquake Engineering Simulation (NEES) Program

The objective of this project is to develop and experimentally validate a performance-based seismic design (PBSD) procedure that would make construction of mid-rise wood-frame construction possible in regions of moderate to high seismicity in the U.S. While wood-frame structures have historically performed well in earthquakes with regard to life safety, they have sustained significant structural and non-structural damage in recent events. Further, the height of wood-frame construction has been limited to approximately four stories, and current building code requirements for engineered wood construction are not based on a global seismic design philosophy but

rather wood elements are designed independently of each other. In this project, we seek to provide the necessary mechanisms to take advantage of the engineering characteristics that make wood-frame construction perform well with regard to life safety, while safely increasing the height of wood-frame structures in seismically active areas and mitigating damage to low-rise wood-frame structures. Two of the focuses of this project are: (1) to help guide the specification of appropriate performance objectives, and (2) to assess the impact of implementing the new PBSD philosophy on a region's seismic risk over time.

### ***New Methods for Measuring, Monitoring, and Evaluating Post-Disaster Recovery***

Principal Investigators: Ronald Eguchi, University of Buffalo, Rachel Davidson, Disaster Research Center, Stephanie Chang, University of British Columbia, Arleen Hill, University of Memphis, and Beverley Adams, Imagecat, Inc.

Graduate Research Assistant: Dana Rathfon

Funding Agency: National Science Foundation

Post-disaster recovery—one of the phases of the disaster management cycle—is a complex physical, social, economic, environmental, and political process. It lasts years, requires enormous financial and other resources, and can define the character of the affected communities for years to come. The literature includes theoretical frameworks of recovery and empirical case studies of historic events. The empirical studies have often focused on a single dimension of recovery, such as housing, and have typically relied on interviews, focus groups, and one-time surveys for data gathering. This literature offers rich cross-sectional insights into recovery at a point in time, but limited systematic, quantitative empirical descriptions of regional recovery over time. Using newly available high-resolution satellite imagery, previously underutilized statistical data, and advanced field survey techniques that capture a detailed geographically-referenced record of recovery through photographs, video, and observations, this study will develop innovative methods for systematically and quantitatively

measuring and monitoring post-disaster recovery. Using a single recent hurricane as a case study, in this project we are: (1) developing methods to process and interpret remote-sensing data to describe the physical and socio-economic manifestations of post-disaster recovery; (2) obtaining and compiling quantitative and qualitative recovery data from remote-sensing, field reconnaissance surveys, secondary statistical sources, interviews, and surveys; (3) developing methods to analyze and synthesize the recovery data to comprehensively measure and monitor recovery; and (4) demonstrating application of the new methods within the case study area. Improved tracking of recovery will serve as a critical first step for future efforts to better explain and evaluate recovery by addressing questions such as: (1) For a disaster that has just occurred, over what timeframes and in what ways is recovery likely to unfold?; (2) Why is recovery proceeding in a particular way?; and (3) How are recovery speed and character correlated with various pre- and post-disaster decisions and actions?

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### ***Population Composition, Geographic Distribution, and Natural Hazards: Vulnerability in the Coastal Regions of Puerto Rico***

Principal Investigators: Havidán Rodríguez, Disaster Research Center, Walter Díaz and Aurelio Mercado, University of Puerto Rico-Mayagüez (UPRM)

Graduate Research Assistant: Jenniffer Santos-Hernández

Undergraduate Research Assistant: Chris Colindres

Funding Agency: University of Puerto Rico Sea Grant College Program

Given its geographic location and climatological characteristics, Puerto Rico is highly susceptible to natural hazards (e.g., hurricanes, floods, tsunamis, and earthquakes). Coastal or riverine flood areas and steep mountains characterize much of Puerto Rico. Hurricanes San Ciriaco (1899), San Felipe (1928), San Ciprián (1932), Santa Clara (1956), Hugo (1989), and Georges (1998) have

had a significant social and economic impact on the Island's population and economy. As a result of changing social and demographic patterns in Puerto Rico, there has been a significant increase in population density, in the proportion of the elderly and physically disabled population, and an increasing concentration of residents in flood and/or landslide prone areas and especially along

the coastline. According to the Insurance Commissioner's Office, as of June, 2003, 160,000 families were living in flood prone areas in Puerto Rico, of which 43,568 (27.2%) did not have flood insurance. These factors have contributed to the increasing vulnerability to natural hazards on the Island. The primary goal of this project is to understand how these and other factors contribute to the vulnerability of the Puerto Rican population living in coastal regions, how they have changed from 1990 to 2000, and how risk and vulnerability vary according to different social, economic, and demographic variables. To accomplish the aforementioned goal, we developed geographical maps, in both paper and GIS format, of the coastal areas of Puerto Rico that include detailed demographic and socioeconomic data of the resident population. Using 1990 and 2000 Census data, Graduate Research Assistant Santos-Hernández completed her MA thesis which presents the estimation of the social vulnerability to storm surge flooding index for Puerto Rico. This

research project allows us to develop a better understanding regarding the demographic and socio-economic factors that contribute to the vulnerability, perception of risk, disaster mitigation, and preparedness among communities on the Island's coastal regions. Further, it will also provide government agencies and emergency management organizations with detailed information that will allow them to play a critical role in mitigating the effects of natural hazards in Puerto Rico. The Disaster Research Center (DRC) has purchased the software necessary to publish on the Internet, in an interactive format, the vulnerability maps that we have developed. This research project is a collaborative and interdisciplinary effort between the Disaster Research Center at the University of Delaware, the Center for Applied Social Research (CISA) in the Department of Social Sciences and the Physical Oceanography Laboratory in the Department of Marine Sciences, both at the University of Puerto Rico-Mayagüez.

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### ***Post-earthquake Water Supply Restoration***

Principal Investigator: Rachel Davidson

Graduate Research Assistant: Susan Brink

In this project, we are developing a discrete event simulation model of post-earthquake restoration for the Los Angeles Department of Water and Power water supply system, and using it to provide insight into the factors that govern restoration efficiency and ways to improve the process. The model mimics the real-life process in detail, simulating the movement of different types of crews as they inspect, reroute around, isolate, and repair system damage. For any given

earthquake, it provides restoration curves with uncertainty bounds, maps showing the spatial distribution of outages over time, and crew and repair material usage information. Results for the 1994 Northridge earthquake suggest the model is capable of accurately estimating the time and spatial sequence of the restoration. This is the first application of discrete event simulation to post-disaster water supply restoration, and one of the first for any infrastructure system.

### ***Research Experience for Undergraduates (REU) Program: Training the New Generation of Disaster Researchers***

Principal Investigators: Havidán Rodríguez and Joanne Nigg

Senior Personnel: Tricia Wachtendorf, Benigno Aguirre

Graduate Research Assistant: Lynn Letukas

Undergraduate Research Assistants: Brittany Scott and Kathleen Shea

Funding Agencies: The National Science Foundation, The U.S. Department of Defense and The University of Delaware

The National Science Foundation originally funded the University of Delaware's Disaster Research Center (DRC) to establish a Research Experience for Undergraduates (REU) site to engage ten (10) undergraduate students in hands-on research training to enhance their understanding of the social science aspects of disasters for three years beginning in the summer of 2005. A renewal of this funding was received in 2007 to continue the program for an additional three years through 2010. Each summer during the funding period, a nine (9) week research training institute is held at DRC to provide students with the necessary academic background, training, and relevant research experiences to prepare them to function as relatively independent research schol-

ars. Course models focus on research methodology, social science approaches to understanding the causes and consequences of disasters, and ethical implications of the research process. Students work with leading scholars and researchers on state-of-the-art research projects that focus on issues such as disaster mitigation, preparedness, response, recovery, vulnerability, and resilience. A multi-disciplinary group of leading disaster researchers and practitioners participates in the Invited Speaker Series in order to emphasize the contributions that other disciplines bring to this field. A series of professional development and social-cultural activities complement the trainees' overall education and training.

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### ***Resiliency of Transportation Corridors Before, During, and After Catastrophic Natural Hazards***

Principal Investigators: Sue McNeil, Disaster Research Center, Joanne Nigg, Disaster Research Center, and Tracy DeLiberty, Geography Department, University of Delaware

Graduate Research Assistant: Silvana Croope

Funding Agency: University of Delaware University Transportation Center with funding from U.S. Department of Transportation

The objective of this project is to develop a framework to evaluate the resiliency of transportation corridors before, during or after a catastrophic event. The project addresses the challenge of working with diverse sets of data that present several problems such as incomplete data, lack of data, data that is too dense for real-time analysis, and data not made available due to homeland security policies. Given these data challenges, we develop the framework using a specific example and then attempt to generalize our findings. We will use U.S. 13 in Sussex County, Delaware as the

example. U.S. 13 is subject to flooding, and we are aware of much of the data DELDOT has available. The evaluation will use real-time emergency event management utilizing data generated from the Transportation Management Center integrated with data from other DELDOT sections and other institutions.

The proposed research serves as the initial concepts and framework for a suite of tools to assist agencies to be better prepared for, better able to respond to and better able to recover from catastrophic events due to natural hazards.



The research uses existing data, GIS tools and concepts of resiliency to assist in this important area. A technical report and presentation will

document the research results and provide direction for further research, development and implementation.

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### ***Resiliency of Transportation Corridors during Disaster***

Principal Investigator: Tricia Wachtendorf

Graduate Research Assistant: Ben Johnson

Undergraduate Research Assistant: Renee Legare

Funding Agency: University of Delaware University Transportation Center with funding from U.S. Department of Transportation

Transportation corridors are vital in allowing for public and commercial mobility. When these corridors are compromised during a disaster, the way in which emergency response networks function is critical to ensuring continuity or resumption of the transportation flow. Interorganizational coordination is central to an effective disaster response and may require interaction across jurisdiction, timely exchange of information, and provision of personnel or material resources. This study examines how multi-organizational actors/agencies expect and are expected to interact during a transportation corridor disaster. Using

social network analysis, researchers will examine the codified and actor-anticipated interaction in maintaining the continuity of transportation flows along the I-95 corridor in Delaware. The research will serve to: (1) provide information to facilitate planning and management of response in Delaware and the surrounding states; (2) increase our understanding of social response networks in place during corridor disasters, which may have applicability in other geographic areas; (3) generate results useful in the development of socio-technical systems to better communication and coordination during corridor disasters.

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### ***Technology, Weather Forecasts, and Warnings: Integrating the End-User Community***

Principal Investigators: Havidán Rodríguez, Disaster Research Center, and Walter Díaz, University of Puerto Rico-Mayagüez (UPRM)

Post-Doctoral Research Fellow: William Donner

Graduate Research Assistants: Melody Cotterill and Jenniffer Santos-Hernández

Undergraduate Research Assistants: Claudia Flores, Yesenia Rodríguez, Stephen Shinn, and Jasmine Wynne

Funding Agencies: National Science Foundation (NSF), Engineering Research Center for the Collaborative Adaptive Sensing of the Atmosphere (ERC-CASA)

Scientists at the Disaster Research Center are contributing through research to the end user integration efforts of the Center for Collaborative Adaptive Sensing of the Atmosphere (CASA) by exploring the social and human dimensions of severe weather forecasts and warnings. CASA is an Engineering Research Center (ERC) within NSF's Directorate for Engineering that focuses on the development of revolutionary sensing technology that will enable earlier and more accurate forecasts of severe weather events.

The aim of CASA is to design the necessary infrastructure to sense, analyze, and predict lower atmospheric events and to respond to potentially hazardous phenomena in order to significantly reduce their impact on society. More accurate and reliable weather forecasts and warning systems (based on the technology proposed by CASA researchers) may lead to improved disaster mitigation, preparedness, and response initiatives. Social Scientists in the CASA project are focusing their research efforts on

examining how improved forecasting can reduce the exposure and vulnerability of individuals and property to everyday and extreme weather events. Specifically, through the use of survey methodology, focus groups, face to face in-depth interviews, and phone interviews using the recently acquired CATI system (Computer Assisted Telephone Interviewing) we are examining how the end-user community members access, utilize, and respond to weather forecasts. We also seek to explore their knowledge and interests concerning weather forecasting issues, attitudes towards climatological information, and their needs and interests in relation to the use

of meteorological information. We aim to answer a variety of questions, including: What are the primary sources of weather information used by emergency management agencies?; How much confidence do these end-users have in this type of information?; According to the end-users, how reliable are weather forecasts and warnings?; How does climatological information affect the decision-making processes of this community of end-users?; and finally, How does the public respond to and interpret warnings? To collect data on the public, we launched a CATI survey in June 2008 and we will continue collecting data during the 2009 tornado season.

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## **Recently Completed Projects**

### ***Characterization of the Supply Chains in the Aftermath of an Extreme Event: The Gulf Coast Experience***

Principal Investigators: Tricia Wachtendorf, Disaster Research Center, Jose Holguin-Veras and Satish Ukkusuri, Rensselaer Polytechnic Institute

Graduate Research Assistant: Bethany Brown

Undergraduate Research Assistants: Chris Colindres and Jeffrey Engle

Funding Agency: National Science Foundation

This project was concerned with gathering perishable information and data about the basic features of the formal and informal logistic systems supporting the recovery and flows of critical and non-critical supplies to areas impacted by Hurricane Katrina. Prior research points to the challenges associated with setting up supply chains to an impacted site that fully account for immediate resource requirements, the range of supply sources and source mechanisms, as well as the management and prioritization of critical versus non-essential donations. This Small Grant for Exploratory Research project (1) identified the basic features of the supply chains delivering resources to the Gulf Coast; (2) gathered data

about the actual flows of critical and non-critical supplies; and (3) documented lessons learned, both positive and negative. This research will provide future researchers with a clear picture of the supply chains in place at the site of an extreme event, which will enable the development of much needed decision support systems. The research involved multi-university collaborations between Rensselaer Polytechnic Institute and the University of Delaware. It made use of quick response data collected by the University of Delaware's Disaster Research Center in the weeks following the hurricane and leveraged resources of Rensselaer's Center for Intermodal Freight Mobility and Security.

### ***FEMA's USAR Taskforce Deployments: Implications for the Emergency Response***

Principal Investigator: Benigno E. Aguirre

Graduate Research Assistants: Lauren Barsky, Rita Poteyeva, Manuel Torres, and Joseph Trainor

Undergraduate Research Assistants: Megan Denver and Jaime Perez

Funding Agency: National Science Foundation

The Urban Search and Rescue taskforces (USAR) sponsored by the National Science Foundation, a key component of the federal emergency response system, were examined to determine: (1) the extent to which these taskforces are impacted by known problems at search and rescue (SAR) operations, as well as the solutions they have developed to these problems; and (2) their intersection with other agencies, EMS personnel, volunteers, and law enforcement organizations, in what has become a critical factor in the conduct of present day SAR operations. Information came from documents, focus groups with ten USAR taskforces, and in-depth interviews with 117 key informants representing other agencies and groups that participated in nine major USAR deployment sites. To check on the validity of the findings, results of the content analysis of textual

material were compared to the findings from statistical analyses of this same information. The research addressed the diversity goals of the NSF. It supported the training of two minority doctoral students and two minority undergraduate students. Results will be made part of graduate and undergraduate courses in risk analysis and emergency planning, and of programs and training at FEMA. The primary outcome of the study is a useful blueprint for local, state, and federal agencies and private organizations to follow during participation in SAR operations that will help improve the effectiveness of disaster responses and USAR activities. It also contributes to the social science understanding of the emergent multi-organizational SAR system as a form of organized, adaptive crisis response social organization.

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### ***Scientific Insights on Preparedness for Public Health Emergencies***

Principal Investigators: Benigno E. Aguirre and Joseph Trainor

Graduate Research Assistant: John Barnshaw

Undergraduate Research Assistants: Ashley Horan and Zephi Fancis

Funding Agency: Delaware Department of Health and Human Services (DHSS)

This project reviewed the state of scientific inquiry related to public health preparedness in order to provide guidance for improving the effectiveness of individual, organizational, and inter-organizational preparedness for Public Health Emergencies in Delaware. Efforts were focused on identifying and summarizing works that discuss ways to maximize the ability of indi-

viduals to prevent, avoid, respond to, and recover from major public health emergencies. The research team paid particular attention to discussions where individual preparedness meets institutional interventions. The team also hosted a large group meeting with Delaware Public Health agencies in order to discuss findings and their applicability within the state.

## DRC Field Studies

In addition to our regular projects, researchers at DRC have conducted over 675 field studies since the Center's inception, traveling to communities throughout the United States and to a number of foreign countries in the immediate aftermath of disaster events. Our work has focused on a broad range of disaster types. Recent field studies have focused on a number of topics including organization, multi-organizational coordination, social behavioral response to disasters, warning and evacuation, and vulnerability.

This section offers a brief list of the field research conducted by DRC faculty and graduate students during the past calendar year.

<b>Location:</b>	Wenchuan, Sichuan Province, China
<b>Dates:</b>	August 2-16, 2008
<b>Researcher:</b>	Tricia Wachtendorf
<b>Funding Agencies:</b>	Earthquake Engineering Research Institute, National Science Foundation
<b>Title:</b>	"Earthquake Reconnaissance and Data Collection, Wenchuan Earthquake"
<b>Reason:</b>	Data collection; visited regions impacted by the 7.9 magnitude Sichuan Province Earthquake to observe community and societal impacts of the earthquake and to determine future relevant areas of study pertaining to the event.
<b>Location:</b>	Lake Charles, Louisiana
<b>Dates:</b>	August 16-23, 2008
<b>Researcher:</b>	Bethany L. Brown
<b>Funding Agency:</b>	Public Entity Risk Institute
<b>Title:</b>	"Organizational Response and Recovery of Domestic Violence Shelters in the Aftermath of Disaster"
<b>Reason:</b>	Data collection; visited Hurricane Rita affected domestic violence shelter.
<b>Location:</b>	Rotterdam, Leerdam, Driebergen, Delft, Den Haag, Nijkerk, Netherlands
<b>Dates:</b>	November 3-7, 2008
<b>Researchers:</b>	Joseph Trainor and Sue McNeil
<b>Funding Agency:</b>	COT Institute for Safety, Security and Crisis Management
<b>Title:</b>	"Learning from a Large Scale Flood Exercise in the Netherlands"
<b>Reason:</b>	Observation and discussion to develop "lessons learned." The week-long national flood exercise "Waterproef," organized by the Flood Management Taskforce (Taskforce Management Overstromingen or TMO), included coastal, river and lake flooding scenarios and both pre-event and post-event actions and decision making.

**Location:** New Orleans, Louisiana  
**Dates:** November 18–21, 2008  
**Researcher:** Lauren Barsky  
**Funding Agency:** National Science Foundation  
**Title:** “Contending with Material Convergence: Optimal Control, Coordination, and Delivery of Critical Supplies to the Site of Extreme Events”  
**Reason:** Data collection; visited representatives of food banks and homeless shelters in order to study the role of organizations that provide services to in-need populations during routine periods vs. times of crisis.



This picture captures some of the severe structural damage caused by the 7.9 magnitude Sichuan Province (China) earthquake that struck May 12, 2008.

*(photo by DRC staff)*



# ***Education/Mentoring***

Students, staff, and faculty affiliated with DRC all play an important role in graduate and undergraduate education at the University. Faculty offer related classes, advise students (as academic advisors and advisors for independent studies and research), and serve on comprehensive exam and dissertation committees; faculty and staff offer professional training sessions for graduate and undergraduate students; and graduate students mentor undergraduates, serve as teaching assistants, and in some cases, such as in the REU program, teach classes. The Disaster Research Center has a history of engaging graduate and undergraduate students in research. Although DRC does not admit students, offer classes, or award degrees, faculty teach classes as part of their responsibilities in their home departments and influence academic programs. DRC faculty members have also been active members of the University-wide committee to develop the interdisciplinary M.S. and Ph.D. program in Disaster Science and Management. The intent is that this new graduate program will begin in the fall of 2009.

This section provides information and examples regarding DRC's efforts to manifest its vision of education and mentoring in a concrete way.

## **Master's Thesis**

*Lynn Letukas*

"Is Aid a Social Problem?: Cross-National Media Construction of Relief Efforts Following the Indian Ocean Tsunami." Department of Sociology and Criminal Justice and Disaster Research Center, University of Delaware, Newark, Delaware.

## **Doctoral Dissertation**

*Joseph E. Trainor*

"Extreme Occasions as Organizational Context: A Contingency Perspective on FEMA'S 'Fit' During the Response to Katrina." Department of Sociology and Criminal Justice and Disaster Research Center, University of Delaware, Newark, Delaware.

## **DRC Salon Series**

The Disaster Research Center Salon Series differs slightly from a traditional lecture in that we encourage presenters to raise substantive issues which might contend with the existing literature, offer new possibilities, or raise issues that require additional study, or offer potential areas for collaboration between DRC and invited Salon presenters. All Salon Series presentations took place on the University of Delaware campus.

“Vulnerability in Chile.” Presented by Benigno Aguirre, Core Faculty Member, Disaster Research Center, University of Delaware, February 6, 2008.

“Meet the Emergency Managers: The Growth of a Profession from FEMA to Katrina.” Presented by Scott Knowles, Assistant Professor of History and Politics, Drexel University, March 12, 2008.

“WikiGIS Project to Enhance Civic Participation in the Restoration of Flood-Damaged Houses in New Orleans.” Presented by Quintus Jett, Senior Research Fellow, Tuck School of Business, Dartmouth University, May 7, 2008.

“Why People Fail to Escape in Emergencies.” Presented by Hirotada Hirose, Professor, Department of Psychology, Tokyo Women’s Christian University, September 30, 2008.

## **DRC Training Series**

The Disaster Research Center Training Series seeks to provide the research community with practical skills which improve the productivity and development of undergraduates, graduates and faculty through introductory or refresher courses on a variety of topics. Each training session is arranged on a topic at the request of students and faculty and most are open to the larger academic and local communities. All Training Series programs took place on the University of Delaware campus.

“Introduction to Graduate School.” Presented by Anne Bowler, Associate Professor, Sociology and Music, University of Delaware, October 20, 2008.

## **Undergraduate Student Achievements**

DRC undergraduate students typically achieve high academic standards and participate in various academic and professional organizations as they are relevant to the students’ course of study and academic interests. Below is a partial list of undergraduate students along with some of their most recent accomplishments and activities.

### ***Chris Colindres***

- University of Delaware Dean’s List
- University Merit Scholarship Recipient
- REU Program participant

### ***Sarah Cornwell***

- University of Delaware Dean’s List
- Global Scholars Award Scholarship Recipient

*Christina Dalton*

- University of Delaware Dean's List

*Sarah Dalton*

- University of Delaware Dean's List
- Science and Engineering Scholar
- REU Program participant

*Claudia Flores*

- University of Delaware Dean's List
- Latina Student of Distinction Award
- College Federal Reserve Challenge Winner, Baltimore Office Competition
- College Federal Reserve Challenge Finalist, Richmond District Competition
- University Merit Scholarship Recipient
- Excel Student Scholarship Recipient
- Research Intern at the United Nations
- Panelist at WAFUNIE, United Nations Research Symposium, November 21, 2008

*Renee Legare*

- University of Delaware Dean's List
- Completed Human Subjects Research Certification

*Charles Mitchell III*

- University of Delaware Dean's List
- Member, Tau Beta Phi (Engineering Honors Fraternity)
- Member, Chi Epsilon (Civil Engineering Honors Fraternity)
- REU Program participant

*Brittany Scott*

- University of Delaware Dean's List
- University of Delaware Women of Promise nominee

## **Research Experience for Undergraduates (REU) Year Three Activities**

The Disaster Research Center's REU program included the following guest speakers:

William Anderson, National Research Council, Washington, DC

Anne Bowler, Sociology Department, University of Delaware, Newark, Delaware

Erin Daix, Morris Library, University of Delaware, Newark, Delaware

Elaine Enarson, Department of Applied Disaster and Emergency Studies, Brandon University, Brandon, Manitoba, Canada

Rusty Lee, Civil and Environmental Engineering, University of Delaware, Newark, Delaware

Marcia Nickle, Emergency Preparedness Coordinator, University of Delaware, Newark, Delaware

Debra H. Norris, Vice Provost for Graduate and Professional Education and Henry F. DuPont Professor of Art Conservation, University of Delaware, Newark, Delaware

Lori Peek, Sociology Department, Colorado State University, Fort Collins, Colorado

Dory Ross, University Writing Center, University of Delaware, Newark, Delaware

Kathleen Tierney, Natural Hazards Center, University of Colorado at Boulder, Boulder, Colorado

Daniel Valle, Red Cross Delmarva, Wilmington, Delaware

Dennis Wenger, National Science Foundation, Washington, DC

David Wilson, Political Science, University of Delaware, Newark, Delaware

The following is a list of the 2008 REU participants, their institutional affiliations, and their research topics:

*Chris Colindres, University of Delaware, Newark, Delaware, USA*

“The Implications of Increasing the Technological Gap between the Haves and Have-Nots.”

*Max Daigh, Tulane University, New Orleans, Louisiana, USA*

“Finishing What Katrina Started: How New Orleans Residents Responded to Tornadoes in the Aftermath of Hurricane Katrina.”

*Sarah Dalton, University of Delaware, Newark, Delaware, USA*

“Hurricane Evacuation in Delaware.”

*Yancy Edwards, Kenyon College, Gambier, Ohio, USA*

“The Media’s Effect on Race Relations in Post-Katrina New Orleans.”

*Jeffrey Engle, University of Delaware, Newark, Delaware, USA*

“Community in the Context of 9/11: The Waterborne Community and Their Response.”

*Lisa Howison, Ohio University, Athens, Ohio, USA*

“Communication and Collective Decision-Making: Household Responses to Tornado Events.”

*Charles Mitchell, III, University of Delaware, Newark, Delaware, USA*

“Emergency Evacuation in Delaware and New Jersey for the Salem/Hope Creek Nuclear Power Generators.”

*Collin Moseley, Millersville University, Millersville, Pennsylvania, USA*

“The Intersection of Past Experience and Warning Response: The Effect of Previous Disaster Experience on Tornado Warning Response.”

### **REU Participants Travel to Natural Hazards Conference**



Boulder, Colorado – REU participants attended the 33rd Annual Natural Hazards Research and Applications Workshop, hosted by the Natural Hazards Center, University of Colorado at Boulder. They are pictured here along with DRC Core Faculty Member and former Director Dr. Havidán Rodríguez (seated, left), current DRC Director Dr. Sue McNeil (seated, right), REU program mentor Dr. Walter Díaz, University of Puerto Rico, Mayagüez (standing, last row, right) and several DRC graduate students.

*(photo by DRC staff)*



*Ilyssa Plumer, Western Washington University, Bellingham, Washington, USA*

“The Differential Influences of Age Following Hurricane Katrina.”

*Emmanuel Raju, Tata Institute of Social Sciences, Mumbai, India*

“Social Interfaces in Tsunami Recovery: Rebuilding Livelihoods and Housing.”

*Rubal Saroha, Tata Institute of Social Sciences, Mumbai, India*

“Disasters, Vulnerability, and Resilience: A Case Study of the Gujarat Earthquake, 2001.”

*Corinne Scoppe, University of Vermont, Burlington, Vermont, USA*

“Gender Influences in Evacuation during Hurricane Katrina.”

*Hillary Smith, University of Florida, Gainesville, Florida, USA*

“The Media’s Construction of FEMA Trailers as a Social Problem.”

*Mike Stokes, University of North Texas, Denton, Texas, USA*

“How Was the Waterborne Evacuation of Lower Manhattan on 9/11 Framed by Media? Content Analysis of Print Media Covering the Event.”

# ***Outreach/Dissemination***

DRC is well known in the academic community of disaster researchers as a major force for the development of research methods and theory within the field. This section illustrates our activities aimed at applying or distributing the information and knowledge gained from DRC research projects and institutional history.

## **Peer Reviewed Publications**

The following are publications authored or co-authored by DRC faculty, students and staff that are related to disasters and which have undergone the peer review process. The list is divided according to publication type.

### ***Articles***

***B. E. Aguirre***

2008. "Katrina." *Encyclopedia of Race, Ethnicity, and Society*, edited by Richard T. Schaefer. Berkeley, California: Sage.

2008. "Sports Fan Violence in North America – Book Review." *Contemporary Sociology*, 37(2): 157–158.

***B. E. Aguirre and E. L. Quarantelli***

2008. "Phenomenology of Death Counts in Disasters: The Invisible Dead in the 9/11 WTC Attack." *International Journal of Mass Emergencies and Disasters*, 26(1): 19–39.

***John Barnshaw***

2008. "Disasters." Pp. 240–242 in *Encyclopedia of Social Problems* edited by Vincent N. Parrillo. Thousand Oaks, California: SAGE Publications.

2008. "Riots." Pp. 249–251 in *International Encyclopedia of the Social Sciences*, Vol. 7, 2nd Edition, edited by William A. Darity, Jr. Detroit, Michigan: Macmillan Reference USA.

***William R. Donner***

2008. "Decision Making as Community Adaptation: A Case Study of Emergency Managers in Oklahoma." *Disasters*, 32(2): 292–302.

*William Donner and Havidán Rodríguez*

2008. "Population Composition, Migration and Inequality: The Influence of Demographic Changes in Disaster Risk and Vulnerability." *Social Forces*, 87(2): 1089–1114.

*Russell R. Dynes*

2008. "Mass Panic and Social Attachment: The Dynamics of Human Behavior – Book Review." *Contemporary Sociology*, 37(2): 138–139.

*Seung-Ryong Han, Seth D. Guikema, Steven M. Quiring,  
Kyung-Ho Lee, David Rosowsky, and Rachel A. Davidson*

2008. "Estimating the Spatial Distribution of Power Outages during Hurricanes in the Gulf Coast Region." *Reliability Engineering and System Safety*, 94(2): 199–210.

*Selina Lee, Rachel Davidson, Norihito Ohnishi, and Charles  
Scawthorn*

2008. "Fire Following Earthquake—Review of the State-of-the-Art Modeling." *Earthquake Spectra*. 24(4): 933–967.

*Lynn Letukas and John Barnshaw*

2008. "A World-System Approach to Post-Catastrophe International Relief." *Social Forces*, 87(2): 1063–1087.

*Enrico L. Quarantelli*

2008. "Panic." Pp. 122–124 in *International Encyclopedia of the Social Sciences*, Vol. 6, 2nd Edition, edited by William A. Darity, Jr. Detroit, Michigan: Macmillan Reference USA.

2008. "Conventional Beliefs and Counterintuitive Realities." *Disasters: Recipes and Remedies*, special issue of *Social Research*, 75(3) edited by Arien Mack: 873–904.

*Kristen Sanford Bernhardt and Sue McNeil*

2008. "Agent-Based Modeling: An Approach for Improving Infrastructure Management." *Journal of Infrastructure Systems*, 14(3): 253–261.

***Jenniffer M. Santos-Hernández and John Barnshaw***

2008. "Rights to Water, Food, and Development." Pp. 152–162 in *The Leading Rogue State: The United States and Human Rights* edited by Judith Blau, David L. Brunsmma, Alberto Moncada, and Catherine Zimmer. Boulder, Colorado: Paradigm Publishers.

***Delta Sousa e Silva and B. E. Aguirre***

2008. "Thorns of Seismic Safety: Risk Mitigation Policy." In *International Seminar on Seismic Risk and Rehabilitation of Stone Masonry Housing, 10th Anniversary of the July 9 Azores Earthquake, 1998* edited by Carlos Sousa Oliveira and Aníbal Costa. Aveiro, Portugal: Instituto Superior Técnico, Universidade de Aveiro.

***Tricia Wachtendorf, Bethany Brown, and Marcia C. Nickle***

2008. "Big Bird, Disaster Masters, and High School Students Taking Charge: The Social Capacities of Children in Disaster Education." *Children, Youth and Environments*, 18(1): 456–469.

**Book Chapters**

***Russell Dynes and Havidán Rodríguez***

2008. "Finding and Framing Katrina: The Social Construction of Disaster." Pp. 282–290 in *Critical Thinking: Thoughtful Writing (4th Edition)* edited by J. Chaffee, C. McMahon, and B. Stout. Boston: Houghton Mifflin Company.

**DRC Preliminary Paper Series**

***Benigno E. Aguirre and Delta Sousa e Silva***

2008. "Thorns of Seismic Safety: Risk Mitigation Policy." Preliminary Paper No. 361.

***Russell R. Dynes and E. L. Quarantelli***

2008. "A Brief Note on Disaster Restoration, Reconstruction and Recovery: A Comparative Note Using Post Earthquake Observations." Preliminary Paper No. 359.

***Sue McNeil and E. L. Quarantelli***

2008. "Past, Present and Future: Building an Interdisciplinary Disaster Research Center on a Half-Century of Social Science Disaster Research." Preliminary Paper No. 362.

*Delta Sousa e Silva and Benigno E. Aguirre*

2008. "Societal Factors Involved on Risk Mitigation Policy: Challenges to Seismic Retrofitting of Hospital Buildings." Preliminary Paper No. 360.

## **Other Publications**

The following are lists of publications authored by DRC faculty, students, and staff generated by DRC-conducted research projects or represent writings within the recognized area of expertise for the author or authors.

### ***Miscellaneous Reports***

*Bruce M. Altevogt, Andrew M. Pope, Martha N. Hill, and Kenneth I. Shine, editors*

2008. "Research Priorities in Emergency Preparedness and Response for Public Health Systems: A Letter Report." Miscellaneous Report No. 56.  
(Committee on Research Priorities in Emergency Preparedness and Response for Public Health Systems, Board on Health Sciences Policy, Institute of Medicine of the National Academies; Joanne Nigg, Committee Member)

*Jenniffer M. Santos-Hernández, Havidán Rodríguez, and Walter Díaz*

2008. "Disaster Decision Support Tool (DDST): An Additional Step Towards Community Resilience." Miscellaneous Report No. 57.

*Taronne H. P. Tabucchi and Rachel A. Davidson*

2008. "Post-Earthquake Restoration of the Los Angeles Water Supply System." Miscellaneous Report No. 60. (MCEER Technical Report, MCEER-08-0008)

*Joseph Trainor, B. E. Aguirre, and John Barnshaw*

2008. "Social Scientific Insights on Preparedness for Public Health Emergencies." Miscellaneous Report No. 59. (A report prepared by the Disaster Research Center for the Delaware Department of Health and Social Services, Division of Public Health, Disaster Preparedness Section)



*Wenchuan Earthquake Reconnaissance Team, Earthquake Engineering Research Institute (EERI) and Geo-Engineering Earthquake Reconnaissance (GEER)*

2008. "Learning from Earthquakes: The Wenchuan, Sichuan Province, China, Earthquake of May 12, 2008." Miscellaneous Report No. 58. (EERI Special Earthquake Report; Tricia Wachtendorf, Team Member)

***Working Papers***

*John Barnshaw, Lynn Letukas and E. L. Quarantelli*

2008. "The Characteristics of Catastrophe and Their Social Evolution: An Exploratory Analysis of Implications for Crisis Policies and Emergency Management Procedures." Working Paper No. 90.

**Presentations at Professional Conferences**

DRC personnel regularly participate in conferences and professional meetings that contribute to the field. Below are lists of these activities.

***Paper Presentations***

*B. E. Aguirre*

"Political Exile, Transnationality, and the Racialized Cuban." Presented at the Association for the Study of the Cuban Economy, August 15, 2008, Miami, Florida.

*Benigno E. Aguirre and Delta Sousa e Silva*

"Thorns of Seismic Safety: Risk Mitigation Policy." Presented at Azores 1998: International Seminar on Seismic Risk and Rehabilitation of Stone Masonry Housing: 10th Anniversary of the July 9th 1998 Azores Earthquake, July 9-13, 2008, Horta, Faial Island, Azores.

*John Barnshaw*

"Collective Water Rights." Presented at the 1st Meeting of Human Rights: Ideas and Action Conference, July 31, 2008, Boston, Massachusetts.

"What is a Disaster? Why Should Anyone Care?" Presented at the 78th Annual Meeting of the Eastern Sociological Society, February 23, 2008, New York, New York.

*John Barnshaw and Lynn Letukas*

“Hurricane Katrina: The Forty Year Catastrophe.” Presented at the 78th Annual Meeting of the Eastern Sociological Society, February 24, 2008, New York, New York.

*John Barnshaw, Lynn Letukas, and Scott Greenly*

“Hurricane Katrina: The Social Geography of Catastrophe.” Presented at the 53rd Annual Meeting of the Association of American Geographers, April 16, 2008, Boston, Massachusetts.

*John Barnshaw, Lynn Letukas, and Anna Olofsson*

“Nationalism Trumps Catastrophe? A Theoretical and Empirical Analysis of Media Constructed Solidarity.” Presented at the 78th Annual Meeting of the Eastern Sociological Society, February 23, 2008, New York, New York.

“Solidarity Trumps Catastrophe? An Empirical and Theoretical Analysis of Post-Tsunami Media in Two Western Nations.” Presented at the 103rd Annual Meeting of the American Sociological Association, August 4, 2008, Boston, Massachusetts.

*Bethany Brown*

“Gender Specific Disaster Efforts: A Case Study of Domestic Violence Shelters Following Hurricanes Katrina and Rita.” Presented at the 33rd Annual Hazards Research and Applications Workshop, July 12–15, 2008, Broomfield, Colorado.

“Against All Odds: Hurricane Katrina as a Window of Organizational Opportunity.” Presented at the 103rd Annual Meeting of the American Sociological Association, August 1–4, 2008, Boston, Massachusetts.

*William Donner, Desiree Grainger, Havidán Rodríguez, Walter Díaz, Jenniffer Santos-Hernández, and Daniel Marks.*

“Rainfall Estimates or Tornado Detection?: An Assessment Based on the Needs of Emergency Managers.” Presented at the 88th American Meteorological Society (AMS) Annual Meeting, Third Symposium on Policy and Socio-Economic Research, January 20–24, 2008, New Orleans, Louisiana.

*James Kendra, Brandi Lea, and Tricia Wachtendorf*

“Coordination and Partnerships in the Waterborne Evacuation of Manhattan on September 11, 2001.” Presented at the 53rd Annual Meeting of the Association of American Geographers, April 16, 2008, Boston, Massachusetts.

*Rusty Lee*

“Restoration of Services in Interdependent Infrastructure Systems.” Presented at Protecting New York from Terrorism and Disaster: Taking Stock, Setting Directions, Looking Forward, January 10–11, 2008, New York, New York.

*Selina Lee and Rachel Davidson*

“Modeling the Different Modes of Post-earthquake Fire Spread.” Presented at the 14th World Conference on Earthquake Engineering, October 15, 2008, Beijing, China.

*Lynn Letukas*

“Thanks, But No Thanks: Theoretical Approaches to Disaster Relief.” Presented at the 58th Annual Meeting of the Society for the Study of Social Problems, July 31 – August 2, 2008, Boston, Massachusetts.

*Sue McNeil and E. L. Quarantelli*

“Past, Present and Future: Building an Interdisciplinary Disaster Research Center on a Half-Century of Social Science Disaster Research.” Presented at the Conference on Risk, Crisis and Public Management, September, 2008, Nanjing, China. (Keynote Address)

*Brenda Phillips and Havidán Rodríguez*

“Designing New Technology to Improve Warning and Response: CASA’s On-going Research.” Presented at the Next Generation Warning Services Workshop, December 2–4, 2008, University of Oklahoma, Norman, Oklahoma.

*Havidán Rodríguez*

“Population Settlements, Vulnerability, and Development: The Societal Impacts of Disasters.” Keynote Address presented at the International Roundtable Conference Researching Disasters: Prospects and Dilemmas, February 4, 2008, Tata Institute of Social Sciences, Mumbai, India.

*Jenniffer Santos-Hernández and Havidán Rodríguez*

“Critical Demography, Sociological Theory, and GIS: Social Vulnerability to Disasters in Puerto Rico.” Presented at the 103rd Annual Meeting of the American Sociological Association, August 3, 2008, Boston, Massachusetts.

*Jenniffer Santos-Hernández, Havidán Rodríguez, and Walter Díaz*

“Disaster Decision Support Tool (DDST):An Additional Step Towards Community Resilience.” Presented at the 2008 Emergency Management Conference, May 22, 2008, Dorado, Puerto Rico.

*Taronne Tabucchi, Rachel Davidson, and Susan Brink*

“Restoring the Los Angeles Water Supply System Following an Earthquake.” Presented at the 14th World Conference on Earthquake Engineering, October 15, 2008, Beijing, China.

*Manuel Torres, Lauren Barsky, Rita Poteyeva and Benigno E. Aguirre*

“A Sociological Examination of Fire Science Studies.” Presented at the Annual Meeting of the Eastern Sociological Society, February 22, 2008, New York, New York.

*John van de Lindt, David Rosowsky, Andre Filiatrault, Rachel Davidson, and Michael Symans*

“Performance-Based Seismic Design of Mid-Rise Light-Frame Wood Buildings: An Overview of the NEESWood Project.” Presented at the World Conference on Timber Engineering 2008, June 2-5, 2008, Miyazaki, Japan.

*Tricia Wachtendorf*

“Resiliency of Transnational Systems to Extreme Events.” Presented at the workshop Surviving Future Disasters, April 8, 2008, Louisiana State University, Baton Rouge, Louisiana.

“Vulnerability Captured on Film: The Benefits and Pitfalls of Student Documentary Projects in Exploring National and Cross-National Hegemonies.” Presented at the Annual Meeting of the National Women Studies Association, June 20, 2008, Cincinnati, Ohio.

*Tricia Wachtendorf, Bethany Brown, Jose Holguin-Veras, and Satish Ukkusuri*

“Network Visibility in Emergency Supply Chain Management.” Presented at the Workshop on Improving Disaster Supply Chain Management: Key Supply Chain Factors for Humanitarian Relief, November 18, 2008, Baton Rouge, Louisiana.

## ***Poster Presentations***

### ***Silvana Croope***

“Resiliency of Transportation Corridors Before, During and After Catastrophic Natural Hazards.” Presented at the Delaware Center for Transportation Research Showcase, May 6, 2008, Dover, Delaware.

“Resiliency of Transportation Corridors Before, After and During Disasters.” Presented at the University Transportation Center Brown Bag Seminar, University of Delaware, November 19, 2008, Newark, Delaware.

### ***Rachel Davidson***

“Generalized Linear (Mixed) Models of Post-earthquake Fire Ignitions.” Presented at the 14th World Conference in Earthquake Engineering, October 15, 2008, Beijing, China.

### ***Rachel Davidson and Selina Lee***

“Post-earthquake Fire Ignition and Spread Models.” Presented at the National Earthquake Conference, April 22–26, 2008, Seattle, Washington.

### ***Selina Lee and Rachel Davidson***

“A Physics-based Approach to Modeling Post-earthquake Fires.” Presented at the International Association of Fire Safety Science Symposium. September 23, 2008, Karlsruhe, Germany. Winner IAFSS Best Poster Award.

### ***Lynn Letukas and Brittany Scott***

“Research Experience for Undergraduates Program.” Presented at the Annual Natural Hazards Conference, July 12–15, 2008, Boulder, Colorado.

### ***Haibin Liu, Rachel Davidson, and Tatiyana Apanasovich***

“Estimating Electric Power Outages Due to Hurricane and Ice Storms Using Spatial Generalized Linear Mixed Models.” Presented at the 2008 ASCE Structures Congress, April 24–26, 2008, Vancouver, British Columbia, Canada.



## ***Invited Presentations***

### ***Benigno E. Aguirre***

“Disaster Science as an Interdisciplinary Field.” Presented at the Laboratório Nacional de Engenharia Civil, April 1, 2008, Lisbon, Portugal.

“Disaster Science as an Interdisciplinary Field.” Presented at the Departamento de Historia, Filosofia, e Ciências Sociais, Universidade de Azores, April 7, 2008, San Miguel, Azores.

“The Rule of Ten: The Counting of the Dead in the 1755 Lisbon Earthquake.” Presented at Katastrophenforschungsstelle, Christian-Albrechts-Universität, April 29, 2008, Kiel, Schleswig-Holstein, Germany.

### ***Sue McNeil***

“Resiliency of Transportation Corridors: Connecting Transportation Planning, Infrastructure Renewal and Disaster Research.” Presented at the Institute for Transport and Communications (SIKA), Mid Sweden University, November 11, 2008, Östersund, Sweden.

“Past, Present and Future: Building an Interdisciplinary Disaster Research Center on a Half-Century of Social Science Disaster Research.” Presented at the meeting of the Crisis and Risk in a Heterogeneous Society (KRIHS), Mid Sweden University, November 11, 2008, Östersund, Sweden.

“Integrating Mitigation Decisions into Asset Management Systems.” Panel Member on the Role of Engineering Science in Mitigating Large-Scale Hazards, Hazards Workshop, November 14, 2008, Boulder, Colorado.

### ***Sue McNeil and Joanne Nigg***

“DRC – Past, Present and Future: Building an Interdisciplinary Center on a Half-Century of Social Science Disaster Research.” Presented at the Center for Biosecurity of the University of Pittsburgh Medical Center, November 22, 2008, Baltimore, Maryland.

### ***Havídan Rodríguez***

“The Social Science of Hurricane Katrina: A Modern Catastrophe in Perspective.” Public Lecture sponsored by the Jamsetji Tata Centre for Disaster Management. Presented at the Convention Centre, Tata Institute of Social Sciences, Naorji Campus, February 4, 2008, Mumbai, India.

“From the Indian Ocean Tsunami to Katrina: The Social Construction of Disasters and Catastrophes.” Presented at Mid-Sweden University and Lund University, October 2-3, 2008, Östersund, Sweden and Lund, Sweden.

*Joseph Trainor and Bruce Gellerman*

“Culture of Disaster Relief.” Guest speaker presentation on Living on Earth, May 9, 2008. (<http://www.loe.org/shows/shows.htm?programID=08-P13-00019>)

*Tricia Wachtendorf*

“Improvising Disaster: The Waterborne Evacuation of Lower Manhattan.” Presented at the Department of Sociology Spring Colloquium Series, Rutgers University, April 23, 2008, New Brunswick, New Jersey.

Guest speaker, KNPR Nevada Public Radio’s “State of Nevada,” discussing risks and perception of risks to various types of disasters, December 18, 2008.

### ***Sessions Organized or Moderated***

*Joseph Trainor*

“IRCD Special Session: Innovative Approaches to Disaster Research.” American Sociological Association Annual Meeting, August 3, 2008, Boston, Massachusetts.

*Tricia Wachtendorf*

“Teaching About Hazards and Disasters: Strategies and Resources.” Natural Hazards Center Workshop, July 13, 2008, Boulder, Colorado.

## ***Faculty and Student Recognitions***

**Tricia Wachtendorf** receives the Exemplary Use of Technology in Teaching Award for 2008.

Professor Tricia Wachtendorf received an award from the Office of the PRESENT for Exemplary Use of Technology in Teaching. PRESENT is the University of Delaware's teaching, learning, and technology center serving all those who teach at the University.

The award is bestowed on faculty who incorporate technology into their teaching to enhance their students' learning experience. Winners received \$500 to use for professional development or to support their efforts with technology in teaching and gave a presentation to the technology summer workshop. Professor Wachtendorf received the award for her use of technology in teaching Disaster, Vulnerability, and Development Sociology in Fall 2007. This course introduces students to social vulnerability analysis of disaster. As part of the course, students utilized the University's new multi-media design center and created two twenty minute documentary videos focused on the social impacts of the Indian Ocean tsunami and Hurricane Katrina. Students screened their films to approximately 100 university and community members in Spring 2008.

**Joseph Trainor** receives the Frank Scarpitti Graduate Student Award.

While completing his graduate studies at the University of Delaware, Professor Joseph Trainor was named as the recipient of the Frank Scarpitti Graduate Student Award. Awarded annually, the recognition is presented to one University of Delaware graduate student from the Department of Sociology and Criminal Justice in recognition of their commitment and contributions to scholarship and the mentoring of fellow graduate students. Professor Trainor was recognized with a plaque and a \$1,000 cash award.

**Megan Denver, Jaime Perez, and B. E. Aguirre** receive the Highly Commended Award.

DRC coauthors Megan Denver, Jaime Perez, and B. E. Aguirre were recognized with the Highly Commended Award from the Emerald Literati Network as part of the Awards for Excellence for their article, "Local Search and Rescue Teams in the United States" which was published in Volume 16, Number 4 (2007) of *Disaster Prevention and Management*.

Congratulations to our DRC faculty and students for these recognitions of their commitment and contributions to education and research!

# ***DRC in University News***

DRC events and activities were publicized regularly throughout the calendar year by the University's electronic newsletter, UDaily. The following are the news stories for 2008 along with their Web URLs:

## **"UD Prof Researches Responses to Terrorist Attacks on Infrastructure"**

This article described the work of Professor Earl "Rusty" Lee on developing a comprehensive response system that can be activated by a geographic information system (GIS) display. The system is being designed for use by emergency managers and those responsible for assessing the vulnerability of infrastructure systems.

Available online at <http://www.udel.edu/PR/UDaily/2008/mar/response032008.html>

## **"Student Films on Katrina, Tsunami Shown April 30"**

This article alerted readers to a screening of the student-produced documentary films, "The 2004 Indian Ocean Tsunami: The Disaster in the Aftermath" and "Flooded with Inequality: An Analysis of Hurricane Katrina." These films were produced by students in Professor Tricia Wachtendorf's Disaster, Vulnerability, and Development Sociology class during fall semester, 2007.

Available online at <http://www.udel.edu/PR/UDaily/2008/apr/films042908.html>

## **"Grad Student Receives \$10,000 Grant for Disaster Research"**

This article detailed DRC Graduate Student Bethany Brown's selection as the recipient of a dissertation enhancement fellowship from the Public Entity Risk Institute (PERI) and the Natural Hazards Center at the University of Colorado, Boulder.

Available online at <http://www.udel.edu/PR/UDaily/2008/jun/award062608.html>

## **"Disaster Research Focus of Summer Program"**

This article described the summer Research Experience for Undergraduates (REU) program hosted by the DRC and funded by the National Science Foundation.

Available online at <http://www.udel.edu/PR/UDaily/2009/aug/drc081908.html>

## **"Social Scientists, Engineers Join Forces to Improve Hurricane Evacuations"**

This article described the three-year, multidisciplinary research project undertaken by Professors Tricia Wachtendorf and Rachel Davidson to improve understanding of and decision support for evacuation and mass case sheltering in hurricanes.

Available online at <http://www.udel.edu/udaily/2009/sep/disaster091708.html>

“Grad Student Keynote Speaker at Disaster Conference in Mexico”

This article highlighted DRC Graduate Student Jenniffer Santos-Hernández’s delivery of the keynote address during a risk and disaster conference in Colima, Mexico as well as her two lectures to the College of Engineering at the University of Colima.

Available online at <http://www.udel.edu/udaily/2009/oct/disaster100808.html>

“UD Prof Part of Earthquake Research Team in China”

This article details Professor Tricia Wachtendorf’s participation in research following the 7.9 magnitude Sichuan Province earthquake as part of a team supported by the Earthquake Engineering Research Institute (EERI) and the National Science Foundation (NSF).

Available online at <http://www.udel.edu/udaily/2009/oct/china103108.html>

DRC related research was also the highlight of an article titled “Seeking Better Shelter from the Storm” by Diane Kukich that appeared in the *University of Delaware Messenger*, Vol. 16, No. 3 (pages 36-37).



Mock medical evacuation that was part of the “Waterproof” exercise held in Delft, The Netherlands by the Delft Waterboard.

*(photo by DRC staff)*



# ***Visitors to DRC***

The DRC hosts numerous national and international visitors throughout the year, many of whom come to work with DRC personnel and to utilize the E. L. Quarantelli Resource Collection. In addition, the DRC also sponsors a speaker series intended to initiate novel and provocative discussion of disaster related topics.

The following is a list of the visitors to the DRC during the past year including their institutional affiliation.

## ***February***

**Ayinde Truxon**, Chemical, Biological, Radiological & Nuclear Defense Information Analysis Center (CBRNIAC), Gunpowder, Maryland, USA

## ***March***

**Anne Doelemeyer**, University of Leipzig, Leipzig, Germany

## ***April***

**Rev. Timothy Stover**, Presbyterian Disaster Assistance, Hollywood, Florida, USA

## ***May***

**Deirdre Guion**, School of Business, North Carolina Central University, Durham, North Carolina, USA

**Quintus R. Jett**, Glassmeyer/McNamee Center for Digital Strategies, Tuck School of Business, Dartmouth University, Hanover, New Hampshire, USA

**Scott Knowles**, Drexel University, Philadelphia, Pennsylvania, USA

**Debra Scammon**, The University of Utah, Salt Lake City, Utah, USA

## ***June***

**Edouard Dervichian**, Swissphone Telecom AG, Samstagern, Switzerland

## ***July***

**Richard Smith**, Ministry of Civil Defence & Emergency Management, Wellington, New Zealand

## ***August***

**Masaki and Harumi Urano**, Waseda University, Tokyo, Japan

## ***September***

**Hirotsada Hirose**, Tokyo Woman's Christian University, Tokyo, Japan

## ***October***

**Chuansheng Jiang**, China Academy of Safety Science and Technology, Beijing, China

**James M. Kendra**, University of North Texas, Denton, Texas, USA

**Joseph Scanlon**, Emergency Communications Research Unit, Carleton University, Ottawa, Ontario, Canada

## ***November***

**Barbara Mann Wall**, University of Pennsylvania, Philadelphia, Pennsylvania, USA

## ***Other Disaster-Related Activities***

In addition to the activities listed above, DRC faculty, students and staff also participate in a range of activities pertaining to disasters including affiliations with various Boards, reviewers for disaster related journals, etc.

Below is a brief list of affiliations currently held by DRC personnel.

### ***Benigno E. Aguirre***

- Member, Editorial and Publication Committee, The Society for the Study of Social Problems
- Grantee, Laboratório Nacional de Engenharia Civil, Lisbon, Portugal
- Organizer, Regular Session on the Sociology of Latin America, Society for the Study of Social Problems Meetings
- Panel Review member, Center for Disease Control, Atlanta, Georgia
- Chair, Collective Behavior and Social Movements Comprehensive Examination Committee

### ***John Barnshaw***

- Reviewer, *Social Forces*
- Reviewer, *Disasters: The Journal of Disaster Policy, Study and Management*
- Member, American Sociological Association
- Member, Alpha Kappa Delta (International Sociology Honor Society)
- Member, Society for the Study of Social Problems
- Member, Sociologos Sin Fronteras (Sociologists without Borders)
- Member, Eastern Sociological Society
- Member, Contingency Planning Association of the Carolinas

### ***Bethany Brown***

- Instructor, Research Experience for Undergraduates Module, Disaster Research Center: "The Social Science of Disaster," University of Delaware, Newark, Delaware
- Recipient, National PERISHIP Award: Dissertation Fellowship in Hazards, Risk and Disasters, Public Entity Risk Institute (PERI) and the Natural Hazards Center, University of Colorado at Boulder with support from the National Science Foundation (NSF) and Swiss Re

### ***Rachel Davidson***

- Faculty Mentor, "Enabling the Next Generation of Hazards and Disasters Researchers" funded by the National Science Foundation (NSF) (<http://www.ncsu.edu/project/nextgen/>)

- Recipient, Best Paper Award for Engineering, Society for Risk Analysis. Awarded for: Jain, Vineet, and Davidson, R. 2007. Application of a regional hurricane wind risk forecasting model for wood-frame houses. *Risk Analysis*: 27(1), 45-58.

### **Kimberly Gill**

- Member, Alpha Kappa Delta (International Sociology Honor Society)
- Member, American Sociological Association (ASA)
- Member, Eastern Sociological Society (ESS)
- Vice President and Board Member, Earthquake Engineering Research Institute (EERI) University of Delaware Chapter
- Member, International Visual Sociology Association (IVSA)

### **Rusty Lee**

- Reviewer, *Journal of Homeland Security and Emergency Management*
- Reviewer, *IEEE Systems Journal*
- Reviewer, *International Journal of Emergency Management*
- Reviewer, *OR Spectrum*

### **Lynn Letukas**

- Reviewer, *Disasters: The Journal of Disaster Policy, Study and Management*
- Graduate Student Mentor, Research Experience for Undergraduates (REU) Program

### **Sue McNeil**

- Associate Editor, *Journal of Infrastructure Systems*
- Proposal Reviewer, National Science Foundation
- Advisor, Research Center for Management of Social Risk and Public Crisis, Nanjing University

### **E. L. Quarantelli**

- Reviewer, *Journal of Contingencies and Crisis Management*
- Consultant to Rand Corporation on Setting a Research Agenda for Public Health Emergency Preparedness

### **Havídan Rodríguez**

- Reviewer, *Journal of Emergency Management*
- Reviewer, *Disasters: The Journal of Disaster Studies, Policy and Management*
- Reviewer, *Sociological Forum*
- Reviewer, *Nature + Culture*
- Reviewer, *Justice Quarterly*

**Joseph Trainor**

- Reviewer, *Disasters: The Journal of Disaster Studies, Policy and Management*
- Reviewer, *Journal of Disaster Planning*
- Reviewer, *Journal of Homeland Security and Emergency Management*
- Reviewer, *Natural Hazards Center: Edited Volume on Quick Response to Katrina*
- Reviewer, *International Journal of Mass Emergencies and Disasters*
- Reviewer, *International Journal of Sociology and Social Policy*
- Reviewer, *Social Forces*
- Member, University of Delaware Research Council

**Tricia Wachtendorf**

- Faculty Adviser, EERI University of Delaware Student Chapter
- Advisory Board Member, Learning from Earthquakes, Earthquake Engineering Research Institute
- Student Activities Board Member, Earthquake Engineering Research Institute
- Proposal Reviewer, National Science Foundation
- Interviewee, *Los Angeles Times*

**Pat Young**

- Vice-Chair, Emergency Response Working Group (ERWG), University of Delaware
- Member, Delaware Disaster Assistance Team (DDAT)



# ***The E. L. Quarantelli Resource Collection***



Pat Young, Resource Collection Coordinator, is seated in the collection space of the E. L. Quarantelli Resource Collection.

*(photo by Erna Danielsson, DRC visiting researcher from Mid Sweden University)*

## **Report of Activities**

One of the key functions at the DRC that supports its ongoing mission of Research, Education/ Mentoring, and Outreach/Dissemination is the continuing maintenance and growth of the E. L. Quarantelli Resource Collection. During the past year the Collection has seen regular growth and Collection staff have undertaken and continued several initiatives to improve and enhance the quality and accessibility of the Collection.

Among the key initiatives begun or completed during the past year were the acquisition of software that will eventually enable Web access to the Collection's catalog database, DISCAT. This project will take several months to a year to complete, however upon completion it will radically transform access to the contents and information that make up the Collection.

Another key focus of the past year has been on preservation of Collection materials. To address this need, Collection staff completed a pilot project in which they worked with

University personnel to successfully digitize 14 audio cassettes that were part of the DRC's field research following the Salt Lake City Flood in 1983. This small scale project was conducted to determine the feasibility of converting other larger sets of sound recordings and the resources needed to do so. The Center's intention is to seek out grant funding in the future to support subsequent projects of this type.

The Resource Collection Coordinator also submitted a successful application for the "Connecting to Collections Bookshelf" — a set of collection preservation resources made available through the Institute of Museum and Library Services (IMLS) as part of their larger "Connecting to Collections" preservation project. The award included 16 resources ranging in focus from care for and preservation of various collection material types (paper, photographs, artifact objects, etc.) to emergency preparedness, mitigation, and response issues relating to collections.

The third major preservation project undertaken within the Resource Collection was participation in Delaware's statewide initiative, the Delaware Collections Stewardship Project. Participation in the project included a detailed review of the DRC's emergency response plan for the collections, acquisition and preservation policies, and assessment of current conditions for both collection materials and collection space. The Center was provided with a detailed final report identifying current preservation issues and recommending appropriate courses of action to enhance preservation efforts.

Resource Collection staff assisted a total of 13 visiting researchers from Germany, Switzerland, New Zealand, Japan, China, and Canada as well as various institutions throughout the United States. Additionally, staff assisted with a total of 34 student visits as well as working closely with the 14 visiting students who participated in this year's Research Experience for Undergraduates (REU) program hosted by the DRC.

DRC documents and publications continue to be added to the University of Delaware's Online Institutional Repository, supported by DSpace and accessible at <http://dspace.udel.edu>. This collection was also featured in NewSpace, the monthly online publication for the DSpace community, in February.

The Resource Collection Coordinator continues to be very actively involved in both the Delaware Disaster Assistance Team (DDAT) and the Emergency Response Working Group (ERWG) at the University of Delaware. The former is a consortium of representatives from various libraries and museums throughout Delaware working toward establishing a team of trained responders who will be able to assist in recovery of essential collections throughout the state in the event of a disaster. The group continues to move toward engaging in training opportunities to equip members with necessary response skills as well as organizing to share information useful to collection managers regarding emergency mitigation, preparedness, response, and recovery. The latter is a similar group consisting of individuals representing various University departments and serving a similar function. Group activities during the past year include a workshop on recovery of wet materials following a disaster as well as

a presentation on creating emergency response kits for collection spaces. The Resource Collection Coordinator continues to serve as the Vice-Chair of ERWG and committee chair of its Education and Training group as well as a core member of DDAT.

The E. L. Quarantelli Resource Collection saw an expansion of 1,744 new acquisitions during the past year. Current collections include print materials, journals and newsletters, electronic files, microfilm, microfiche, videos in both VHS and DVD format, slides and film and currently numbers approximately 57,000 items. New acquisitions included items obtained during a visit by the Resource Collection Coordinator to the Library of Congress as part of their Surplus Books Program.

The Collection continues to expand to meet the developing needs of researchers who utilized its resources. It is our hope that we will be able to continue our efforts to expand access to the Collection as well in the future.

## **DRC Publications**

The DRC produces a number of publications throughout the year including published articles, peer-reviewed Preliminary Papers, book chapters, miscellaneous reports, and invited commentaries. For a complete list of this year's publications, please refer to the "Peer Reviewed Publications" and "Other Publications" in the Outreach/Dissemination section of this report beginning on page 31.





[www.udel.edu/DRC](http://www.udel.edu/DRC)



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