Research Digest

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Research Digest is a quarterly online publication (www.colorado.edu/hazards/rd) that compiles recent research into an easily accessible format to advance and communicate knowledge on hazard mitigation and disaster preparedness, response, and recovery within an all-hazard, interdisciplinary framework for the hazards and disasters community. It provides complete references and abstracts (when available) for current research in the field. The issues are compiled by Center staff and include abstracts from peer-reviewed publications.

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All Hazards

Johnson, Cassidy. 2007. Strategic planning for post-disaster temporary housing. *Disasters* 31(4): 435-458.
Temporary housing programs suffer from excessively high cost, late delivery, poor location, improper unit designs, and other inherent issues. These issues can be attributed in part to a prevalence of ad hoc tactical planning, rather than pre-disaster strategic planning, for reconstruction undertaken by governments and non-governmental organizations (NGOs) in the chaotic post-disaster environment. An analysis of the process and outcomes from six case studies of temporary housing programs after disasters in Turkey and Colombia in 1999, Japan in 1995, Greece in 1986, Mexico in 1985, and Italy in 1976 yields information about the extent to which strategic planning is employed in temporary housing programs, as well as common issues in temporary housing. Based on an understanding of these common issues, this paper proposes a framework for strategic planning for temporary housing that identifies organizational designs and available resources for temporary housing before the disaster, but allows modifications to fit the specific post-disaster situation.

Kano, Megumi, and Linda B. Bourque. 2008. Correlates of school disaster preparedness: Main effects of funding and coordinator role. *Natural Hazards Review* 9(1): 49-59.
This study examined the correlates of public schools' preparedness for emergencies and disasters. Hypotheses for the study were derived from the social science literature on disaster preparedness among schools, households, and organizations. It was hypothesized that preparedness would be associated with demographic factors, general and preparedness-specific resources, and prior experience. A mail survey was conducted with a sample of 470 public schools in California between September 2005 and February 2006. Responses were obtained from 157 schools. Multivariate regression analyses were performed with unweighted data. Having funding for preparedness activities and a school-based emergency preparedness coordinator were positively associated with measures of school preparedness, including perceived level of preparedness, availability of emergency equipment and supplies, extent of interagency coordination, and provision of in-service training. School characteristics, such as size, urbanicity, general resource base, and prior experience with emergencies or disasters were not associated with levels of preparedness.

Levine, Joyce N., Ann-Margaret Esnard, and Alka Sapat. 2007. Population displacement and housing dilemmas due to catastrophic disasters. *Journal of Planning Literature* 22(1): 3-15.

As Hurricane Katrina revealed, coastal communities have become far more vulnerable to tropical storms and the long-term displacement of residents. Yet, because the emergency management model presumes that recovery quickly follows response, governments focus only on short-term, localized displacement. However, long-term and long-distance displacement exposes a gray area between immediate shelter and permanent housing, along with concerns about vulnerability, housing availability, and land development. The authors begin this article by discussing the transition between response and recovery. They review literature regarding social vulnerability, displacement, provision of temporary housing, households' return decisions, and disaster-driven land development and housing construction processes. They close with thoughts on future research to increase planners' understanding of the issues involved and to help them craft effective policies.

Liu, Brooke Fisher. 2008. Online disaster preparation: Evaluation of state emergency management web sites. *Natural Hazards Review* 9(1): 43-48.

The purpose of this study is to provide a baseline of information available on state emergency management Web sites. Through a content analysis of all 50 state emergency management Web sites, the study examines four variables identified in the literature as important markers of effective electronic government communication: democratic outreach, information content, outreach to special needs populations, and intergovernmental relations. The results from this study provide a baseline for future research on state emergency management communication and provide insights into how state emergency management agencies can improve their Web sites.

Mercer, Jessica, Dale Dominey-Howes, Ilan Kelman, and Kate Lloyd. 2007. The potential for combining indigenous and western knowledge in reducing vulnerability to environmental hazards in small island developing states. *Environmental Hazards* 7 (4): 245-256.

The benefits of indigenous knowledge within disaster risk reduction are gradually being acknowledged and identified. However, despite this acknowledgement there continues to be a gap in reaching the right people with the correct strategies for disaster risk reduction. This paper identifies the need for a specific framework identifying how indigenous and western knowledge may be combined to mitigate against the intrinsic effects of environmental processes and therefore reduce the vulnerability of rural indigenous communities in small island developing states (SIDS) to environmental hazards. This involves a review of the impacts of environmental processes and their intrinsic effects upon rural indigenous communities in SIDS and how indigenous knowledge has contributed to their coping capacity. The paper concludes that the vulnerability of indigenous communities in SIDS to environmental hazards can only be addressed through the utilization of both indigenous and Western knowledge in a culturally compatible and sustainable manner.

Shaluf, Ibrahim Mohamed. 2007. Disaster types. *Disaster Prevention and Management* 16(5): 704-717.

This paper aims to provide graduate students, researchers, and government and independent agencies with an overview of disaster types. It summarizes the views of researchers and agencies. Disaster types are collected from several sources such as technical, general articles, Internet Web sites, and internal reports. Disaster definitions, criteria, and types are reviewed. Disasters are classified into natural disasters, man-made disasters, and hybrid disasters. Man-made disasters are classified into technological disasters, transportation accidents, public places failure, and production failure. The paper presents a comparison between the main types of disasters. It is believed that the three disaster types cover all disastrous events. No definition of disaster is universally accepted. Several criteria are proposed to define disasters. Understanding of disaster definitions, criteria, and types aids researchers and agencies in the proper classification, good recording, and better analysis of disasters. Disasters have different characteristics and impact; however, disasters have a common element, which is their severity. This paper presents a definition of and criteria for disasters. It also presents an overview of disaster types, makes a comparison between the main types of disasters, and combines various disaster terms into one record.

Shaluf, Ibrahim Mohamed. 2007. An overview on disasters. *Disaster Prevention and Management* 16(5): 687-703.

This paper seeks to provide graduate students, researchers, and government and independent agencies with an overview of disasters. Disasters have been the subject of research and a source of concern to academicians and government and independent agencies. In this paper disaster types are collected from several sources such as technical, general articles, Internet Web sites, and internal reports. Disaster types, definitions, hazards, and mitigations are reviewed. Disasters are classified into natural disasters, man-made disasters, and hybrid disasters. Man-made disasters are classified into technological disasters, transportation accidents, public places failure, and production failure. Natural and/or man-made disasters sometimes lead to subsequent disasters. It is believed that the three disaster types cover all disastrous events. Disasters have different characteristics and impacts; however, disasters have a common element, which is their severity. Natural disasters are those disasters that result from natural forces. Man-made disasters are those disasters that result from human decisions. Hybrid disasters are those disasters that result from both natural and man-made causes. Subsequent disasters are those disasters that result from natural and/or man-made disasters. Epidemics could be a disaster or a subsequent disaster. This paper presents the types, definition, hazards, and mitigation of disasters. Disasters are arranged into disaster types, sub-disasters, and disastrous events in the form of a disaster tree. An algorithm can be written utilizing this disaster tree. The

algorithm can be used for training purposes to prevent or reduce disasters.

Tran, Phong, and Rajib Shaw. 2007. Towards an integrated approach of disaster and environment management: A case study of Thua Thien Hue province, central Vietnam. ***Environmental Hazards*** **7(4): 257-270.**
Disasters and environmental degradation create serious problems all around the world. They are inherently linked, but little attention is paid to their interaction, particularly at local levels. The degree of integration of disaster management and risk analysis with environmental management programs in relation to human vulnerability has been examined in Thua Thien Hue Province, Central Vietnam. Unsustainable agricultural practices and inappropriate development programs have contributed substantially to the increase of disaster risks. On the other hand, disasters damage natural resources and reduce environmental quality, indirectly contributing to increasing poverty, which in turn adds to the vulnerability of both natural and human systems, further increasing disaster losses. Notwithstanding, in Vietnam, there is a big gap between disaster and environment management policies and programs. In order to bridge the gap, an integrated approach in which environment-disaster linkage, rural–urban linkage, and poverty are brought into focus as core aspects of disaster management.

Yi, Wei, and Linet Ozdamar. 2007. A dynamic logistics coordination model for evacuation and support in disaster response activities. ***European Journal of Operational Research*** **179(3): 1177-1193.**
This paper describes an integrated location-distribution model for coordinating logistics support and evacuation operations in disaster response activities. Logistics planning in emergencies involves dispatching commodities (e.g., medical materials and personnel, specialized rescue equipment and rescue teams, food, etc.) to distribution centers in affected areas and evacuation and transfer of wounded people to emergency units. During the initial response time it is also necessary to set up temporary emergency centers and shelters in affected areas to speed up medical care for less heavily wounded survivors. In risk mitigation studies for natural disasters, possible sites where these units can be situated are specified according to risk based urban structural analysis. Logistics coordination in disasters involves the selection of sites that result in maximum coverage of medical need in affected areas. Another important issue that arises in such emergencies is that medical personnel who are on duty in nearby hospitals have to be re-shuffled to serve both temporary and permanent emergency units. Thus, an optimal medical personnel allocation must be determined among these units. The proposed model also considers this issue. The proposed model is a mixed integer multi-commodity network flow model that treats vehicles as integer commodity flows rather than binary variables. This results in a more compact formulation whose output is processed to extract a detailed vehicle route and load instruction sheet. Post processing is achieved by a simple routing algorithm that is pseudo-polynomial in the number of vehicles utilized, followed by the solution of a linear system of equations defined in a very restricted domain. The behavior and solvability of the model is illustrated on an earthquake scenario based on Istanbul's risk grid as well as larger size hypothetical disaster scenarios.

Business Continuity

De Silva, D. A. M., and Masahiro Yamao. 2007. Effects of the tsunami on fisheries and coastal livelihood: A case study of tsunami-ravaged southern Sri Lanka. ***Disasters*** **31(4): 386-404.**
Beyond the death toll, the tsunami of December 26, 2004, crippled many of the livelihood assets (human, social, physical, financial, and natural) available to assist those directly affected. Drawing on surveys of three villages in three districts in the south of Sri Lanka, this paper describes the livelihood asset building capacity of the fishing communities. Assessments are also made of the impact of the tsunami on coastal communities and the impact of government policy on rebuilding. A livelihood asset score was calculated for each village by comparing strengths in capacity building. In all aspects of capital building, including human, social, financial, physical, and natural capital, the fishing community in Tangalle was significantly ahead of the fishing communities in Hikkaduwa and Weligama. Experienced fishermen with better educational backgrounds had a significant influence on the capacity building of livelihood assets. Relocation and resettlement plans brought persistent uncertainty to fishermen in Hikkaduwa and Weligama and threatened to disrupt their community bonds and social networks.

Flynn, David T. 2007. The impact of disasters on small business disaster planning: A case study. ***Disasters*** **31(4): 508-515.**
A major flood in 1997 forced the evacuation of Grand Forks, North Dakota and caused damage of USD 1 billion. Despite this recent disaster there is only marginal evidence of an increase in disaster recovery planning by businesses that experienced the flood. This finding is consistent with the results of other business-related disaster research. Statistical tests of survey results from 2003 indicate that there is a significantly higher rate of disaster recovery planning in businesses started since the 1997 flood than in businesses started before the flood and still in business. Such an outcome indicates a need for public policy actions emphasizing the importance of disaster planning. Improved disaster planning is an aid to business recovery and the results demonstrate the need for more widespread efforts to improve disaster recovery planning on the part of smaller businesses, even in areas that have recently experienced disasters.

Ingles, Palma and Heather McIlvaine-Newsad. 2007. Any port in the storm: The effects of Hurricane Katrina on two fishing communities in Louisiana. ***National Association for the Practice of Anthropology Bulletin*** **28(1): 69-86.**
This article is based on research conducted in two fishing communities in Louisiana that were heavily impacted in 2005 by Hurricane Katrina: Grand Isle and the

Empire-Venice area. The authors conducted research in June and August 2006 to better understand the impacts of Hurricane Katrina on these communities. Previous research had been conducted in these communities by the same researchers in 2004. The baseline data obtained in 2004 proved invaluable for understanding the nature of the fishing industry in these communities before Hurricane Katrina struck. The 2006 research focused on changes in the fishing industries, the individuals, and the communities following the hurricane. It also examined the challenges for recovery and implications for fishing management in these communities. The two coastal communities in this study are heavily involved in the commercial shrimp fishery that before the storm had been overcapitalized for years. The eye of the storm passed over Empire-Venice and, as a result, this area received more damage than Grand Isle. In both areas, homes were destroyed, boats were sunk, and lives were changed forever. A year later, both areas are still struggling to recover from the hurricane. This article focuses on the methods the authors used for research in these communities after the storm: semi-structured ethnographic interviews, photography, and mapping. It also reports on some of the findings. The authors conducted interviews with fishermen, people who work in fishing-related businesses, and other community members who could provide them with information regarding the impacts of Hurricane Katrina on these communities and the state of the fisheries.

Ouedraogo, Alidou. 2007. Crisis management and corporate strategy in African firms: Towards a contingency approach. *Journal of Contingencies and Crisis Management* 15(4): 220-231.
Crisis management logic suggests that preparing for a crisis should be a critical part of organizational strategy. This article aims to explore the difficulties in translating this logic into business practices in the African context. By comparing the application of the three most popular theoretical perspectives used in the field of strategy with the context of African firms, the author concludes that another approach, the contingency perspective, must be integrated in order for African companies to manage small business crises successfully. This study is based on four case studies. It ends with two proposals for future research and practice in crisis management in African firms: (1) introducing logic of solidarity; and (2) introducing the idea of the 'palabre'.

Smith, James Fielding, Sandra Sue Waggoner, Arthur Rabjohn, and Avi Bachar. 2007. Protecting the functionality of airports during disaster responses: Natural disasters, accidents, and pandemics. *Journal of Emergency Management* 5(6): 29-39.
Airports are important assets during disaster response. Traditional roles as command posts, shelters, temporary hospitals, and alternative communication hubs were filled by airports after Hurricane Katrina and for 9/11 flight diversions. The basic thesis of this article is that airports need special measures to preserve functionality (continuity of business) during response and recovery. The second thesis is that sound emergency management measures should be built into airports as a type of mitigation. This article applies qualitative analysis to historical case studies, plans, documents, and scenarios for use of airports during disasters. It focuses on policy, procedural, organizational, and operational measures to protect the functionality during responses.

Climate Change, Drought, and El Niño

Allen, Myles, Pardeep Pall, Daithi Stone, Peter Stott, David Frame, Seung-Ki Min, Toru Nozawa, and Seiji Yukimoto. 2007. Scientific challenges in the attribution of harm to human influence on climate. *University of Pennsylvania Law Review* 155(6): 1353-1400.
The authors of this article review the current state of the science of attribution of anthropogenic climate change, with particular emphasis on the methodological challenges that are likely to confront any attempt to establish a direct causal link between greenhouse gas emissions and specific damaging weather events. Standard "detection and attribution" analyses, such as those cited by the Intergovernmental Panel on Climate Change (IPCC), are generally sufficient to establish the strength of human influence on large-scale, long-term-average climate, but fall short of quantifying the role of greenhouse gas emissions in almost any conceivable case of actual harm, since nobody is directly exposed to a change in global average temperature alone. The authors argue that it should be possible to agree on a relatively objective approach to quantifying the role of human influence on climate in cases of actual harm. There are, however, a number of questions to be resolved, including: can we apply the concept of Fraction Attributable Risk, developed for population studies in epidemiology, to the analysis of an unprecedented change in a single system such as the world's climate? Can we rely on computer simulation to address counterfactual questions such as "what would the climate have been like in the absence of twentieth century greenhouse gas emissions," given that we are working with imperfect simulation models? Due to multiple anthropogenic and natural contributions to changing weather risks, it will always be necessary to apply some kind of principle of ceteris paribus to quantify the role of any particular causal agent, such as greenhouse gas emissions. How is this principle to be applied? These questions are not, in themselves, scientific issues, although how they are to be resolved will have a direct bearing on how and whether climate science can inform specific causal attribution claims. In summary, we need the legal community to ask the scientific community the right questions. It is imperative that these issues be resolved as soon as possible, to avoid having them become entwined in the outcomes of specific cases. Thus, this article serves as a kind of tutorial, going over some material that many will find familiar in order to place it in the context of attribution.

Boykoff, Maxwell T., and Jules M. Boykoff. 2007. Climate change and journalistic norms: A case-study of U.S. mass-media coverage. *Geoforum* 38(6): 1190-1204.
The Intergovernmental Panel on Climate Change, comprised of top climate scientists from around the globe, has reached consensus that human activities have contributed

significantly to global climate change. However, over time, the United States has refused to join concerted international efforts such as the Kyoto Protocol to curb human activities contributing to climate change. U.S. newspaper and television media constitute key influences among a set of complex dynamics shaping information dissemination in this politicized environment. Mass-media coverage of climate change is not simply a random amalgam of newspaper articles and television segments; rather, it is a social relationship between scientists, policy actors and the public that is mediated by such news packages. This paper demonstrates that consistent adherence to interacting journalistic norms has contributed to impediments in the coverage of anthropogenic climate change science. Through analysis of U.S. newspaper and television coverage of human contributions to climate change from 1988 through 2004, this paper finds that adherence to first-order journalistic norms—personalization, dramatization, and novelty—significantly influence the employment of second-order norms—authority-order and balance—and that this has led to informationally deficient mass-media coverage of this crucial issue. By critically scrutinizing U.S. print and television media as a 'public arena,' the authors improve understanding of how journalistic activities have shaped interactions at the interface with climate science, policy, and the public.

Carlin, Alan. 2007. Global climate change control: Is there a better strategy than reducing greenhouse gas emissions? *University of Pennsylvania Law Review* 155(6): 1401-1497.
This article identifies four major global climate change problems, analyzes whether the most prominent of the greenhouse gas (GHG) control proposals is likely to be either effective or efficient in solving each of the problems, and then extensively analyzes both management and technological alternatives to the proposals. Efforts to reduce emissions of GHGs, such as carbon dioxide, in a decentralized way or even in a few countries (such as the United States or under the Kyoto Protocol) without equivalent actions by all the other countries of the world, particularly the most rapidly growing ones, cannot realistically achieve the temperature change limits most emission control advocates believe are necessary to avoid dangerous climatic changes, and would be unlikely to do so even with the cooperation of these other countries. This article concludes that the most effective and efficient solution would be to use a concept long proven by nature to reduce the radiation reaching the earth by adding particles optimized for this purpose to the stratosphere to scatter a small portion of the incoming sunlight back into space, as well as to undertake a new effort to better understand and reduce ocean acidification. Current temperature change goals could be quickly achieved by stratospheric scattering at a very modest cost without the need for costly adaptation, human lifestyle changes, or the general public's active cooperation, all required by rigorous emission controls. Although stratospheric scattering would not reduce ocean acidification, for which several remedies are explored in this article, it appears to be the most effective and efficient first step toward global climate change control. Stratospheric scattering is not currently being pursued or even developed; however, such development is particularly needed to verify the lack of significant adverse environmental effects of this remedy. Reducing GHG emissions to the extent proposed by advocates, even if achievable, would cost many trillions of dollars, and is best viewed as a last resort rather than the preferred strategy.

Changnon, Stanley A. 2007. New risk assessment products for dealing with financial exposure to weather hazards. *Natural Hazards* 43(3): 295-301.
A market place designed to provide a variety of weather-sensitive institutions with products for dealing with their risks from weather-climate hazards has been developing in recent years. Shifts in demographics, growing population, and greater wealth across the United States, coupled with deregulation of utilities and expansion of global economics, have increased corporate vulnerability to weather/climate extremes. Availability of long-term quality climate data and new technologies has allowed development of weather-risk products. One widely used by electric-gas utilities is weather derivatives. These allow a utility to select a financially critical seasonal weather threshold and for a price paid to a provider, to get financial payments if this threshold is exceeded. Another new product primarily used by the insurance industry is weather risk models. These define the potential risks of severe weather losses across a region where little historical insured loss data exists. Firms develop weather-risk models based on historical storm information combined with a target region's societal, economic, and physical conditions. Examples of the derivatives and weather-risk models and their uses are presented. These various endeavors of the new weather market exhibit the potential for dealing with shifts in weather risks due to a change in climate.

Farber, Daniel A. 2007. Basic compensation for victims of climate change. *University of Pennsylvania Law Review* 155(6): 1605-1656.
Global climate change is the greatest environmental challenge facing the world today. The most urgent issue is how to prevent further accumulation of greenhouse gases (GHGs) that will only fuel the process. The next priority is to implement adaptive measures, limiting harm to the extent that climate change cannot be avoided. Some degree of climate change is inevitable, imposing substantial cost to society in the form of direct harm and adaptation expenses. It is not too soon to begin considering how these costs will be allocated. In particular, we should begin to consider whether some of the damages should be shifted from victims of climate change to responsible parties, such as large-scale emitters of GHGs.

Hersch, Joni, and W. Kip Viscusi. 2007. Allocating responsibility for the failure of global warming policies. *University of Pennsylvania Law Review* 155(6): 1657-1694.
A recent series of climate change lawsuits has sought to mimic the "regulation through litigation" approach of the claims brought by the states against cigarette manufacturers. What is distinctive about the cigarette cases relative to conventional tort claims is that they were not brought on

behalf of individual smokers, but rather sought to recoup the Medicaid-related costs of smoking. A parallel climate change litigation approach seeks payments from public utilities, energy producers, and other parties responsible for greenhouse gas emissions to reflect the long-term societal damages that the plaintiffs claim will be caused by this pollution. While environmental litigation of this type is unprecedented, the cigarette cases were novel as well. The cigarette litigation did not establish legal precedents because the cases were settled without any court verdicts, but the threat of the suits was sufficiently real that it led to damages payments of close to $250 billion. Here the authors examine the similarities and differences between lawsuits seeking to recoup the value of financial externalities caused by smoking and lawsuits targeted at the value of environmental damages due to global warming.

Hill, Troy D., and Colin Polsky. 2007. Suburbanization and drought: A mixed methods vulnerability assessment in rainy Massachusetts. *Environmental Hazards* 7(4): 291-301.

This paper presents evidence that water restrictions in suburbanizing eastern Massachusetts towns are becoming more common, controlling for climate. The authors assess the relationship between these suburban droughts and residential development. Focusing on the suburbs of Boston, seven towns independent of the Boston water supply system were selected to represent differing levels of sprawl-style growth. Water restrictions are becoming more frequent in all of the towns studied, and models demonstrate that restrictions are increasing in duration, independent of climate. Interviews suggest that residential development is playing a central role in this increasing sensitivity to suburban drought, though other factors are also important. Long-term planning and integration of land use planning and water management emerged as two key paths for attenuating the impacts of development.

Hsiung, Wayne, and Cass R. Sunstein. 2007. Climate change and animals. *University of Pennsylvania Law Review* 155(6): 1695-1740.

Climate change is already having adverse effects on animal life, and those effects are likely to prove devastating in the future. Nonetheless, the relevant harms to animals have yet to become a serious part of the analysis of climate change policy. Even if animals and species are valued solely by reference to human preferences, consideration of animal welfare dramatically increases the argument for aggressive responses to climate change. They estimate that, even under conservative assumptions about valuation, losses to nonhuman life might run into the hundreds of billions of dollars annually. Whatever the precise figure, the general conclusion is clear: an appreciation of the likely loss of animal life leads to a massive increase in the assessment of the overall damage and cost of climate change.

Kunreuther, C. Howard, O. Erwann, and O. Michel-Kerjan. 2007. Climate change, insurability of large-scale disasters, and the emerging liability challenge. *University of Pennsylvania Law Review* 155(6): 1795-1842.

This article focuses on the interaction between uncertainty and insurability in the context of some of the risks associated with climate change. It discusses the evolution of insured losses due to weather-related disasters over the past decade and the key drivers of the sharp increases in both economic and insured catastrophe losses over the past 20 years. In particular, the authors examine the impact of development in hazard-prone areas and of global warming on the potential for catastrophic losses in the future. In this context, the authors discuss the implications for insurance risk capital and the capacity of the insurance industry to handle large-scale events. A key question that needs to be addressed is which factors determine the insurability of a risk and the extent of coverage offered by the private sector to provide protection against extreme events when there is significant uncertainty surrounding the probability and consequences of a catastrophic loss. The authors further discuss the concepts of insurability by focusing on coverage for natural hazards, such as earthquakes, hurricanes, and floods. The article also focuses on the liability issues associated with global climate change and possible implications for insurers, including issuers of Directors' and Officers' policies, given the difficulty in identifying potential defendants, tracing harm to their actions, and apportioning damages among them. The article concludes by suggesting ways that insurers can help mitigate future damages from global climate change by providing premium reductions and rate credits to companies investing in risk-reducing measures.

Pielke, Roger A. 2007. The case for sustainable climate policy: Why costs and benefits must be temporally balanced. *University of Pennsylvania Law Review* 155(6): 1843-1857.

The question of what actions on climate change make sense in the short term remains largely unanswered. Until we better organize the climate science and technology enterprise to focus on policy options for the short term, the climate debate is likely to remain in its present gridlock. Policies that address climate change—including both mitigation and adaptation—have both long-term and short-term effects. To date, climate policy has focused primarily on the long term, and so too has the research intended to inform that policy. As a consequence, too little attention is paid to policy options and technological alternatives that might make sense in the short term. One reason for the short term being overlooked is the intellectual gerrymandering of the climate change issue at the international level, which has maintained a narrow focus on greenhouses gases (GHGs) and their effects. Billions of dollars of public investments in climate science and technology might be reoriented to better serve the needs of decision makers grappling with climate change, which will be a policy issue for decades to come, by focusing on policies that make sense in both the short and long terms.

Zhang, David D., Brecke Peter, Harry F. Lee, Yuan-Qing He, and Jane Zhang. 2007. Global climate change, war, and population decline in recent human history. ***Proceedings of the National Academy of Sciences*** **104(49): 19214-19219.**
Although scientists have warned of possible social perils resulting from climate change, the impacts of long-term climate change on social unrest and population collapse have not been quantitatively investigated. In this study, high-resolution paleo-climatic data have been used to explore at a macroscale the effects of climate change on the outbreak of war and population decline in the preindustrial era. This article shows that long-term fluctuations of war frequency and population changes followed the cycles of temperature change. Further analyses show that cooling impeded agricultural production, which brought about a series of serious social problems, including price inflation, then successively war outbreak, famine, and population decline. The findings suggest that worldwide and synchronistic war, peace, population, and price cycles in recent centuries have been driven mainly by long-term climate change. The findings also imply that social mechanisms that might mitigate the impact of climate change were not significantly effective during the study period. Climate change may thus have played a more important role and imposed a wider ranging effect on human civilization than has so far been suggested. Findings of this research may lend an additional dimension to the classic concepts of Malthusianism and Darwinism.

Critical Infrastructure

Cagnan, Zehra, and Rachel A. Davidson. 2007. Discrete event simulation of post-earthquake restoration process for electric power systems. ***International Journal of Risk Assessment and Management*** **7(8): 1138-1156.**
This paper describes a discrete event simulation model of the post-earthquake restoration process for electric power systems. The model explicitly represents the real-life restoration process enabling development of geographically disaggregated, quantitative restoration curves with uncertainty bounds, a dynamic map showing the spatial distribution of outages changing over time, and information on how personnel and repair materials are used throughout the process. The new restoration modeling approach is applied to the Los Angeles Department of Water and Power electric power system. Simulation results for the 1994 Northridge earthquake indicate that the model is capable of accurately estimating the restoration time and spatial sequence of the recovery process. The model aims to help improve the quantitative restoration time estimates that are required to estimate economic losses due to business interruption caused by power outages, and identify and compare the effectiveness of different ways to improve the restoration process in future earthquakes.

Enke, David L., Tirasirichai Chakkaphan, and Ronaldo Luna. 2008. Estimation of earthquake loss due to bridge damage in the St. Louis Metropolitan Area II: Indirect losses. ***Natural Hazards Review*** **9(1): 12-19.**
An approach to estimate the indirect economic loss due to damaged bridges within the highway system from an earthquake event is presented. The indirect cost considered refers to the increased highway transportation cost only. The study zone covers the St. Louis metropolitan area and its surrounding suburban regions. An earthquake scenario centered in St. Louis, with a magnitude 7.0 is used. The direct earthquake loss was primarily damage to bridges, which causes an increase in travel time and distance within the transportation network. This information is then used as input for the indirect loss model. The indirect loss is examined from an economic perspective. The results reveal that the indirect loss is significant when compared to the direct loss resulting from bridge damage. From the study results, a transportation network planner can prepare an appropriate preventive action plan (such as choosing alternative routes for potential damaged links, as well as reinforcing possible high damage bridges) to reduce the potential losses before the earthquake occurs.

Luna, Ronaldo, David Hoffman, and William T. Lawrence. 2008. Estimation of earthquake loss due to bridge damage in the St. Louis Metropolitan Area I: Direct losses. ***Natural Hazards Review*** **9(1): 1-11.**
The risk associated with earthquake hazards on highway systems is dependent on the complexity of a network and its redundancy in providing traffic flow. Earthquake loss estimation studies can provide decision makers with an appreciation of the importance of having a highway network resistant to earthquakes and information to make the network resistant to these events. The direct economic loss was estimated for a major metropolitan area, St. Louis, for a series of earthquake scenarios. The primary component of the study was damage to bridges within the highway system. The study zone covers the St. Louis metropolitan area and its surrounding suburban regions. The study region includes several major alluvial river valleys with liquefaction susceptible areas. Earthquake scenarios with epicenters in St. Louis (MW 7.0), Germantown, Illinois (MW 7.0), and New Madrid, Missouri (MW 7.7), were selected to contrast high impact/low probability and low impact/higher probability events. The losses to the bridge infrastructure were estimated to range from $70 to $800 million depending on the earthquake event. The data collection, generation, and interpretation are described along with the procedures required to carry out the loss estimation using the geographic information system-based HAZUS-MH system. The output of this project was used as input for a hybrid indirect loss calculation presented in the companion paper.

Martin, Daniel W. 2007. Bridging emergency management: A professional assessment of the Minneapolis bridge collapse and other infrastructure failures. ***Journal of Emergency Management*** **5(6): 41-44.**
To many in the emergency management profession, the Minneapolis bridge collapse was an epic event that has raised the situational awareness of our crumbling infrastructure. Although this event provided insight to the emergency management community, the vast majority in the civil engineering profession have long recognized the failing integrity of our aging and overburdened infrastructure and the cataclysmic result of its failure. The

Minneapolis bridge collapse is a result of the failure, as a profession and a society, to proactively raise awareness of all hazards and to address emerging threats. These hazards include those risks that are created by our technological advances and lack of essential maintenance of these vital national assets.

Disaster and Emergency Management

Barnes, Paul, Michael B. Charles, Mark Branagan, and Alistair Knight. 2007. Intelligence and anticipation: Issues in security, risk and crisis management. ***International Journal of Risk Assessment and Management*** **7(8): 1209-1223.**

This article deals with the way in which intelligence flows and other critical information can be embedded into a risk framework that will facilitate the early warning of emerging threat scenarios. That is, an organization should be able to anticipate crisis triggers and know when a crisis situation will manifest itself. As an outcome, a conceptual framework that defines how to make sense of complex situations, datasets, and real world anomalies is suggested.

Barsky, Lauren E., Joseph E. Trainor, Manuel R. Torres, Benigno E. Aguirre. 2007. Managing volunteers: FEMA's Urban Search and Rescue program and interactions with unaffiliated responders in disaster response. ***Disasters*** **31(4): 495-507.**

In the aftermath of disasters it is not uncommon for a large number of individuals, ranging from professional technical responders to untrained, albeit well meaning, volunteers, to converge on site of a disaster in order to offer to help victims or other responders. Because volunteers can be both a help and a hindrance in disaster response, they pose a paradox to professional responders at the scene. Through focus group interviews and in-depth structured interviews, this paper presents an extended example of how Urban Search and Rescue (US&R) task forces, a type of professional technical-responder organization, interact with and utilize volunteers. Findings show that US&R task forces evaluate the volunteers in terms of their presumed legitimacy, utility, and potential liability or danger posed during the disaster response. Other responses to volunteers such as a feeling of powerlessness or the use of volunteers in non-technical ways are also explored. This paper demonstrates some key aspects of the relationship between volunteers and formal response organizations in disasters.

Burkle, Frederick M., Hsu Edbert B. Loehr Michael, Michael D. Markenson David Christian, Lewis Rubinson, and Frank L. Archer. 2007. Definition and functions of health unified command and emergency operations centers for large-scale bioevent disasters within the existing ICS. ***Disaster Medicine and Public Health Preparedness*** **1(2): 135-141.**

The incident command system provides an organizational structure at the agency, discipline, or jurisdiction level for effectively coordinating response and recovery efforts during most conventional disasters. This structure does not have the capacity or capability to manage the complexities of a large-scale health-related disaster, especially a pandemic, in which unprecedented decisions at every level (e.g., surveillance, triage protocols, surge capacity, isolation, quarantine, health care staffing, deployment) are necessary to investigate, control, and prevent transmission of disease. Emerging concepts supporting a unified decision making, coordination, and resource management system through a health-specific emergency operations center are addressed and the potential structure, function, roles, and responsibilities are described, including comparisons across countries with similar incident command systems.

Caragliano, Simona and Davide Manca. 2007. Emergency management and land use planning in industrial hazardous areas: Learning from an Italian experience. ***Journal of Contingencies and Crisis Management*** **15(4):194-207.**

This paper discusses some methodological and organizational issues characterizing local policies for industrial risk prevention in Italy. These include both emergency preparedness and land use control as strategic activities aimed at risk reduction in areas where Seveso facilities are located. The article discusses an Italian case study in the Lombardia region. It covers the development of a so-called Local Operating Manual for external industrial emergency management as well as a so-called Technical Study for land use control around hazardous plants. After these documents were revised, a real accident occurred, showing the limitations of planning. The lessons learnt from this experience suggested some multi-organizational directions and methodological procedures for further research on risk management and communication.

Gill, Brendan Patrick. 2007. Risk communication and its importance in disaster management. ***Journal of Emergency Management*** **5(6): 11-16.**

During the onslaught of Hurricane Katrina on the United States Gulf Coast in August 2005, local emergency planning officials, state agencies, and federal entities came together to impress upon those still left in the danger zone to evacuate. Unfortunately, more than 100,000 people remained in the danger zone. In this article, the author examines Protective Action Recommendations, proper and poor risk communications, and the need for emergency management officials to keep the pulse of those that they serve.

Glotzer, David, Walter Psoter, Rudolph St. Jean, and Kera Weiserbs. 2007. The shelter-in-place decision: All things considered. ***Australian Journal of Emergency Management*** **22(4): 8-12.**

In the event of a serious accident or intentional chemical or radiological incident, the emergency management system must move in a quick and coordinated manner. Furthermore, emergency management must be prepared to advise the public on how to best protect themselves and be able to manage large number of casualties among disaster victims and the worried well. The ability of emergency management to coordinate a response is based upon their ability in pre-incident planning and preparedness education to quickly detect an incident, to determine its impact and spread rate, and to inform the public whether the

best protective action is to evacuate or to shelter-in-place. Effectiveness of the response should be optimized through community education.

Gopalakrishnan, Chennat and Norio Okada. 2007. Designing new institutions for implementing integrated disaster risk management: Key elements and future directions. ***Disasters*** **31(4):353-372.**
The goal of integrated disaster risk management is to promote an overall improvement in the quality of safety and security in a region, city, or community at disaster risk. This paper presents the case for a thorough overhaul of the institutional component of integrated disaster risk management. A review of disaster management institutions in the United States indicates significant weaknesses in their ability to contribute effectively to the implementation of integrated disaster risk management. The authors' analysis and findings identify eight key elements for the design of dynamic new disaster management institutions. Six specific approaches are suggested for incorporating the identified key elements in building new institutions that would have significant potential for enhancing the effective implementation of integrated disaster risk management. The authors have developed a possible blueprint for effective design and construction of efficient, sustainable, and functional disaster management institutions.

King, Granville. 2007. Narcissism and effective crisis management: A review of potential problems and pitfalls. ***Journal of Contingencies and Crisis Management*** **15(4): 183-193.**
In the event of a crisis, effective leadership by senior officials plays a significant role in an organization's attempt to return to a state of normal operation. Effectiveness, however, can be hampered by a leader's behavior and attitude towards colleagues and other employees within the organization. This paper explores how narcissism and narcissistic leaders may affect crisis management within an organization. Using the literature from the American Psychiatric Association, crisis management, and leadership, this paper explores how personality disorders associated with narcissism may affect the pre-crisis, crisis, and post-crisis stages of crisis management. The paper concludes by offering suggestions on how to handle narcissistic leaders within an organization and areas for future research.

Kroll-Smith, Steve, Pam Jenkins, and Vern Baxter. 2007. The bricoleur and the possibility of rescue: First responders to the flooding of New Orleans. ***Journal of Public Management and Social Policy*** **13(2): 5-21.**
In this paper, the authors interviewed first responders to the 2005 flooding of New Orleans to discern and make sense of what they thought and how they acted in a protracted moment of terror. Viewed from a certain angle, the behavior of first responders is a window onto a self stripped of convention and the mundane protocols of proper conduct. First responders, the authors argue, often employ a cleverness that does not recognize itself as such. Measured against the principles and standards of official training manuals and tests, "clever" first responders might appear to be reckless or incompetent. A shape-shifter, assuming whatever forms are necessary to accomplish the tasks at hand, the first responder resembles in action and character the bricoleur, that person who alters and transforms ideas and materials to create new and innovative approaches to the world (Levi-Strauss 1966). It is not rationality per se that guides the bricoleur, but neither is his or her behavior irrational, though it may at times appear something other than reasonable. A grounded imagination operates through an admixture of disposition, intuition, emotion, intellect, and the acumen of the body. Neither rational nor irrational, the bricoleur behaves in, what Dreyfus and Dreyfus call, an "arational" manner.

Liu, Brooke Fisher. 2008. Online disaster preparation: Evaluation of state emergency management web sites. ***Natural Hazards Review*** **9(1): 43-48.**
The purpose of this study is to provide a baseline of information available on state emergency management Web sites. Through a content analysis of all 50 state emergency management Web sites, the study examines four variables identified in the literature as important markers of effective electronic government communication: democratic outreach, information content, outreach to special needs populations, and intergovernmental relations. The results from this study provide a baseline for future research on state emergency management communication and provide insights into how state emergency management agencies can improve their Web sites.

Myer, Rick A., Christian Conte, and Sarah E. Peterson. 2007. Human impact issues for crisis management in organizations. ***Disaster Prevention and Management*** **16(5): 761-770.**
The purpose of this article is to describe the adaptation of an assessment model, the Triage Assessment System (TAS), which is widely used in crisis intervention to understand the human impact of a crisis within an organization. Following a literature review, the Triage Assessment System is adapted to be applicable to organizations in crisis. Nine characteristics associated with the impact of crises on employees of an organization are discussed. Suggestions are made for ways in which organizations can use the TAS to improve their preparation for recovery efforts after a crisis. These suggestions outline approaches that consultants may employ when working with organizations. Suggestions are also made for future research using the TAS with organizations. Although developed for individuals, the concepts used in the TAS can also be applied to organizations in crisis. The article offers practical suggestions to help organizations manage the impact of organizational crises on their employees. Research in this area should help to refine the TAS for organizations, particularly assessment of the severity of organizational reactions.

Nelson, Jeff, Kiril Hristovski, and Danny Peterson. 2007. Mission possible: A failure mode and effect analysis of the Federal Emergency Management Agency. ***Journal of Emergency Management*** **5(6): 17-24.**
In its report pertaining to the performance of the Federal Emergency Management Agency (FEMA) during Hurricane Katrina, the US Senate recommended replacing

FEMA with a bigger and better organization. Instead of replacing FEMA as a whole, an attempt should be made to scientifically identify and correct any significant gaps within the organizational and operational structure of FEMA based on FEMA's current mission requirements under the National Response Plan. This article demonstrates the use of Failure Mode and Effect Analysis (FMEA) methodology for identification, analysis, measurement, and prioritization of the systemic root causes for FEMA's inadequate mission performance during disasters of Katrina's magnitude. The article also provides suggestions for the most effective corrective action models for the top five high-risk functions at FEMA identified and prioritized using FMEA.

Palm, Jenny, and Elina Ramsell. 2007. Developing local emergency management by co-ordination between municipalities in policy networks: Experiences from Sweden. *Journal of Contingencies and Crisis Management* 15(4): 173-182.

This study aims to increase our understanding of how co-operation in inter-municipality policy networks in a Swedish region is established and maintained regarding emergency management. The authors discuss how a network of five municipalities emerged and took shape. Overall, they conclude that co-ordination and co-operation in municipal emergency management are probably relatively easy to develop, because it is easy for the involved actors to see the benefits. Sharing resources is seen as crucial when establishing and financing efficient, high-quality emergency management. The municipalities' lack of resources to provide effective emergency services, as required by law, makes them dependent on each other. Limits for co-ordination were connected to distance and other geographical factors. Other limits of equal importance were linked to factors such as culture/tradition, mutual understanding, size of partners, and unwillingness to give up authority, as well as a prior barrier for co-operation between small and bigger municipalities.

Pande, Ravindra K., and Rajnish Pande. 2007. A model Citizen's Charter for disaster management in Uttaranchal (India). *Disaster Prevention and Management* 16(5): 755-760.

The purpose of the paper is to persuade all partners in disaster management to take action and create a pair of synergistic and invincible forces of government and people that interact to bring about a reduction in the impact of natural hazards in Uttaranchal, India. There is an urgent need for a comprehensive tool to make the community aware of its right to safety. Today, policies and planning for disaster management is done by the State, and community participation is negligible. Therefore, disaster management has become supply-driven instead of demand-driven. A Citizen's Charter of Disaster Management is considered to be another appropriate tool to bring in citizen-centric governance. The Charter aspires to meet the present and anticipated needs of citizens in an efficient manner by eradicating errors and wastage through a scientific approach with participation between government and citizens. The analysis is based on the experience gained over a period of seven years (1999-2005). The period is short for developing any hypothesis, but sufficient care has been taken to consider vital factors. With the help of the Citizen's Charter of Disaster Management, the quality of public services can be improved. To make society safer, people should know the mandate of the Department of Disaster Management concerned, how one can get in touch with its officials, what to expect by way of services, and how to seek a remedy if something goes wrong. The Citizen's Charter of Disaster Management does not create new legal rights, but helps in enforcing existing rights.

Rojek, Jeff, and Michael R. Smith. 2007. Law enforcement lessons learned from Hurricane Katrina. *Review of Policy Research* 24(6): 589-608.

Major disasters represent infrequent events that often require response organizations to vicariously learn from the experiences of others in order to improve their operations. A primary mechanism for such knowledge diffusion is the different practitioner and empirical journals for the organizational fields that comprise disaster response. A review of the literature for the law enforcement field, however, reveals that little attention is given to how these organizations manage actual disasters. In particular, the presentation of organizational experiences, whether through case studies or other methodologies, is very limited in the practitioner and empirical literature of this field. This represents a considerable problem for improvements of disaster response operations given that law enforcement agencies represent a key component in such efforts. The research presented in this article is an effort to fill this knowledge gap and thereby facilitate organizational learning to improve future law enforcement disaster response activities. The authors traveled to Mississippi and Louisiana after Hurricane Katrina to examine the response efforts of state and local law enforcement agencies to the storm. The findings from this research are reported here in a lessons-learned format to inform law enforcement disaster response policy.

Smith, James Fielding, Sandra Sue Waggoner, Arthur Rabjohn, and Avi Bachar. 2007. Protecting the functionality of airports during disaster responses: Natural disasters, accidents, and pandemics. *Journal of Emergency Management* 5(6): 29-39.

Airports are important assets during disaster response. Traditional roles as command posts, shelters, temporary hospitals, and alternative communication hubs were filled by airports after Hurricane Katrina and for 9/11 flight diversions. The basic thesis of this article is that airports need special measures to preserve functionality (continuity of business) during response and recovery. The second thesis is that sound emergency management measures should be built into airports as a type of mitigation. This article applies qualitative analysis to historical case studies, plans, documents, and scenarios for use of airports during disasters. It focuses on policy, procedural, organizational, and operational measures to protect the functionality during responses.

Tran, Phong, and Rajib Shaw. 2007. Towards an integrated approach of disaster and environment management: A case study of Thua Thien Hue province, central Vietnam. ***Environmental Hazards*** **7(4): 257-270.**

Disasters and environmental degradation create serious problems all around the world. They are inherently linked, but little attention is paid to their interaction, particularly at local levels. The degree of integration of disaster management and risk analysis with environmental management programs in relation to human vulnerability has been examined in Thua Thien Hue Province, Central Vietnam. Unsustainable agricultural practices and inappropriate development programs have contributed substantially to the increase of disaster risks. On the other hand, disasters damage natural resources and reduce environmental quality, indirectly contributing to increasing poverty, which in turn adds to the vulnerability of both natural and human systems, further increasing disaster losses. Notwithstanding, in Vietnam, there is a big gap between disaster and environment management policies and programs. In order to bridge the gap, an integrated approach in which environment-disaster linkage, rural–urban linkage, and poverty are brought into focus as core aspects of disaster management.

Enke, David L., Tirasirichai Chakkaphan, and Ronaldo Luna. 2008. Estimation of earthquake loss due to bridge damage in the St. Louis Metropolitan Area II: Indirect losses. ***Natural Hazards Review*** **9(1): 12-19.**

An approach to estimate the indirect economic loss due to damaged bridges within the highway system from an earthquake event is presented. The indirect cost considered refers to the increased highway transportation cost only. The study zone covers the St. Louis metropolitan area and its surrounding suburban regions. An earthquake scenario centered in St. Louis, with a magnitude 7.0 is used. The direct earthquake loss was primarily damage to bridges, which causes an increase in travel time and distance within the transportation network. This information is then used as input for the indirect loss model. The indirect loss is examined from an economic perspective. The results reveal that the indirect loss is significant when compared to the direct loss resulting from bridge damage. From the study results, a transportation network planner can prepare an appropriate preventive action plan (such as choosing alternative routes for potential damaged links, as well as reinforcing possible high damage bridges) to reduce the potential losses before the earthquake occurs.

Luna, Ronaldo, David Hoffman, and William T. Lawrence. 2008. Estimation of earthquake loss due to bridge damage in the St. Louis Metropolitan Area I: Direct losses. ***Natural Hazards Review*** **9(1): 1-11.**

The risk associated with earthquake hazards on highway systems is dependent on the complexity of a network and its redundancy in providing traffic flow. Earthquake loss estimation studies can provide decision makers with an appreciation of the importance of having a highway network resistant to earthquakes and information to make the network resistant to these events. The direct economic loss was estimated for a major metropolitan area, St. Louis, for a series of earthquake scenarios. The primary component of the study was damage to bridges within the highway system. The study zone covers the St. Louis metropolitan area and its surrounding suburban regions. The study region includes several major alluvial river valleys with liquefaction susceptible areas. Earthquake scenarios with epicenters in St. Louis (MW 7.0), Germantown, Illinois (MW 7.0), and New Madrid, Missouri (MW 7.7), were selected to contrast high impact/low probability and low impact/higher probability events. The losses to the bridge infrastructure were estimated to range from $70 to $800 million depending on the earthquake event. The data collection, generation, and interpretation are described along with the procedures required to carry out the loss estimation using the geographic information system-based HAZUS-MH system. The output of this project was used as input for a hybrid indirect loss calculation presented in the companion paper.

Disaster Relief

Abdallah, Saade, Rebekah Heinzen, and Gilbert Burnham. 2007. Immediate and long-term assistance following the bombing of the U.S. Embassies in Kenya and Tanzania. ***Disasters*** **31(4): 417-434.**

On 7 August 1998 truck bombs destroyed the US Embassies in Kenya and Tanzania. The response in both countries was characterized by an absence of incident command, limited pre-hospital care, a disorganized hospital response and a lack of transportation for those injured. In the next five years USD 50 million was provided by the United States Agency for International Development (USAID) to alleviate the resulting suffering, support reconstruction and strengthen disaster preparedness capacity in the two countries. These two programs have enhanced awareness of disaster management issues, improved training capacity, built response structures and provided material resources. Their design and implementation provide lessons for future disasters in developing countries. The assistance programs evolved very differently. In Kenya the program largely excluded the public sector and the potential for government coordination, while the Tanzanian program concentrated heavily on central government and regional hospital structures largely omitting the non-governmental or civil society sector. Excluding key stakeholders raises concerns about program sustainability and the ability to respond effectively to future emergencies.

Barsky, Lauren E., Joseph E. Trainor, Manuel R. Torres, and Benigno E. Aguirre. 2007. Managing volunteers: FEMA's Urban Search and Rescue program and interactions with unaffiliated responders in disaster response. ***Disasters*** **31(4): 495-507.**

In the aftermath of disasters it is not uncommon for a large number of individuals, ranging from professional technical responders to untrained, well meaning volunteers to converge on the site of a disaster in order to offer to help victims or other responders. Because volunteers can be both a help and a hindrance in disaster response, they pose a paradox to professional responders at the scene. Through focus group interviews and in-depth structured interviews, this paper presents an extended example of

how Urban Search and Rescue (USAR) task forces, a type of professional technical-responder organization, interact with and utilize volunteers. Findings show that USAR task forces evaluate the volunteers in terms of their presumed legitimacy, utility, and potential liability or danger posed during the disaster response. Other responses to volunteers, such as a feeling of powerlessness or the use of volunteers in non-technical ways, are also explored. This paper demonstrates some key aspects of the relationship between volunteers and formal response organizations in disasters.

Bonnett, Carl J., Tony R. Schock, Kevin E. McVaney, Christopher B. Colwell, and Christopher Depass. 2007. Task Force St. Bernard: Operational issues and medical management of a National Guard disaster response operation. *Prehospital and Disaster Medicine* 22(5): 440-447.
After Hurricane Katrina struck the Gulf Coast of the United States on 29 August 2005, it became obvious that the country was facing an enormous national emergency. With local resources overwhelmed, governors across the US responded by deploying thousands of National Guard soldiers and airmen. The National Guard has responded to domestic disasters due to natural hazards since its inception, but an event with the magnitude of Hurricane Katrina was unprecedented. The deployment of more than 900 Army National Guard soldiers to St. Bernard Parish, Louisiana, in the aftermath of the hurricane was studied to present some of the operational issues involved with providing medical support for this type of operation. In doing so, the authors attempt to address some of the larger issues of how the National Guard can be incorporated into domestic disaster response efforts. A number of unforeseen issues with regard to medical operations, medical supply, communication, preventive medicine, legal issues, and interactions with civilians were encountered and are reviewed. A better understanding of the National Guard and how it can be utilized more effectively in future disaster response operations can be developed.

Green, John J., Anna M. Kleiner, and Jolynn P. Montgomery. 2007. The texture of local disaster response: Service providers' views following Hurricane Katrina. *Southern Rural Sociology* 22(2): 28-44.
Disasters highlight elements of community vulnerability and resiliency. Effective responses are organized and managed to provide goods and services to survivors while also being supportive of the organizations attempting to meet these needs. Collaboration among local service providers, such as nonprofit, faith-based, and governmental organizations, allows communities to build upon internal and external networks and resources to prepare for and respond to disasters. Using a livelihoods framework, the authors analyze 139 qualitative field interviews conducted in the Mississippi Gulf Coast and Southeast Louisiana, to learn from the experiences, needs, and recommendations of people working on the front lines of disaster in response to Hurricane Katrina. Narrative information from service providers will help inform sociologists, organizations, and policymakers about the views of practitioners serving as intermediaries between people's everyday lives and broader structures and processes influenced by crisis events.

Earthquakes

Allmann, Bettina P., and Peter M. Shearer. 2007. A high-frequency secondary event during the 2004 Parkfield earthquake. *Science* 318(5854): 1279-1283.
By using seismic records of the 2004 magnitude 6.0 Parkfield earthquake, the authors identified a burst of high-frequency seismic radiation that occurred about 13 kilometers northwest of the hypocenter and 5 seconds after rupture initiation. They imaged this event in three dimensions by using a waveform back-projection method, as well as by timing distinct arrivals visible on many of the seismograms. The high-frequency event is located near the south edge of a large slip patch seen in most seismic and geodetic inversions, indicating that slip may have grown abruptly at this point. The time history obtained from full-waveform back projection suggests a rupture velocity of 2.5 kilometers per second. Energy estimates for the sub-event, together with long-period slip inversions, indicate a lower average stress drop for the northern part of the Parkfield earthquake compared with that for the region near its hypocenter, which is in agreement with stress-drop estimates obtained from small-magnitude aftershocks.

Armas, Iuliana, and Eugen Avram. 2008. Patterns and trends in the perception of seismic risk. Case study: Bucharest Municipality/Romania. *Natural Hazards* 44(1): 147-161.
This research looks at the very nature of perception of seismic risk, an issue that is not only academically important, but can save lives and reduce injury and community costs. The background idea is that citizens in big cities, vulnerable to seismic hazard, are living with latent and permanent concerns about a possible earthquake. The authors were interested in revealing significant aspects of Bucharest citizens' orientations and tendencies in relation to the possible seismic event. Bucharest, the capital of Romania, is exposed to the greatest seismic hazard compared with other European capitals. The dimensions of study were the anticipations of seismic occurrence, the behavior during the event, evaluations of consequences, support factors, and individual vulnerability. This article is an example of the low-cost approach on a sample of 190 citizens, understood as an exercise in attempting to relate population characteristics to various aspects of risk perception. The methodology used was based on a field investigation, where the research agents' applied one questionnaire containing free/post codified/fan answers concerning demographic variables, the buildings' features, and perceptions about the possible earthquake event. The findings of this study showed that the hazard perception significantly associates with aspects concerning the subjects' orientation toward institutional factors/human relations/negativism, and toward financial/material/moral support in case of disaster, etc. It is hoped that this issue will serve to inspire further investigations into this very important and socially sensitive field, due to the fact that hazard analysis and mitigation would be more effective when it takes into account the human dimension of disasters.

Asgary, Ali, Jason K. Levy, and Nader Mehregan. 2007. Estimating the willingness to pay for a hypothetical earthquake early warning systems. ***Environmental Hazards*** **7(4): 311-320.**

The development of reliable, accessible, and transparent earthquake early warning systems (EEWSs) for disaster reduction have been given increased priority at local, national, and international levels. Accurately quantifying the social and economic benefits accrued to households and businesses from EEWSs is a challenging and difficult task. In this paper, the Contingent Valuation Method (CVM) is used to evaluate the benefits of a hypothetical EEWS to the citizens of Tehran Metropolitan. This study clarifies public willingness to pay (WTP) for EEWS in Tehran, and the dominant factors involved in WTP through a CVM analysis. The survey, completed by more than 504 households, showed that on average households are willing to pay 367,471 Rials (38 U.S. dollars) per month for the hypothetical EEWS. Those willing to pay the most for EEWS are households that currently possess a fire alarm. Also the more educated the respondents and the more children the respondents have, the more willing they are to pay for EEWS. These results could be used by policy makers and technology firms in order to determine the optimal investments in early warning systems for earthquake disaster reduction.

Bilal, Muhammad Sami, Mowadat Huassain Rana, Sajid Rahim, and Sohail Ali. 2007. Psychological trauma in a relief worker: A case report from earthquake-struck areas of north Pakistan. ***Prehospital and Disaster Medicine*** **22(5): 458-461.**

Vicarious traumatization is now a well-known entity and may have negative influences on those that are involved in rescue efforts in any disaster or traumatic event. Health care workers work with trauma survivors and witness an immense array of gruesome and ghastly images. This work has the potential to cause those engaged in rescue efforts to become affected subconsciously. Job-related stress may cause psychological symptoms in care providers who provide support and listen to the survivors' account of trauma. A therapist working in disaster situations may become a victim of psychological anguish undermining their physical and mental well-being as well as their profession, adversely affecting their traumatized patients, and leading to a counter-productive therapist-survivor relationship. This significant theme of secondary trauma must be recognized in relief workers at early stages and must be addressed at an individual as well as organizational level. The key may lie in turning social supports, adapting positive coping mechanisms, and subsequently seeking mental health consultation.

Beroya, M. A., and A. Aydin. 2007. First-level liquefaction hazard mapping of Laoag City, Northern Philippines. ***Natural Hazards*** **43(3): 415-430.**

During the 1990 Luzon earthquake, the central part of Luzon Island, Philippines, suffered much from liquefaction-related processes. Examination of inventories shows that the affected areas lie on certain geological environments that are characteristically vulnerable to liquefaction. Based on this local experience and the findings of earlier workers correlating geological setting with liquefaction susceptibility, a first-level map of liquefaction hazard for Laoag City, Northern Philippines, was produced. Distinct micro-geomorphological units were identified within the mainly fluvio-deltaic setting of the study area. The liquefaction susceptibility of each unit was then ranked as high, moderate, low, or non-liquefiable, taking also the geomorphological evolution of the area into account. The geomorphological model of the fluvio-deltaic basin was tested against the results of the georesistivity survey carried out in this study. Moreover, compatibility of the liquefaction susceptibility map with historical liquefaction records supported the validity of the proposed ranking. The study showed that microzonation based on geomorphological criteria is indeed very useful in less-developed countries like the Philippines, where funds for a more rigorous determination of liquefaction potential are limited and not always available.

Brancati, Dawn. 2007. Political aftershocks: The impact of earthquakes on intrastate conflict. ***Journal of Conflict Resolution*** **51(5): 715-743.**

Although many scholars, policy makers, and relief organizations suggest that natural disasters bring groups together and dampen conflicts, earthquakes can actually stimulate intrastate conflict by producing scarcities in basic resources, particularly in developing countries where the competition for scarce resources is most intense. Capitalizing on a natural experiment design, this study examines the impact of earthquakes on intrastate conflict through a statistical analysis of 185 countries over the period from 1975 to 2002. The analysis indicates that earthquakes not only increase the likelihood of conflict, but that their effects are greater for higher magnitude earthquakes striking more densely populated areas of countries with lower gross domestic products as well as preexisting conflicts. These results suggest that disaster recovery efforts must pay greater attention to the conflict-producing potential of earthquakes and undertake certain measures, including strengthening security procedures, to prevent this outcome from occurring.

Burbidge, David, and Phil Cummons. 2007. Assessing the threat to Western Australia from tsunami generated by earthquakes along the Sunda Arc. ***Natural Hazards*** **43(3): 319-331.**

A suite of tsunamis spaced evenly along the subduction zone to the south of Indonesia (the Sunda Arc) were numerically modeled in order to make a preliminary estimate of the level of threat faced by western Australia from tsunamis generated along the Arc. Offshore wave heights from these tsunamis were predicted to be significantly higher along the northern part of the west Australian coast than for the rest of the coast south of the town of Exmouth. In particular, the area around Exmouth may face a higher tsunami hazard than other areas of the west Australian coast nearby. Large earthquakes offshore of Java and Sumbawa are likely to be a greater hazard to western Australia than those offshore of Sumatra. The authors' numerical models indicate that a magnitude 9 or above earthquake along the eastern part of the Sunda Arc

has the potential to significantly impact a large part of the west Australian coastline.

Cagnan, Zehra, and Rachel A. Davidson. 2007. Discrete event simulation of post-earthquake restoration process for electric power systems. ***International Journal of Risk Assessment and Management*** **7(8): 1138-1156.**
This paper describes a discrete event simulation model of the post-earthquake restoration process for electric power systems. The model explicitly represents the real-life restoration process enabling development of geographically disaggregated, quantitative restoration curves with uncertainty bounds, a dynamic map showing the spatial distribution of outages changing over time, and information on how personnel and repair materials are used throughout the process. The new restoration modeling approach is applied to the Los Angeles Department of Water and Power electric power system. Simulation results for the 1994 Northridge earthquake indicate that the model is capable of accurately estimating the restoration time and spatial sequence of the recovery process. The model aims to help improve the quantitative restoration time estimates that are required to estimate economic losses due to business interruption caused by power outages, and identify and compare the effectiveness of different ways to improve the restoration process in future earthquakes.

Ceyhan, Esra, and A. Aykut Ceyhan. 2007. Earthquake survivors' quality of life and academic achievement six years after the earthquakes in Marmara, Turkey. ***Disasters*** **31(4): 516-529.**
This study investigates the quality of life (QOL) and academic achievement of earthquake survivors six years after the earthquakes in Marmara, Turkey. Data were collected from 407 Turkish university students. Of these, 201 were earthquake survivors and 206 had not been exposed to an earthquake. The Turkish adaptation of the brief version of the World Health Organization's QOL instrument was used to measure QOL. The results reveal that the earthquake survivors' psychological and environmental domains of QOL and academic achievement were significantly lower than those of individuals not exposed to an earthquake. The results also highlight the risk factors that affect the QOL of the earthquake survivors significantly. These are their gender, their age at the time of earthquake, and the continued existence of financial difficulties linked to the earthquakes.

Chou, Frank Huang-Chih, Hung-Chi Wu, Pesus Chou, Chao-Yueh Su, Kuan-Yi Tsdai, Shin-Shin Chao, Ming-Chao Chen, Tom tung-Ping Su, Wen-Jung Sun, and Wen-Chen Ou-Yang. 2007. Epidemiologic psychiatric studies on post-disaster impact among Chi-Chi earthquake survivors in Yu-Chi, Taiwan. ***Psychiatry and Clinical Neuroscience*** **61(4): 370-378.**
The aim of the present study was to survey a cohort population for the risk factors of post-traumatic stress disorder (PTSD) and major depression, and the prevalence of different psychiatric disorders at 6 months and 2 and 3 years after a major earthquake. The Disaster-Related Psychological Screening Test (DRPST), part I, and the Mini-International Neuropsychiatric Interview (MINI) were administered by trained interviewers and psychiatrists in this community interview program. The prevalence of PTSD decreased from 8.3% at 6 months to 4.2% at 3 years after the earthquake. Suicidality increased from 4.2% at 6 months and 5.6% at 2 years to 6.0% at 3 years after the earthquake; drug abuse/dependence increased from 2.3% at 6 months to 5.1% at 3 years after the disaster. The risk factors for PTSD and major depression in various post-disaster stages were determined. Earthquake survivors had a high percentage of psychiatric disorders in the first 2 years, and then the prevalence declined. Following the devastation caused by the Chi-Chi earthquake, it is important to focus on treating symptoms of major depression and PTSD and eliminating the risk factors for both of these disorders in survivors to avoid the increase in suicidality.

Eksi, Aysel, Kathryn L. Braun, Hayriye Ertem-Vehid, Gulcan Peykerli, Reyhan Saydam, Derya Toparlak, and Behiye Alyanak. 2007. Risk factors for the development of PTSD and depression among child and adolescent victims following a 7.4 magnitude earthquake. ***International Journal of Psychiatry in Clinical Practice*** **11(3): 190-199.**
PTSD and major depression occur frequently following traumatic exposure, both as separate disorders and concurrently. Although much of Turkey is under threat of severe earthquakes, risk factors for developing psychiatric disorders among Turkish children have not yet been studied. The aim of the study was to examine risk factors for PTSD and depression development in children. A total of 160 survivors (102 girls and 58 boys) severely impacted by Turkey's 7.4-magnitude quake participated in a psychiatric interview 6-20 weeks after the disaster. The mean age was 14.43. Logistic regression was used to test effects of pre-disaster, disaster-related and post-disaster factors on diagnoses, yielding odds ratios (OR). CAPS indicated that 96 (60%) had PTSD, and psychiatric interview found 49 (31%) with depression. Children diagnosed with PTSD were more likely to have witnessed death (OR=2.47) and experienced an extreme parental reaction (OR=3.45). Children with depression were more likely to be male (OR=4.48), have a higher trait anxiety score (OR=1.12 for every additional point), sustain injury (OR=4.29), and have lost a family member in the quake (OR=10.96). Focusing on the 96 children with PTSD, those with comorbid depression were more likely male, have a higher trait anxiety score, and have lost of family member. Mental health professionals should offer support to children witnessing death or losing a family member in a disaster. The ability of the family to remain calm and reassuring also may be a key factor in preventing PTSD.

Enke, David L., Tirasirichai Chakkaphan, and Ronaldo Luna. 2008. Estimation of earthquake loss due to bridge damage in the St. Louis Metropolitan Area II: Indirect losses. ***Natural Hazards Review*** **9(1): 12-19.**
An approach to estimate the indirect economic loss due to damaged bridges within the highway system from an earthquake event is presented. The indirect cost considered refers to the increased highway transportation cost only. The study zone covers the St. Louis metropolitan area and its surrounding suburban regions. An earthquake scenario centered in St. Louis, with a magnitude 7.0 is

used. The direct earthquake loss was primarily damage to bridges, which causes an increase in travel time and distance within the transportation network. This information is then used as input for the indirect loss model. The indirect loss is examined from an economic perspective. The results reveal that the indirect loss is significant when compared to the direct loss resulting from bridge damage. From the study results, a transportation network planner can prepare an appropriate preventive action plan (such as choosing alternative routes for potential damaged links, as well as reinforcing possible high damage bridges) to reduce the potential losses before the earthquake occurs.

Gullu, Hamza, Atilla M. Ozbay, and Aydin Ansal. 2008. Seismic hazard studies for Gaziantep city in South Anatolia of Turkey. ***Natural Hazards*** **44(1): 19-50.**
Seismic hazard studies were conducted for Gaziantep city in the South Anatolia of Turkey. For this purpose, a new attenuation relationship was developed using the data of Zaré and Bard and accelerations were predicted employing this new equation. Deterministic approach, total probability theorem and GIS methodology were all together utilized for the seismic assessments. Seismic hazard maps with 0.25° grid intervals considering the site conditions were produced by the GIS technique. The results indicated that the acceleration values by the GIS hazard modelings were matched with the ones from the deterministic approach, however, they were underestimated comparing with the total probability theorem. In addition, the GIS based seismic hazard maps showed that the current seismic map of Turkey fairly yields conservative acceleration values for the Gaziantep region. Therefore, the constructed GIS hazard models are offered as a base map for a further modification of the current seismic hazard map.

Luna, Ronaldo, David Hoffman, and William T. Lawrence. 2008. Estimation of earthquake loss due to bridge damage in the St. Louis Metropolitan Area I: Direct losses. ***Natural Hazards Review*** **9(1): 1-11.**
The risk associated with earthquake hazards on highway systems is dependent on the complexity of a network and its redundancy in providing traffic flow. Earthquake loss estimation studies can provide decision makers with an appreciation of the importance of having a highway network resistant to earthquakes and information to make the network resistant to these events. The direct economic loss was estimated for a major metropolitan area, St. Louis, for a series of earthquake scenarios. The primary component of the study was damage to bridges within the highway system. The study zone covers the St. Louis metropolitan area and its surrounding suburban regions. The study region includes several major alluvial river valleys with liquefaction susceptible areas. Earthquake scenarios with epicenters in St. Louis (MW 7.0), Germantown, Illinois (MW 7.0), and New Madrid, Missouri (MW 7.7), were selected to contrast high impact/low probability and low impact/higher probability events. The losses to the bridge infrastructure were estimated to range from $70 to $800 million depending on the earthquake event. The data collection, generation, and interpretation are described along with the procedures required to carry out the loss estimation using the geographic information system-based HAZUS-MH system. The output of this project was used as input for a hybrid indirect loss calculation presented in the companion paper.

Perea, Hector, and Kuvvet Atakan. 2007. Influence of slow active faults in probabilistic seismic hazard assessment: The northwestern margin of the València trough. ***Natural Hazards*** **43(3): 379-396.**
Areas of low strain rate are typically characterized by low to moderate seismicity. The earthquake catalogs for these regions do not usually include large earthquakes because of their long recurrence periods. In cases where the recurrence period of large earthquakes is much longer than the catalog time span, probabilistic seismic hazard is underestimated. The information provided by geological and paleo-seismological studies can potentially improve seismic hazard estimation through renewal models, which assume characteristic earthquakes. In this work, the authors compare the differences produced when active faults in the northwestern margin of the València trough are introduced in hazard analysis. The differences between the models demonstrate that the introduction of faults in zones characterized by low seismic activity can give rise to significant changes in the hazard values and location. The earthquake and fault seismic parameters (recurrence interval, segmentation, or fault length that controls the maximum magnitude earthquake and time elapsed since the last event or Te) were studied to ascertain their effect on the final hazard results. The most critical parameter is the recurrence interval, where shorter recurrences produce higher hazard values. The next most important parameter is the fault segmentation. Higher hazard values are obtained when the fault has segments capable of producing big earthquakes. Finally, the least critical parameter is the time elapsed since the last event (Te), when longer Te produces higher hazard values.

Proctor, Laura J., Angele Fauchier, Pamella H. Oliver, Michelle C. Ramos, Martha A. Rios, and Gayla Margolin. 2007. Family context and young children's responses to earthquake. ***Journal of Child Psychology and Psychiatry*** **48(9): 941-949.**
Family context can affect children's vulnerability to various stresses, but little is known regarding the role of family variables on children's reactions to natural disaster. This prospective study examined the influence of pre-disaster observed parenting behaviors and post-disaster parental stress on young children's distress following an earthquake. Participants were 117 two-parent families with a child age 4-5 at the initial assessment. The families experienced different degrees of impact from the earthquake. Pre-earthquake family context comprised observations of parents' positive and negative behaviors during a parent-child play task. Eight months after the earthquake, mothers reported symptoms of parental stress and children's distress. Earthquake impact and children's distress symptoms were moderately correlated (r ¼ .44), but certain pre-earthquake parental behaviors moderated the relationship. The dose response association between earthquake impact and children's symptoms did not hold for families in which fathers showed high levels of negative behaviors with daughters, or mothers showed

low levels of positive behaviors with sons. In addition, results consistent with full mediation for boys (and partial mediation for girls) indicated that 86% of the total effect of earthquake impact on boys' distress (and 29% on girls' distress) occurred through the mediator of reported parental stress. These findings demonstrate that young children's responses to an abrupt, negative environmental event, such as an earthquake, are influenced in part by the nature of the parent-child relationship prior to the event as well as by the responses parents exhibit following the event.

Sayil, Nilgun, and Ilhan Osmansahin. 2008. An investigation of seismicity for western Anatolia. ***Natural Hazards*** **44(1): 51-64.**
In order to investigate the seismicity of western Anatolia, limited with the coordinates of 36°–40° N, 26°–32° E, Gutenberg–Richter magnitude–frequency relation, seismic risk, and recurrence period have been computed. The data belonging to both the historical period before 1900 (I0 = 5.0 corresponding to MS = 4.4) and the instrumental period until the end of 2006 (MS = 4.0) has been used in the analysis. The study area has been divided into 13 sub-regions due to certain seismotectonic characteristics, plate tectonic models and geology of the region. All the computations have been performed for these sub-regions, separately. According to the results, a and b values in the computed magnitude–frequency relations are in the intervals 3.19±0.17 – 5.15±0.52 and 0.42±0.05 – 0.66±0.07, respectively. The highest b values have been determined for sub-regions 3 and 12 (Demirci-Gediz and Gökova Gulf-Mugla-Gölhisar). The lowest b values have also been determined for sub-regions 1 and 9 (Balikesir and Bodrum-Istanköy). Finally, seismic risk and recurrence period computations from a and b values have shown as expected that sub-regions 1 and 9 have the lowest b values and the highest risks and the shortest-recurrence periods.

Schultz, Carl H., Kristi L. Koenig, and Roger J. Lewis. 2007. Decision making in hospital earthquake evacuation: Does distance from the epicenter matter? ***Annals of Emergency Medicine*** **50(3): 320-326.**
Over large expanses, the risk for hospital damage from an earthquake attenuates as the distance from the epicenter increases, which may not be true within the immediate disaster zone (near field), however. This study examines the impact of epicenter distance and ground motion on hospital evacuation and closure for those structures near the epicenter of the 1994 Northridge earthquake and the implications for patient evacuation. This is a retrospective case-control study of all hospitals reporting off-site evacuations or permanent closure because of damage from the January 17, 1994, earthquake in Northridge, California. Control hospitals were randomly identified from those facilities that did not evacuate patients. Distances from the epicenter and peak ground accelerations were calculated for each hospital from Trinet ShakeMap data and compared. Eight hospitals evacuated patients (study group); four of these hospitals were condemned. These were compared to eight hospitals that did not evacuate patients (control group). The median epicenter-to-hospital distance for evacuated facilities was 8.1 miles (interquartile range [IQRs] 4.0 to 17.2 miles), whereas that for nonevacuated facilities was 14.1 miles (IRQ 10.5 to 17.0 miles). The difference in the median distances was 6.0 miles (95% confidence interval 4.8 to 11.9 miles). The peak ground acceleration had a median of 0.77g (IQR 0.53 to 0.85g) for study hospitals and a median of 0.36g (IQR 0.24 to 0.50g) for control hospitals, where 1g equals the force of gravity. The difference in median acceleration of 0.41g (95% CI 0.14 to 0.55g) was significant (P=.009). The distances from the epicenter for evacuated or condemned facilities and control hospitals do not appear to differ in the near field. Peak ground acceleration is a superior indicator of the risk for hospital damage and evacuation. Physicians can obtain these data in real time from the Internet and should transfer patients to facilities in areas of lower recorded peak ground acceleration regardless of distance from the epicenter.

Sen, Samil. 2007. A fault zone cause of large amplification and damage in Avcilar (west of Istanbul) during 1999 Izmit earthquake. ***Natural Hazards*** **43(3): 351-363.**
Twenty-seven buildings collapsed and 2,076 buildings were heavily damaged during the August 17, 1999, Izmit earthquake in Avcilar (west of Istanbul), which is nearly 100 kilometers from the epicenter of the earthquake. The geology of Avcilar consists of Upper Miocene poorly bounded conglomerate and sandstone (Çukurçesme formation), claystone with sandstone and limestone interbedding (Güngören member), and limestone with sandstone and claystone interbedding (Bakirköy formation). Lithological and geotechnical parameters of these formations in Avcilar are not different from non-damaged parts of western Istanbul such as Zeytinburnu, Bakirköy and Beylikdüzü, but these formations were cut by several faults in the damaged area. Collapsed and damaged buildings are located on this fault zone. Thus, cause of large amplification and damage in Avcilar might be related with this fault zone because the fault zone behaves as a wave-guide, trapping seismic energy.

Floods

Aragon-Durand, Fernando. 2007. Urbanization and flood vulnerability in the peri-urban interface of Mexico City. ***Disasters*** **31(4): 477-494.**
Chronic flooding in the Chalco valley, state of Mexico, Mexico, is the outcome of past and present socio-environmental changes that have taken place in Mexico City's south-eastern peri-urban interface. This flooding is the result of a complex interaction between urbanization in an ex-lacustrine area, permanent ecological deterioration and ground subsidence, poor sanitation and inadequate policy responses. Far from solving the flooding problem, short-term policy responses have created increasingly unsafe conditions for current residents. A socio-historical analysis of disasters reveals the importance of taking into consideration particular social actors and institutions in hazard generation and flood vulnerability over time. This paper analyzes three aspects of this flooding: first, the importance of approaching floods from a socio-historical perspective; second, the relation between urbanization, former policies and flood risk generation; and third, cur-

rent policy responses to and the failure in the risk management of La Compañía Canal.

Bell, Heather M., and Graham A. Tobin. 2007. Efficient and effective? The 100-year flood in the communication and perception of flood risk. *Environmental Hazards* 7(4): 302-311.
This paper presents a synopsis of several terms used to describe U.S. policy's benchmark flood and a preliminary study of how such terms are interpreted. Questionnaire surveys were conducted in a flood-prone community with residents living in and out of official floodplains. Comparable questions regarding uncertainty, perceived need for protection, and concern were asked in connection with four descriptive methods: a 100-year flood; a flood with a 1 percent chance of occurring in any year; a flood with a 26 percent chance of occurring in 30 years; and a flood risk map. Statistical analysis and qualitative observation showed a disjuncture between understanding and persuasion, potential problems with the 26 percent chance method, and a preference for concrete references in describing risk.

Benight, C. C., E.C. Gruntfest, M. Hayden, and L. Barnes. 2007. Trauma and short-fuse weather warning perceptions. *Environmental Hazards* 7(3): 220-226.
The purpose of this research was to assess the importance of psychological trauma in understanding reactions to short lead time weather warnings. The research consisted of two case studies: one in Denver, Colorado, and the other in Austin, Texas. A total of 61 individuals with 9 or greater traumas were compared to 281 non-trauma exposed individuals. Results demonstrated significant differences on questions related to general beliefs about flash floods and warning perceptions as well as reported anticipated actions during a flash flood at home. Results suggest that high trauma exposure may lead to more threat sensitivity and a higher probability of initiated action in a home-based flash flood.

Bokszczanin, Anna. 2007. PTSD symptoms in children and adolescents 28 months after a flood: Age and gender differences. *Journal of Traumatic Stress* 20(3): 347-351.
The present study examined the prevalence and predictors of posttraumatic stress disorder symptoms (PTSD) in a sample of 533 students (aged 11 to 21) 28 months after the 1997 flood in southwestern Poland. The results show that 18% of the participants met all diagnostic criteria for PTSD. Based on hierarchical multiple regression analyses, PTSD criteria symptoms were positively correlated with the degree of exposure to trauma experienced during the disaster. A three-way interaction of trauma, age, and gender showed that more PTSD symptoms were observed among the younger participants and girls than among the older boys. The results confirm the need for research that tests culturally sensitive implementation of mental health programs for young victims of disasters, taking into account their age and gender.

Cheng, Shin-Jen, Huey-Hong Hsieh, Cheng-Feng Lee, and Yu-Ming Wang. 2008. The storage potential of different surface coverings for various scale storms on Wu-Tu watershed, Taiwan. *Natural Hazards* 44(1): 129-146.
An impervious surface cover is continuously spreading over the Wu-Tu upstream watershed due to the concentrated population and raised economical demands, while that area also frequently suffers from heavy storms or typhoons during the summer season. The increased flood volume due to this extended imperviousness causes a greater potential hazard than in the past. In order to evaluate the urbanized impacts on the watershed, a set of methods was used to estimate the changes of the watershed storage. This research chose 51 observed events from three rain gauges on the Wu-Tu upstream watershed, Taiwan, to study the volume characteristic of abstracted rainwater. In the study, the block Kriging method was used to estimate the area rainfall, and the hourly excess was derived through the non-linear programming (NLP). A total of 40 samples were calibrated through the hydrological model and the Soil Conservation Service (SCS) model using the optimum seeking method in order to search out and establish the best parameters that illustrate the hydrological and geomorphic conditions at that time. Eleven cases were used to examine the established relationship of the parameters and the impervious coverings. A design storm approach was used to view the changes of the volume for various scale storms/typhoons because of the different degrees of urbanization. Then, a diagram was designed to show the relationships that exist among the runoff coefficient, return period, and impervious surface. The results show that storage capability of rainwater for various scale storms on the Wu-Tu watershed would be respectively reduced about 42–156 cms in different decrements up to now.

Ding, Aiju , James F. Ullman, Paul W. Fashokun, and Adebola O. White. 2008. Evaluation of HAZUS-MH flood model with local data and other program. *Natural Hazards Review* 9(1): 20-28.
This paper presents an evaluation of the HAZUS-MH flood model conducted as part of the Harris County Risk Assessment Program completed in November 2005. The county-wide analysis proved the capability of the HAZUS-MH software for a large urban county application. For the pilot watershed study, the HAZUS-MH Level 1 analysis was quick and least costly. However, the loss estimates may be questionable. The Level 2 analysis produced much more reasonable loss estimates than the Level 1 analysis when compared with other detailed analyses. HAZUS-MH Level 2 estimated $179 million for 1% probability event and $286 million for 0.2% probability event building related economic loss for residential properties in White Oak Bayou watershed. This compares well with the results of the Section 211 Federal Flood Control Project: General Reevaluation Report study for the same area of $153 million for 1% and $292 million for 0.2% loss estimates. Both the building damage count and loss estimates from HAZUS-MH Level 2 showed a linear correlation with the Federal Flood Control Project results (R2=0.9997 for building damage count and R2=0.9786 for loss estimate). Based on comparison in this study, a HAZUS-MH Level 2 analy-

sis appears to be a better, more cost-effective approach to achieve reliable results for risks assessment and mitigation planning.

Drobot, Sheldon, and Dennis J. Parker. 2007. Advances and challenges in flash flood warnings. *Environmental Hazards* 7(3): 173-178.

Drobot, Sheldon D., C. Benight, and E. C. Gruntfest. 2007. Risk factors for driving into flooded roads. *Environmental Hazards* 7(3): 227-234.

Motor vehicle-related deaths account for more than half of all flood fatalities in the United States, but to date, very little is known about the risk factors associated with why people drive into flooded roads. Using data from survey questionnaires administered in Denver, Colorado, and Austin, Texas, this paper suggests that people who do not take warnings seriously are more likely to drive through flooded roads, as are people aged 18-35 and those who do not know that motor vehicles are involved in more than half of all flood fatalities. In Denver, people who have not experienced a flood previously and those who do not know they live in flood-prone areas are also more likely to drive into flooded roads.

Flynn, David T. 2007. The impact of disasters on small business disaster planning: A case study. *Disasters* 31(4): 508-515.

A major flood in 1997 forced the evacuation of Grand Forks, North Dakota, and caused damage of USD 1 billion. Despite this recent disaster there is only marginal evidence of an increase in disaster recovery planning by businesses that experienced the flood. This finding is consistent with the results of other business-related disaster research. Statistical tests of survey results from 2003 indicate that there is a significantly higher rate of disaster recovery planning in businesses started since the 1997 flood than in businesses started before the flood and still in business. Such an outcome indicates a need for public policy actions emphasizing the importance of disaster planning. Improved disaster planning is an aid to business recovery, and the results demonstrate the need for more widespread efforts to improve disaster recovery planning on the part of smaller businesses, even in areas that have recently experienced disasters.

Hayden, M. H., S. Drobot, S. Radil, C. Benight, E. C. Gruntfest, and L. R. Barnes. 2007. Information sources for flash flood warnings in Denver, CO and Austin, TX. *Environmental Hazards* 7(3): 211-219.

This research examines sources of information for flash floods in two large metropolitan areas: Denver, CO, and Austin, TX. Previous research has noted that information delivery systems for weather forecasts are geared toward the cultural majority and suggests that inadequate warnings are a primary contributor to deaths and injuries from hazards. This investigation used chi-square analysis to determine the prime warning source preferences and preferred time of day for receiving different media. Results indicate that successful warning messages need to be targeted toward specific sub-populations if the warning is to be received, understood, and responded to properly.

Jin, Ju-Liang, Jian Cheng, and Yi-Ming Wei. 2008. Forecasting flood disasters using an accelerated genetic algorithm: Examples of two case studies for China. *Natural Hazards* 44(1): 85-92.

This article discusses a rescaled range analysis model, titled AGA-R/S, that is based on an accelerated genetic algorithm. The parameter a, Hurst index of rescaled range analysis, and the recurrent time of disaster in the next time-period were directly computed using an accelerated genetic algorithm developed by the authors. As case studies, using the AGA-R/S model, a forecast was made of the tendency for change in a time series of annual precipitation for the city of Jinhua, China. The model also forecast flooding-disaster in the city of Wuzhou, China. Results indicate that it is a relatively efficient technique to forecast the change-tendency of flood and disaster time series using the AGA-R/S model. When time series is utilized, forecasted error of the AGA-R/S model is less than with a linear least square method. The Hurst indexes of the two cities are from 0.23 to 0.24, which indicates that these time series are fractal and relatively long term. Their fractional Brownian motion shows anti-persistence. AGA-R/S has application in forecasting the change-tendency of other natural disaster for specific time series.

Johnson, Clare, Edmund Penning-Roswell, and Dennis Parker. 2007. Natural and imposed injustices: The challenges in implementing 'fair' flood risk management policy in England. *The Geographical Journal* 173(4): 374-390.

This paper examines the challenges facing English flood risk management (FRM) policy and practice when considering fair decision-making processes and outcomes at a range of spatial scales. It is recognized that flooding is not fair per se: the inherent natural spatial inequality of flood frequency and extent, plus the legacy of differential system interventions, being the cause. But, drawing on the three social justice models (procedural equality, Rawls' maximum rule and maximum utility), the authors examine the fairness principles currently employed in FRM decision-making. This is achieved, firstly, in relation to the distribution of taxpayers' money for FRM at the national, regional and local levels and, secondly, for non-structural strategies, most notably those of insurance, flood warnings and awareness raising, land use control, home owner adaptation and emergency management. A case study of the Lower Thames catchment illustrates the challenges facing decision-makers in 'real life': how those strategies that appear to be most technically and economically effective fall far short of being fair from either a vulnerability or equality perspective. The paper concludes that if we are to manage flood risk somewhat more fairly, then a move in the direction of government funding of nationally consistent non-structural strategies, in conjunction with lower investment decision thresholds for other local-level FRM options, appears to offer a greater contribution to equality and vulnerability-based social justice principles than does the status quo.

Kroll-Smith, Steve, Pam Jenkins, and Vern Baxter. 2007. The bricoleur and the possibility of rescue: First responders to the flooding of New Orleans. ***Journal of Public Management and Social Policy*** **13(2): 5-21.**
In this paper, the authors interviewed first responders to the 2005 flooding of New Orleans to discern and make sense of what they thought and how they acted in a protracted moment of terror. Viewed from a certain angle, the behavior of first responders is a window onto a self stripped of convention and the mundane protocols of proper conduct. First responders, the authors argue, often employ a cleverness that does not recognize itself as such. Measured against the principles and standards of official training manuals and tests, "clever" first responders might appear to be reckless or incompetent. A shape-shifter, assuming whatever forms are necessary to accomplish the tasks at hand, the first responder resembles in action and character the bricoleur, that person who alters and transforms ideas and materials to create new and innovative approaches to the world (Levi-Strauss 1966). It is not rationality per se that guides the bricoleur, but neither is his or her behavior irrational, though it may at times appear something other than reasonable. A grounded imagination operates through an admixture of disposition, intuition, emotion, intellect, and the acumen of the body. Neither rational nor irrational, the bricoleur behaves in, what Dreyfus and Dreyfus call, an "arational" manner.

McCarthy, Simon, Sylvia Tunstall, Dennis Parker, Hazel Faulkner, and Joe Howe. 2007. Risk communication in emergency response to a simulated extreme flood. ***Environmental Hazards*** **7(3): 179-192.**
Risk communication in flood incident management can be improved through developing hydrometeorological and engineering models used as tools for communicating risk between scientists and emergency management professionals. A range of such models and tools was evaluated by participating flood emergency managers during a 4-day, real-time simulation of an extreme event in the Thamesmead area in the Thames estuary close to London, England. Emergency managers have different communication needs and value new tools differently, but the indications are that a range of new tools could be beneficial in flood incident management. Provided they are communicated, large model uncertainties are not necessarily unwelcome among flood emergency managers. Even so, they are cautious about sharing the ownership of weather and flood modeling uncertainties.

Morss, Rebecca E., and Eugene Wahl. 2007. An ethical analysis of hydrometeorological prediction and decision making: The case of the 1997 Red River flood. ***Environmental Hazards*** **7(4): 342-352.**
Weather, climate, and flood predictions are incorporated into human decisions in a wide variety of situations, including decisions related to hazardous hydrometeorological events. This article examines ethical aspects of such predictions and decisions, focusing on the case of the 1997 Red River flood in Grand Forks, North Dakota, and East Grand Forks, Minnesota (US). The analysis employs a formal ethical framework and analytical method derived from medical and business ethics. The results of the analysis highlight issues related to forecast generation, communication of forecast meaning and uncertainty, responsibility for the use of forecasts in decision making, and trade-offs between the desire for forecast certainty and the risk of missed events. Implications of the analysis for the broader arenas of weather, climate, and flood prediction and disaster management are also discussed.

Parker, Dennis, Sue Tapsell, and Simon McCarthy. 2007. Enhancing the human benefits of flood warnings. ***Natural Hazards*** **43(3): 397-414.**
This article evaluates some of the factors that limit the human benefits of hazard warnings, with specific reference to flood warnings, and concludes by suggesting ways of enhancing these benefits. The authors focus mainly on the economic benefits generated by flood damage savings by households that warnings facilitate; health effects of flooding and flood warnings; and the effects of warnings on loss of life and physical injury. The results, based partly on surveys of flooded households, reveal that economic benefits are currently more limited than previously thought, but that for several reasons these benefits are likely to be under-estimated. They argue that the intangible benefits to public health, safety and security must also be taken into account in decisions about investment in flood warnings. In England and Wales, the public's response to flood warnings is currently low and is a key benefit-limiting factor that could begin to undermine a recent major shift in national flood risk management policy towards a more people-centered, portfolio approach in which changing human behavior is viewed as important. Using a transdisciplinary approach, the authors discuss the evidence and literature surrounding this poor response and suggest a number of ways in which the issue may be addressed in the future.

Parker, Dennis J., Sylvia M. Tunstall, and Simon McCarthy. 2007. New insights into the benefits of flood warnings: Results from a household survey in England and Wales. ***Environmental Hazards*** **7(3): 193-210.**
The flood defense agency in England and Wales has been pursuing a program of flood warning systems enhancement, engaging householders at risk in improving their warning responses. The immediate aim of this paper is to test and revise a model of economic benefits of warnings, but the survey data also generate insights into the constraints acting on flood warning responses. Damage saving is less than previously anticipated: warning reliability and householder availability problems limit savings. Warnings are less likely to be received by those in lower social grades, and flood warning lead time is a factor in avoiding damage. The survey data indicate the complexities involved in improving flood warning response and provide policy pointers.

Rashid, Harun, Wolfgang Haider, and Doug McNeil. 2007. Urban riverbank residents' evaluation of flood evacuation policies in Winnipeg, Manitoba, Canada. ***Environmental Hazards*** **7(4): 372-382.**
The results of a discrete choice experiment (DCE) as part of a survey among the urban riverbank residents on the Red River in Winnipeg, Manitoba, Canada, indicated that

the risk of over-dike flooding, set at 2 feet above the 1997 flood water level, was a significant determinant of both voluntary and mandatory evacuation, compared to those set at the 1996 or 1997 levels. Mandatory evacuation was more preferred over voluntary evacuation when the likelihood of flooding was at its most severe, and the opposite relationship was the case when the likelihood was low. The notification time for evacuation, suggested as 1, 2, and 4 days, proved to be an insignificant attribute, whereas the respondents indicated significant preference for full flood compensation over an offer of either 80% or 90% flood relief, irrespective of the alternatives of voluntary or mandatory evacuation.

Ruin, Isabelle, Jean-Christophe Gaillard, and Celine Lutoff. 2007. How to get there? Assessing motorists' flash flood risk perception on daily itineraries. *Environmental Hazards* 7(3): 235-244.
Flash floods are characterized by their suddenness, fast and violent movement, rarity, and small scale but high level of damage. They are particularly difficult to forecast accurately, and there is little lead time for warning. This makes motorists especially vulnerable. Assuming that these flash flood hazard specificities may be significant factors leading to difficulties for drivers to perceive danger, the authors used cognitive mapping combined with GIS data processing to assess motorists' flash flood risk perception in their daily itineraries. The analysis of 200 mental maps collected allows planners to have maps highlighting dangerous areas where risk perception is weak and to identify reasons for this.

Speakman, Dorian. 2008. Mapping flood pressure points: Assessing vulnerability of the UK Fire Service to flooding . *Natural Hazards* 44(1): 111-127.
A vulnerability index for the Fire Service in the UK has been designed to identify vulnerable locations during episodes of severe floods. Taking recent case studies with the UK Fire Service, the patterns of vulnerability, in terms of demand on time and resources, can be explained by investigating the environmental causes and their interaction with the adaptive capacity of the response agencies.

Gender and Vulnerable Populations

Bokszczanin, Anna. 2007. PTSD symptoms in children and adolescents 28 months after a flood: Age and gender differences. *Journal of Traumatic Stress* 20(3): 347-351.
The present study examined the prevalence and predictors of posttraumatic stress disorder symptoms (PTSD) in a sample of 533 students (aged 11 to 21) 28 months after the 1997 flood in southwestern Poland. The results show that 18% of the participants met all diagnostic criteria for PTSD. Based on hierarchical multiple regression analyses, PTSD criteria symptoms were positively correlated with the degree of exposure to trauma experienced during the disaster. A three-way interaction of trauma, age, and gender showed that more PTSD symptoms were observed among the younger participants and girls than among the older boys. The results confirm the need for research that tests culturally sensitive implementation of mental health programs for young victims of disasters, taking into account their age and gender.

Clark, Nigel. 2007. Living through the tsunami: Vulnerability and generosity on a volatile earth. *Geoforum* 38(6): 1127-1139.
How might geographers respond 'generously' to a disaster on the scale of the Indian Ocean tsunami? Critical geographers and other left intellectuals have chosen to stress the way pre-existing social forces conditioned human vulnerability, and have implied that ordinary people 'here' were implicated in the suffering of others 'there' through their positioning in chains of causality. Critics have also sought to expose the bias, unjustness, and inappropriateness of post-tsunami patterns of donation and programs of aid and recovery. A supplement to this mode of critique is offered in the form of a view of disasters and human vulnerability that hinges on the idea of the self as 'radically passive'; that is, as inherently receptive to both the stimuli that cause suffering, and to the demands of others who are suffering. All forms of thought, including geography and disaster studies, should themselves be seen as 'vulnerable' and responsive to the impact to disasters. The idea that every 'self' bears the trace of past disasters and past gifts of others forms the basis of a vision of bodies and communities as always already 'fractured' by disaster in ways which resist being 'brought to light'. This offers a way of integrating human and physical geographies through a shared acknowledgement of what is unknowable and absent. It is also suggestive that gratitude might be an appropriate response to a sense of indebtedness to others for who we are, as much as for what we have done.

Germany, Kent B. 2007. The politics of poverty and history: Racial inequality and the long prelude to Katrina. *Journal of American History - Through the Eye of Katrina: The Past as Prologue? Special Issue* 94(3): 743-751.

Krishnadas, Jane. 2007. Identities in reconstruction: From rights of recognition to reflection in post-disaster reconstruction processes. *Feminist Legal Studies* 15(2): 137-165.
This article examines the role of rights in both governing and shaping women's relationship with the reconstruction process and their position in the reconstructed society. Through four years of empirical research in the post-earthquake reconstruction process in Maharashtra, India, this article focuses on how women's rights in social reconstruction are contingent upon processes of recognition. Through a critique of cultural, material and spatial acts and frameworks of recognition within the U.N., World Bank, State Government, public interest litigation, and personal and nonformal law, rights are seen to actively and hierarchically construct either a modern, liberal subject or a religious, communitarian subject, which both either deny or prescribe agency. The experience of women's organizing reveals the possibility of reconstructing a feminist rights strategy of reflection.

La Greca, Annette M. 2007. Understanding the psychological impact of terrorism on youth: Moving beyond posttraumatic stress disorder. *Clinical Psychology: Science and Practice* 14(3): 219-223.
Comer and Kendall's (2007) comprehensive review of the impact of terrorism on youth organizes this important and burgeoning area of research. The present commentary focuses on youth outcomes associated with proximal contact

with terrorist attacks, and highlights several important issues that merit attention. Specifically, the commentary emphasizes the importance of examining youths' post-attack outcomes broadly (in addition to posttraumatic stress disorder and its symptoms), assessing traumatic grief and bereavement when mass casualties occur, and evaluating issues of comorbidity and functional impairment. Future research on the impact of terrorism on youth would benefit from adopting a developmental psychopathology perspective in understanding variables that may influence and be influenced by youths' reactions to terrorist events. Implications for research and clinical practice are discussed.

Landphair, Juliette. 2007. "The forgotten people of New Orleans": Community, vulnerability, and the Lower Ninth Ward. ***Journal of American History - Through the Eye of Katrina: The Past as Prologue? Special Issue*** **94(3): 837-845.**

Levine, Joyce N., Ann-Margaret Esnard, and Alka Sapat. 2007. Population displacement and housing dilemmas due to catastrophic disasters. ***Journal of Planning Literature*** **22(1): 3-15.**

As Hurricane Katrina revealed, coastal communities have become far more vulnerable to tropical storms and the long-term displacement of residents. Yet, because the emergency management model presumes that recovery quickly follows response, governments focus only on short-term, localized displacement. However, long-term and long-distance displacement exposes a gray area between immediate shelter and permanent housing, along with concerns about vulnerability, housing availability, and land development. The authors begin this article by discussing the transition between response and recovery. They review literature regarding social vulnerability, displacement, provision of temporary housing, households' return decisions, and disaster-driven land development and housing construction processes. They close with thoughts on future research to increase planners' understanding of the issues involved and to help them craft effective policies.

Long, Alecia P. 2007. Poverty is the new prostitution: Race, poverty, and public housing in post-Katrina New Orleans. ***Journal of American History - Through the Eye of Katrina: The Past as Prologue? Special Issue*** **94(3): 795-803.**

Mercer, Jessica, Dale Dominey-Howes, Ilan Kelman, and Kate Lloyd. 2007. The potential for combining indigenous and western knowledge in reducing vulnerability to environmental hazards in small island developing states. ***Environmental Hazards*** **7 (4): 245-256.**

The benefits of indigenous knowledge within disaster risk reduction are gradually being acknowledged and identified. However, despite this acknowledgement there continues to be a gap in reaching the right people with the correct strategies for disaster risk reduction. This paper identifies the need for a specific framework identifying how indigenous and western knowledge may be combined to mitigate against the intrinsic effects of environmental processes and therefore reduce the vulnerability of rural indigenous communities in small island developing states (SIDS) to environmental hazards. This involves a review of the impacts of environmental processes and their intrinsic effects upon rural indigenous communities in SIDS and how indigenous knowledge has contributed to their coping capacity. The paper concludes that the vulnerability of indigenous communities in SIDS to environmental hazards can only be addressed through the utilization of both indigenous and Western knowledge in a culturally compatible and sustainable manner.

Moses, Marina S., Donna S. Caruso, Timothy G. Otten, Sam Simmens, and Tee L. Guidotti. 2007. Community ready! Assessing and meeting the needs of parents in Arlington County, VA. ***Journal of Emergency Management*** **5(6): 53-60.**

In March 2006, three elementary schools, composed of at least 50 percent Latino populations, were selected in Arlington County, VA, to participate in a multi-tiered survey to evaluate parents' emergency preparedness needs. This article describes how to identify vulnerable populations and tailor specific information and services to their public health needs. An oral survey was administered to parents in their preferred language, English or Spanish, regarding their questions, concerns, preferences, and needs pertaining to public health emergency preparedness. Major themes that emerged included the need for language and culturally sensitive preparedness information; the merit of using established community venues for parents to gather; and the importance of using group-specific preferred modes of information dissemination. Significant differences were observed between vulnerability, level of preparedness, and preferences for acquiring information. An important similarity that presented itself was that all parents surveyed regard the public school system as safe, trustworthy, and best suited for providing public health prepareparedness information to the community. Based on this study, an innovative model is being developed called Community Ready! which will be an all-hazards approach to public health preparedness outreach that will be reproducible in other municipalities and school districts.

Rosenkoetter, Marlene M., Elanor K. Jrassen, Brenda K. Cobb, Sheila Bunting, and Martin Weinrich. 2007. Perceptions of older adults regarding evacuation in the event of a natural disaster. ***Public Health Nursing*** **24(2):160-168.**

This article investigates the evacuation needs and beliefs of older adults in two counties in Georgia; identifies health risk factors; and provides public health and emergency management officials with planning information. A descriptive survey using The Older Adult Disaster Evacuation Assessment was given to 139 lower socioeconomic participants at congregate meal sites. Over 70% said they would definitely evacuate in the future and nearly 16% would probably evacuate, yet over 13% reported 'maybe'' or 'no.'' Multiple logistic regressions suggest that those who do not trust the media and county officials' information would have only 1/4 the odds of definitely evacuating. Those who say they would not follow their county officials' advice have only 1/3 the odds

of definitely evacuating. Primary health problems were decreased mobility (40.1%), hypertension (70.5%), and arthritis (53.2%). Forty-six percent would need transportation; approximately 40% lived alone; and about 40% had fair or poor health. Trust and belief in county officials and the media were the best predictors of willingness to evacuate. Participants in this study would need assistance with transportation, preparation, and support for serious health problems in order to evacuate. Further study is needed with a larger, more representative sample.

Thornton, William E., and Lydia Voigt. 2007. Disaster rape: Vulnerability of women to sexual assaults during Hurricane Katrina. ***Journal of Public Management and Social Policy*** **13(2): 23-49.**
The relative lack of status, power, and resources put many women at risk of being sexually assaulted during Hurricane Katrina. Controversy still remains regarding the actual incidence of rapes that took place and are still occurring. The "Katrina Disaster" represents a multi-impact series of catastrophes (i.e., Hurricane Katrina, several levee breeches, an oil spill, a chemical storage facility explosion, and Hurricane Rita) that together have produced cumulative disaster effects unlike any in the history of the United States. The complete breakdown of law and order during the early phases of the Katrina Disaster, when normal crime reporting mechanisms were non-existent, created an atmosphere for the emergence of rumors about rape and other crimes that were widely distributed in the media only to be later recanted. Even though many early reports were dismissed, sexual assaults did occur. This study examines official reports, victim self reports, and narratives of first-responders and victim advocates regarding rapes and other sexual assaults that occurred during Katrina and its aftermath in New Orleans and other areas where storm victims evacuated. This paper contributes to disaster research by capturing the unique characteristics of the Katrina Disaster and identifying the special vulnerabilities of women during different phases of this multi-disaster event.

Tyler, Pamela. 2007. The post-Katrina, semi-separate world of gender politics. ***Journal of American History - Through the Eye of Katrina: The Past as Prologue? Special Issue*** **94(3): 780-788.**
When the New York Times reported "a wave of citizen activism" in New Orleans after Hurricane Katrina, it failed to mention that much of the wave was wearing lipstick and carrying a purse. Mopping up is, and always has been, women's work, so it comes as no surprise that large numbers of local women were active in post-Katrina recovery efforts in New Orleans. While some worked singly, volunteering their help in countless ways, others chose the timeworn path of women's associations. This essay focuses on the activities of three organizations formed by women after the hurricane: Citizens for 1 Greater New Orleans, the Katrina Krewe, and Women of the Storm.

Homeland Security and Terrorism

Abdallah, Saade, Rebekah Heinzen, and Gilbert Burnham. 2007. Immediate and long-term assistance following the bombing of the U.S. Embassies in Kenya and Tanzania. ***Disasters*** **31(4): 417-434.**
On 7 August 1998 truck bombs destroyed the US Embassies in Kenya and Tanzania. The response in both countries was characterized by an absence of incident command, limited pre-hospital care, a disorganized hospital response and a lack of transportation for those injured. In the next five years USD 50 million was provided by the United States Agency for International Development (USAID) to alleviate the resulting suffering, support reconstruction and strengthen disaster preparedness capacity in the two countries. These two programs have enhanced awareness of disaster management issues, improved training capacity, built response structures and provided material resources. Their design and implementation provide lessons for future disasters in developing countries. The assistance programs evolved very differently. In Kenya the program largely excluded the public sector and the potential for government coordination, while the Tanzanian program concentrated heavily on central government and regional hospital structures largely omitting the non-governmental or civil society sector. Excluding key stakeholders raises concerns about program sustainability and the ability to respond effectively to future emergencies.

Friedmann, Robert R., and William J. Cannon. 2007. Homeland security and community policing: Competing or contemplating public safety policies. ***Journal of Homeland Security and Emergency Management*** **4(4).**
In the aftermath of the September 11, 2001, terrorist atrocities in the United States, a new organizational policy was introduced as "Homeland Security." Both a concept and a governmental department, homeland security became the "in" policy, and as such invented a new organization and a new approach to public safety. As a result, however, the dominant policing policy up to that time – Community Policing – was largely sidestepped by homeland security efforts as well as budgets. The purpose of this article is to demonstrate that the two public safety policies actually have a great deal in common, and that homeland security is to benefit from integrating principles of community policing in its localized strategies.

Gordon, Janey. 2007. The mobile phone and the public sphere: Mobile phone usage in three critical situations. Convergence. ***The International Journal of Research into New Media Techniques*** **13(3): 307-319.**
This article seeks to explore the influence of the mobile phone on the public sphere, in particular with regard to its effect on news agendas, gatekeepers and primary definers. Using the examples of the Chinese SARS outbreak (2003), the southeast Asian tsunami (December 2004) and the London bombings (July 2005), the author questions the extent to which the mobile phone is challenging conventional and official sources of information. At times of national and personal calamity, the mobile phone is used to document and report events from eyewitnesses and those closely involved. Using multimedia messages

(MMS) or text messages (SMS) to communities of friends and families, as well as audio phone calls, mobile phone users may precede and scoop official sources and thwart censorship and news blackouts. They can also provide valuable evidence of what actually occurred. Users are able to take pictures and short films and transmit these rapidly to others along with reports of what is happening where they are. They are also able to access other media broadcasts and the internet. They are what have become known as `citizen journalists'. The evidence suggests that mobile phone usage is contributing to the public sphere and in some instances is circumventing official repression or inadequate information. There is also an indication that the `mobcam' is capturing images that would otherwise be lost. However, the mainstream media have been quick to take advantage of this citizen journalism and mediate it within its own parameters.

La Greca, Annette M. 2007. Understanding the psychological impact of terrorism on youth: Moving beyond posttraumatic stress disorder. ***Clinical Psychology: Science and Practice*** **14(3): 219-223.**
Comer and Kendall's (2007) comprehensive review of the impact of terrorism on youth organizes this important and burgeoning area of research. The present commentary focuses on youth outcomes associated with proximal contact with terrorist attacks and highlights several important issues that merit attention. Specifically, the commentary emphasizes the importance of examining youths' post-attack outcomes broadly (in addition to posttraumatic stress disorder and its symptoms), assessing traumatic grief and bereavement when mass casualties occur, and evaluating issues of comorbidity and functional impairment. Future research on the impact of terrorism on youth would benefit from adopting a developmental psychopathology perspective in understanding variables that may influence and be influenced by youths' reactions to terrorist events. Implications for research and clinical practice are discussed.

Lemyre, Louise, Michelle C. Turner, Jennifer Lee, and Daniel Krewski. 2007. Differential perception of chemical, biological, radiological and nuclear terrorism in Canada. ***International Journal of Risk Assessment and Management*** **7(8): 1191-1208.**
As part of the Canadian national public survey of perceived chemical, biological, radiological and nuclear (CBRN) terrorism threat and preparedness, 1502 Canadians were recently interviewed by telephone. This paper presents a descriptive examination of perceptions of the occurrence of terrorist bombings and CBRN terrorism in Canada on a number of evaluative dimensions, including perceived likelihood, uncertainty, severity, personal impact and ability to cope should such an event occur. Overall, Canadians perceived that the occurrence of terrorism in Canada was associated with serious consequences and would have a great impact on their lives. However, they also perceived that such an event was unlikely to occur. Terrorist bombings were perceived as the most likely to occur but were perceived as having the least severe consequences. The converse was found for perceptions of nuclear terrorist attacks. Perceptions varied by demographic background, with gender and education representing important determinants. The implications of findings for risk management and communication are discussed.

McGill, William L., Bilal M. Ayyub, and Mark Kaminskiy. 2007. Risk analysis for critical asset protection. ***Risk Analysis*** **27(5): 1265-1281.**
This article proposes a quantitative risk assessment and management framework that supports strategic asset-level resource allocation decision making for critical infrastructure and key resource protection. The proposed framework consists of five phases: scenario identification, consequence and criticality assessment, security vulnerability assessment, threat likelihood assessment, and benefit-cost analysis. Key innovations in this methodology include its initial focus on fundamental asset characteristics to generate an exhaustive set of plausible threat scenarios based on a target susceptibility matrix (which the authors refer to as asset-driven analysis) and an approach to threat likelihood assessment that captures adversary tendencies to shift their preferences in response to security investments based on the expected utilities of alternative attack profiles assessed from the adversary perspective. A notional example is provided to demonstrate an application of the proposed framework. Extensions of this model to support strategic portfolio-level analysis and tactical risk analysis are suggested.

Montoya, Isaac D., and Olive M. Kimball. 2007. The Laboratory Response Network: Its role in times of disaster. ***Journal of Emergency Management*** **5(6): 45-52.**
The Laboratory Response Network (LRN) was established by the Centers for Disease Control and Prevention. Today, the LRN is charged with the task of maintaining an integrated network of state and local public health, federal, military, and international laboratories that can respond to bioterrorism, chemical terrorism, and other public health emergencies. The more than 150 laboratories that make up the current LRN are affiliated with federal agencies, military installations, international partners, and state and local public health departments. Laboratories in the network may accept samples from hospitals, clinics, the Federal Bureau of Investigation, other law enforcement groups, emergency medical services, and the military and other agencies. All of the LRN laboratories use the same protocols and validated methods to ensure rapid and certain identification of dangerous biologic agents that cause anthrax, botulism, plague, tularemia, brucellosis, and other illnesses.

Padrone, Marzia, and Kanti Donatella. 2007. Is game theory a useful tool for terrorism insurance? ***International Journal of Risk Assessment and Management*** **7(8): 1176-1190.**
This paper addresses the topic of terrorism insurance. Financial markets and international institutions believe that terrorism risk modeling falls short of making the likelihood of future attacks more predictable and quantifiable. The authors present the literature of research in the domain of game theory applied to terrorism insurance and scrutinize the possibility of using evolutionary game theory, and they put forward the theoretical and practical

issues that need to be addressed before reaching a satisfactory modeling framework to be used by the sector.

Piegorsch, Walter W., Susan L. Cutter, and Frank Hardisty. 2007. Benchmark analysis for quantifying urban vulnerability to terrorist incidents. *Risk Analysis* 27(6): 1411-1425.
This article describes a quantitative methodology to characterize the vulnerability of U.S. urban centers to terrorist attack, using a place-based vulnerability index and a database of terrorist incidents and related human casualties. Via generalized linear statistical models, it studies the relationships between vulnerability and terrorist events and finds that a place-based vulnerability metric significantly describes both terrorist incidence and occurrence of human casualties from terrorist events in these urban centers. The article also introduces benchmark analytic technologies from applications in toxicological risk assessment to this social risk/vulnerability paradigm, and uses these to distinguish levels of high and low urban vulnerability to terrorism. It is seen that the benchmark approach translates quite flexibly from its biological roots to this social scientific archetype.

Hurricanes and Coastal Hazards

Barber, Kristen, Danielle Antoinette Hidalgo, Timothy J. Haney, Stan Weeber, Jessica W. Pardee, and Jennifer Day. 2007. Narrating the storm: Storytelling as a methodological approach to understanding Hurricane Katrina. *Journal of Public Management and Social Policy* 13(2): 99-120.
There is significant debate over how and why Hurricane Katrina impacted the lives of so many people in the South. In this article, the authors present the human side of this debate. Beyond the political and economic effects of Hurricane Katrina, those who intimately experienced these events struggle to cope with both the daily trials and the ongoing physical and emotional displacement of their lives. This article is based on a larger project that utilizes storytelling to address the sociological impact of Hurricane Katrina. Using storytelling sociology as a method, the authors integrate first-person narratives of experiences with Hurricane Katrina and its aftermath. These narratives explicitly connect to or use a sociological concept, theme, theory, or perspective to shed light on ways Hurricane Katrina impacted people's lives. The article begins with stories of evacuation and exile then transitions into the processes of coming home. It ends with narrative reflections on the "new normal," the continuing process of living in and through a period of rebuilding homes and lives either throughout the Gulf Coast or in new and unlikely places.

Bonnett, Carl J., Tony R. Schock, Kevin E. McVaney, Christopher B. Colwell, and Christopher Depass. 2007. Task Force St. Bernard: Operational issues and medical management of a National Guard disaster response operation. *Prehospital and Disaster Medicine* 22(5): 440-447.
After Hurricane Katrina struck the Gulf Coast of the United States on 29 August 2005, it became obvious that the country was facing an enormous national emergency. With local resources overwhelmed, governors across the US responded by deploying thousands of National Guard soldiers and airmen. The National Guard has responded to domestic disasters due to natural hazards since its inception, but an event with the magnitude of Hurricane Katrina was unprecedented. The deployment of more than 900 Army National Guard soldiers to St. Bernard Parish, Louisiana, in the aftermath of the hurricane was studied to present some of the operational issues involved with providing medical support for this type of operation. In doing so, the authors attempt to address some of the larger issues of how the National Guard can be incorporated into domestic disaster response efforts. A number of unforeseen issues with regard to medical operations, medical supply, communication, preventive medicine, legal issues, and interactions with civilians were encountered and are reviewed. A better understanding of the National Guard and how it can be utilized more effectively in future disaster response operations can be developed.

Campanella, Richard. 2007. An ethnic geography of New Orleans. *Journal of American History* 94(3): 704-715.
As Hurricane Katrina's surge filled the bowl-shaped metropolis of New Orleans, the simple geography of rising water came face-to-face with the complex human geography of a nearly 300-year-old city. Whose homes were flooded, in terms of race, ethnicity, and class, became the subject of national discussion. This article describes how those residential patterns fell into place beginning in colonial times, and how they were affected by Katrina's flood.

Chambers, Jeffrey Q., Jeremy I. Fisher, Hongcheng Zeng, Elise L. Chapman, David B. Baker, and Geogre C. Hurtt. 2007. Hurricane Katrina's carbon footprint on U.S. Gulf Coast forests. *Science* 318(5853): 1107.
Hurricane Katrina's impact on U.S. Gulf Coast forests was quantified by linking ecological field studies, Landsat and Moderate Resolution Imaging Spectroradiometer (MODIS) image analyses, and empirically based models. Within areas affected by relatively constant wind speed, tree mortality and damage exhibited strong species-controlled gradients. Spatially explicit forest disturbance maps coupled with extrapolation models predicted mortality and severe structural damage to ~320 million large trees totaling 105 teragrams of carbon, representing 50% to 140% of the net annual U.S. forest tree carbon sink. Changes in disturbance regimes from increased storm activity expected under a warming climate will reduce forest biomass stocks, increase ecosystem respiration, and may represent an important positive feedback mechanism to elevated atmospheric carbon dioxide.

Cheng, Chang-Chi, Nien-Sheng Hsu, and Chih-Chiang Wei. 2008. Decision-tree analysis on optimal release of reservoir storage under typhoon warnings. *Natural Hazards* 44(1): 65-84.
The wet and dry seasons are distinctive in Taiwan as the amount of precipitation in wet seasons accounts for over three-fourths of the total rainfall. And the water-resources management relies pretty much on the rainfall brought in by typhoons as it accounts for a significant portion of the precipitation during wet seasons. Furthermore, as

the storage of reservoirs is limited due to topographical factors, the management of typhoon rainfall has always been an important issue in Taiwan. The technique of decision-tree analysis is applied in this article to determine the optimal reservoir release in advance upon the issuance of a typhoon warning by the Central Weather Bureau (CWB), and the proposed methodology may provide solution to the trade-off judgment of reservoir operations between flood control and water supply according to economic efficiency. In this article, the economic loss functions of flooding damage and water-supply shortage are assumed in linear and nonlinear conditions, and the respective expected optimal releases based on the predicted precipitation as issued by CWB are derived. The proposed methodology has been applied to the Shihmen Reservoir System, and the capabilities of the model as an aid to real-time decision making as well as the evaluation of the economic worth of forecasts is presented.

Curtis, Andrew, Jacqueline W. Kennedy, Barrett Mills, Stewart Fotheringham, and Timothy McCarthy. 2007. Understanding the geography of post-traumatic stress: An academic justification for using spatial video acquisition system in the response to Hurricane Katrina. ***Journal of Contingencies and Crisis Management*** **15(4): 208-219.**
In the aftermath of a disaster like Hurricane Katrina, remote-sensing methods are often employed in an effort to assess damage. However, their utility may be limited by the aerial perspective and image resolution. The Spatial Video Acquisition System (SVAS), in conjunction with a geographic information system (GIS), has the potential to be a complementary methodology for obtaining damage assessment information as well as capturing recovery related geographies associated with post-traumatic stress. An example is provided from the Lower Ninth Ward of New Orleans with data that could be used to predict neighborhood post-traumatic stress. Results reveal six dimensions in which a SVAS can improve existing disaster-related data collection approaches: organization, archiving, transferability, evaluation, objectivity, and feasibility.

DeVore, Donald E. 2007. Water in sacred places: Rebuilding New Orleans black churches as sites of community empowerment. ***Journal of American History*** **94(3): 752-761.**

Fussell, Elizabeth. 2007. Constructing New Orleans, constructing race: A population history of New Orleans. ***Journal of American History*** **94(3): 846-857.**

Gaillard, Frye. 2007. After the storms: Tradition and change in Bayou La Batre. ***Journal of American History*** **94(3): 856-862.**

Gaillard, Jean-Christophe, Catherine C. Liamzon, and Jessica D. Villanueva. 2007. 'Natural' disaster? A retrospect into the causes of the late-2004 typhoon disaster in Eastern Luzon, Philippines. ***Environmental Hazards*** **7(4): 257-270.**
Between November 14 and December 4, 2004, four successive tropical depressions and typhoons lashed the eastern coast of Luzon in the Philippines. Heavy rainfall triggered massive landslides and devastating flash floods, which brought tremendous damage and killed more than 1,600 people. Immediately after the disaster, there was a media and political consensus to incrimate 'extraordinary' natural phenomena and widespread deforestation as responsible for the catastrophe. This paper argues that the tragedy that befell the municipalities of General Nakar, Infanta, and Real, among other devastated areas, is enmeshed in a deeper tangle of causal factors that are political, socio-economic, and demographic in nature. These factors include unmanaged population growth, difficult access to land and resources, corruption within the government, and power of the elite.

Germany, Kent B. 2007. The politics of poverty and history: Racial inequality and the long prelude to Katrina. ***Journal of American History*** **94(3): 743-751.**

Green, John J., Anna M. Kleiner, and Jolynn P. Montgomery. 2007. The texture of local disaster response: Service providers' views following Hurricane Katrina. ***Southern Rural Sociology*** **22(2): 28-44.**
Disasters highlight elements of community vulnerability and resiliency. Effective responses are organized and managed to provide goods and services to survivors while also being supportive of the organizations attempting to meet these needs. Collaboration among local service providers, such as nonprofit, faith-based, and governmental organizations, allows communities to build upon internal and external networks and resources to prepare for and respond to disasters. Using a livelihoods framework, the authors analyze 139 qualitative field interviews conducted in the Mississippi Gulf Coast and Southeast Louisiana to learn from the experiences, needs, and recommendations of people working on the front lines of disaster in response to Hurricane Katrina. Narrative information from service providers will help inform sociologists, organizations, and policy makers about the views of practitioners serving as intermediaries between people's everyday lives and broader structures and processes influenced by crisis events.

Green, Rebekah, Lisa K. Bates, and Andrew Smyth. 2007. Impediments to recovery in New Orleans' Upper and Lower Ninth Ward: One year after Hurricane Katrina. ***Disasters*** **31(4): 311-335.**
In the aftermath of Hurricane Katrina, a rapid succession of plans put forward a host of recovery options for the Upper and Lower Ninth Ward in New Orleans. Much of the debate focused on catastrophic damage to residential structures and discussions of the capacity of low-income residents to repair their neighborhoods. This article examines impediments to the current recovery process of the Upper and Lower Ninth Ward, reporting results of an October 2006 survey of 3,211 plots for structural damage, flood damage and post-storm recovery. By examining recovery one year after Hurricane Katrina, and by doing so in the light of flood and structural damage, it is possible to identify impediments to recovery that may disproportionately affect these neighborhoods. This paper concludes with a discussion of how pre- and post-disaster inequalities have slowed recovery in the Lower Ninth Ward and of

the implications this has for post-disaster recovery planning there and elsewhere.

He, Xueqin Elaine, John P. Tiefenbacher, and Eric L. Samson. 2007. Hurricane evacuation behavior in domestic and international college students: The influences of environmental familiarity, expressed hurricane evacuation, and personal experience. ***Journal of Emergency Management*** **5(6): 61-69.**

This study examines the cultural variation of risk perception and attitudes toward emergency evacuation. Although evacuation behavior is a direct consequence of perceived risk, few attempts have been made to consider the cross-cultural differences of evacuation behavior. This article compares domestic American and international university students' familiarity with their residential environments, their expressions of intent to evacuate in advance of hurricanes of varying strength, and their personal experiences with hurricanes and evacuations by examining related variables. Logistic regression was used to analyze the 2007 survey data. Results indicate that international students are more familiar with their residential risk conditions than domestic students. Environmental familiarity correlates positively with students' certainty of future evacuations. The expressed likelihood of evacuation under voluntary order also correlates positively with international and domestic students' certainty of future hurricane evacuation. Past disaster and evacuation experiences contribute to international students' certainty about future responses, but do not affect those of domestic students. Experiences with false alarms determine domestic students' certainty more than international students' future behaviors. Evacuation experiences associated with Hurricane Rita in 2005 increased all students' certainty of future hurricane evacuation.

Hirsch, Arnold L. 2007. Fade to black: Hurricane Katrina and the disappearance of Creole New Orleans. ***Journal of American History*** **94(3): 752-761.**

Ingles, Palma and Heather McIlvaine-Newsad. 2007. Any port in the storm: The effects of Hurricane Katrina on two fishing communities in Louisiana. National Association for the Practice of Anthropology Bulletin 28(1): 69-86. This article is based on research conducted in two fishing communities in Louisiana that were heavily impacted in 2005 by Hurricane Katrina: Grand Isle and the Empire-Venice area. The authors conducted research in June and August 2006 to better understand the impacts of Hurricane Katrina on these communities. Previous research had been conducted in these communities by the same researchers in 2004. The baseline data obtained in 2004 proved invaluable for understanding the nature of the fishing industry in these communities before Hurricane Katrina struck. The 2006 research focused on changes in the fishing industries, the individuals, and the communities following the hurricane. It also examined the challenges for recovery and implications for fishing management in these communities. The two coastal communities in this study are heavily involved in the commercial shrimp fishery that before the storm had been overcapitalized for years. The eye of the storm passed over Empire-Venice and, as a result, this area received more damage than Grand Isle. In both areas, homes were destroyed, boats were sunk, and lives were changed forever. A year later, both areas are still struggling to recover from the hurricane. This article focuses on the methods the authors used for research in these communities after the storm: semi-structured ethnographic interviews, photography, and mapping. It also reports on some of the findings. The authors conducted interviews with fishermen, people who work in fishing-related businesses, and other community members who could provide them with information regarding the impacts of Hurricane Katrina on these communities and the state of the fisheries.

Kelman, Ari. 2007. Boundary issues: Clarifying New Orleans's murky edges. ***Journal of American History*** **94(3):695-703.**

Kingsley, Karen. 2007. New Orleans architecture: Building renewal. ***Journal of American History*** **94(3): 716-725.**

This essay on the architecture of New Orleans looks at certain features of the city—architectural icons, vernacular structures, and nature—and some conflicts they have provoked in the city's renewal of its built fabric. The author has structured the essay as a sequence of vignettes, a composition that reflects the fragmentary nature of the city as it reshapes itself in the aftermath of Hurricane Katrina.

Ladd, Anthony E., Duane A. Gill, and John Marszalek. 2007. Riders from the storm: Disaster narratives of relocated New Orleans college students in the aftermath of Hurricane Katrina. ***Journal of Public Management and Social Policy*** **13(2): 50-80.**

Hurricane Katrina forced the evacuation of some 50,000 college students from New Orleans, as well as the closing of universities and the relocation of over 18,000 of these students to new colleges and universities around the country. While qualitative studies and oral histories of Katrina survivors have recently begun to appear, no research to date has examined the narrative accounts and experiences of college students who evacuated from New Orleans in the wake of this historic disaster. Utilizing qualitative data drawn from a Web-based survey of college students (N=7,100) displaced from their universities in the aftermath of the storm, this paper analyzes a diverse array of individual narratives that illustrate the disaster's salient impacts on their lives and education. These accounts thematically highlight traumatic events associated with students' evacuation and relocation, personal and financial loss, psychological stress, perceptions of recreancy, satisfaction with official disaster responses, educational impacts, and feelings about returning to New Orleans. It concludes by discussing the implications of this work for current disaster research, as well as the value of qualitative research for understanding the "voices of Katrina."

Landphair, Juliette. 2007. "The forgotten people of New Orleans": Community, vulnerability, and the Lower Ninth Ward. ***Journal of American History*** **94(3): 837-845.**

Leong, Karen J., Christopher A. Airriess, Wei Li, Angela Chia-Chen Chen, and Verna M. Keith. 2007. Resilient history and the rebuilding of a community: The Vietnamese American community in New Orleans East. ***Journal of American History*** **94(3): 770-779.**

Levine, Joyce N, Ann-Margaret Esnard, and Alka Sapat. 2007. Population displacement and housing dilemmas due to catastrophic disasters. *Journal of Planning Literature* 22(1): 3-15.

As Hurricane Katrina revealed, coastal communities have become far more vulnerable to tropical storms and the long-term displacement of residents. Yet, because the emergency management model presumes that recovery quickly follows response, governments focus only on short-term, localized displacement. However, long-term and long-distance displacement exposes a gray area between immediate shelter and permanent housing, along with concerns about vulnerability, housing availability, and land development. The authors begin this article by discussing the transition between response and recovery. They review literature regarding social vulnerability, displacement, provision of temporary housing, households' return decisions, and disaster-driven land development and housing construction processes. They close with thoughts on future research to increase planners' understanding of the issues involved and to help them craft effective policies.

Long, Alecia P. 2007. Poverty is the new prostitution: Race, poverty, and public housing in post-Katrina New Orleans. *Journal of American History* 94(3): 795-803.

Marfai, Muh Aris, and Lorenz King. 2008. Tidal inundation mapping under enhanced land subsidence in Semarang, Central Java Indonesia. *Natural Hazards* 44(1): 93-109.

Tidal inundation by high tide under enhanced land subsidence is a damaging phenomenon and a major threat to the Semarang urban area in Indonesia. It impacts on economic activities, as well as the cost of an emergency program, and causes interruption of pubic services, danger of infectious diseases, and injury to human lives. This study examines a spatial analysis tool on the GIS-raster system for the tidal inundation mapping based on the subsidence-benchmark data and modified detail digital elevation model. Neighborhood operation and iteration model as a spatial analysis tool have been applied in order to calculate the encroachment of the tidal inundation on the coastal area. The resulting map shows that the tidal flood spreads to the lowland area and causes the inundation of coastal settlement, infrastructure, as well as productive agricultural land (i.e., the fish-pond area). The monitoring of the vulnerable area due to the tidal inundation under the scenario of extended land subsidence plays an important role in long-term coastal zone management in Semarang.

Miller, DeMond Shondell. 2007. Returning home and uncertainty in the local newspaper: Risk narratives and policy decisions in the immediate aftermath of Hurricane Katrina. *Journal of Public Management and Social Policy* 13(2): 5-21.

This paper focuses on risk-related themes in the context of the local media's portrayal of the environmental dangers present immediately before, during, and after Hurricane Katrina's flooding of New Orleans. The Times Picayune, a local New Orleans newspaper, is used to identify existing patterns in local media coverage throughout this time period. It is the primary assumption of this research that by identifying the patterns in a chronological sequence of events, the hurricane and subsequent flooding will unfold as a risk saga that influenced public policy during an unstable period in the United States' disaster history. Specifically, this research describes the relationships among the differing types of uncertainties, such as general, legal-moral, social, institutional, and those determined by the rights or interests of property and privacy, to chronicle the events of Hurricane Katrina and construct a risk narrative that shapes local opinion and impacts public policy decisions, specifically regarding survivors' ability to return.

Miller, Lee M. 2007. Collective disaster response to Katrina and Rita: Exploring therapeutic community, social capital and social control. *Southern Rural Sociology* 22(2): 45-63.

The goal of this paper is to explore the dynamics of one East Texas community's responses to Hurricanes Katrina and Rita. Literature on community response to disaster forms a basis for reflections on observed local response activities, including convergence behavior. In particular, the concept of social capital is compared to, and contrasted with, Barton's model of therapeutic community. Social control is a relatively unexplored element of social capital, but one that helps us understand the development of normative frameworks, generalized trust, and the perceived legitimacy of institutions—important factors in effective community response to disasters. In conclusion, implications for future preparedness are mentioned.

Otte, Marline. 2007. The mourning after: Languages of loss and grief in post-Katrina New Orleans. *Journal of American History* 94(3): 828-836.

The following essay is as much a testimony to, as a testimony of, the post-Hurricane Katrina era in New Orleans. First formulated about four months after the author's return to New Orleans in January 2006, this essay was written in transitional times, when many returnees felt compelled to share their thoughts and coping strategies after months of isolation and displacement. For the more fortunate ones, the Katrina drama unfolded in three distinct acts: a hasty evacuation, a shocking return to the ruined city, and an arduous path toward the restoration of former lives. The author documents how others managed their passage through those distinct periods, as a smooth transition from one to the next could not be taken for granted. She also discusses the coping mechanisms that individuals developed in post-Katrina New Orleans, what was the relationship between individual and collective memory in this disaster, and what prevented many from experiencing and processing their trauma collectively?

Pielke, Roger A., Joel Gratz, Christopher W. Collins, Douglas Landsea, Mark A. Musulin, and Rade Saunders. 2008. Normalized hurricane damage in the United States: 1900-2005. *Natural Hazards Review* 9(1): 29-42.

After more than two decades of relatively little Atlantic hurricane activity, the past decade saw heightened hurricane activity and more than $150 billion in damage in 2004 and 2005. This paper normalizes mainland U.S. hurricane damage from 1900 to 2005 values using two

methodologies. A normalization provides an estimate of the damage that would occur if storms from the past made landfall under another year's societal conditions. Our methods use changes in inflation and wealth at the national level and changes in population and housing units at the coastal county level. Across both normalization methods, there is no remaining trend of increasing absolute damage in the data set, which follows the lack of trends in landfall frequency or intensity observed over the twentieth century. The 1970s and 1980s were notable because of the extremely low amounts of damage compared to other decades. The decade 1996 to 2005 has the second most damage among the past 11 decades, with only the decade 1926 to 1935 surpassing its costs. Over the 106 years of record, the average annual normalized damage in the continental United States is about $10 billion under both methods. The most damaging single storm is the 1926 Great Miami storm, with $140-157 billion of normalized damage: the most damaging years are 1926 and 2005. Of the total damage, about 85% is accounted for by the intense hurricanes (Saffir-Simpson Categories 3, 4, and 5), yet these have comprised only 24% of the U.S. landfalling tropical cyclones. Unless action is taken to address the growing concentration of people and properties in coastal areas where hurricanes strike, damage will increase, and by a great deal, as more and wealthier people increasingly inhabit these coastal locations.

Powell, Lawrence. 2007. What does American history tell us about Katrina and vice versa? *Journal of American History* 94(3): 863-876.

Raeburn, Bruce Boyd. 2007. "They're tryin' to wash us away": New Orleans musicians surviving Katrina. *Journal of American History* 94(3): 812-819.
This historical look at New Orleans shows how one can learn much about the city by looking at how musicians respond to disaster and inquiring into how repertoire, the experience of exile, and the urban cultural environment have been affected by cataclysmic events, now and in the past.

Rojek, Jeff, and Michael R. Smith. 2007. Law enforcement lessons learned from Hurricane Katrina. *Review of Policy Research* 24(6): 589-608.
Major disasters represent infrequent events that often require response organizations to vicariously learn from the experiences of others in order to improve their operations. A primary mechanism for such knowledge diffusion is the different practitioner and empirical journals for the organizational fields that comprise disaster response. A review of the literature for the law enforcement field, however, reveals that little attention is given to how these organizations manage actual disasters. In particular, the presentation of organizational experiences, whether through case studies or other methodologies, is very limited in the practitioner and empirical literature of this field. This represents a considerable problem for improvements of disaster response operations given that law enforcement agencies represent a key component in such efforts. The research presented in this article is an effort to fill this knowledge gap and thereby facilitate organizational learning to improve future law enforcement disaster response activities. The authors traveled to Mississippi and Louisiana after Hurricane Katrina to examine the response efforts of state and local law enforcement agencies to the storm. The findings from this research are reported here in a lessons-learned format to inform law enforcement disaster response policy.

Slepski, Lynn A. 2007. Emergency preparedness and professional competency among health care providers during Hurricanes Katrina and Rita: Pilot study results. *Disaster Management and Response* 5(4): 99-110.
To date, no systematic examination of the preparedness of individual health care providers and their response capabilities during a large-scale disaster has been conducted. As a result, very little is known about what knowledge, skills and abilities, or professional competencies are needed, or how professional competency requirements may change depending on the circumstances of a disaster. The objective of this pilot study was to collect, explore, and describe background data on professional competencies from health care providers who were involved in the Hurricanes Katrina and/or Rita disaster responses. Utilizing an anonymous survey of a convenience sample, 200 health care providers attending two disaster conferences were asked to respond to open-ended questions about the competencies they needed and performed during their disaster response. Of the 200 respondents, registered nurses (37%) and physicians (24%) were the largest categories of providers. Basic clinical care (39%) and triage (26%) were the most frequent response skills reported; the areas wherein respondents felt least prepared were disaster-specific response skills (22%) and systems issues (34%). Only 22% of respondents reported that they did not know a specific skill. The 200 respondents made 495 individual recommendations for future responders, including actions to improve the respondent's personal preparedness (23%) and the need for training (25%). However, only 3% of the recommendations (n=15) actually identified a specific type of training such as Advanced Cardiac Life Support or triage. Few respondents reported knowledge deficits. Rather, what they described was an abrupt change or transition from their everyday practice worlds that required accommodation in order to practice effectively. Current training programs generally focus on providing skills information. Further research is required to determine if training programs should address facilitating the transition process.

Souther, J. Mark. 2007. The Disneyfication of New Orleans: The French Quarter as facade in a divided city. *Journal of American History* 94(3): 804-811.

Thornton, William E., and Lydia Voigt. 2007. Disaster rape: Vulnerability of women to sexual assaults during Hurricane Katrina. *Journal of Public Management and Social Policy* 13(2): 23-49.
The relative lack of status, power, and resources put many women at risk of being sexually assaulted during Hurricane Katrina. Controversy still remains regarding the actual incidence of rapes that took place and are still occurring. The "Katrina Disaster" represents a multi-impact series of catastrophes (i.e., Hurricane Katrina, several

levee breeches, an oil spill, a chemical storage facility explosion, and Hurricane Rita) that together have produced cumulative disaster effects unlike any in the history of the United States. The complete breakdown of law and order during the early phases of the Katrina disaster, when normal crime reporting mechanisms were non-existent, created an atmosphere for the emergence of rumors about rape and other crimes that were widely distributed in the media only to be later recanted. Even though many early reports were dismissed, sexual assaults did occur. This study examines official reports, victim self reports, and narratives of first-responders and victim advocates regarding rapes and other sexual assaults that occurred during Katrina and its aftermath in New Orleans and other areas where storm victims evacuated. This paper contributes to disaster research by capturing the unique characteristics of the Katrina disaster and identifying the special vulnerabilities of women during different phases of this multi-disaster event.

Tootle, Deborah M. 2007. Disaster recovery in rural communities: A case study of southwest Louisiana. ***Southern Rural Sociology*** **22(2): 6-27.**
This paper provides a descriptive case study to develop a better understanding of the disaster recovery and rebuilding process in the three parishes (counties) in South Louisiana that were hardest hit by Hurricane Rita in 2005. The data come from a number of sources: official documents, news articles, published data, and personal observations. This case study's implications raise questions about current approaches to disaster recovery. It also suggests strategies for practice, program development, and policy.

Tyler, Pamela. 2007. The post-Katrina, semi-separate world of gender politics. ***Journal of American History*** **94(3): 780-788.**
When the New York Times reported "a wave of citizen activism" in New Orleans after Hurricane Katrina, it failed to mention that much of the wave was wearing lipstick and carrying a purse. Mopping up is, and always has been, women's work, so it comes as no surprise that large numbers of local women were active in post-Katrina recovery efforts in New Orleans. While some worked singly, volunteering their help in countless ways, others chose the timeworn path of women's associations. This essay focuses on the activities of three organizations formed by women after the hurricane: Citizens for 1 Greater New Orleans, the Katrina Krewe, and Women of the Storm.

Vigdor, Jacob L. 2007. The Katrina effect: Was there a bright side to the evacuation of Greater New Orleans? ***The B.E. Journal of Economic Analysis and Policy*** **7(1).**
This paper uses longitudinal data from Current Population Surveys conducted between 2004 and 2006 to estimate the net impact of Hurricane Katrina-related evacuation on various indicators of well-being. While evacuees who have returned to the affected region show evidence of returning to normalcy in terms of labor supply and earnings, those who persisted in other locations exhibit large and persistent gaps, even relative to the poor outcomes of individuals destined to become evacuees observed prior to Katrina. Evacuee outcomes are not demonstrably better in destination communities with lower initial unemployment or higher growth rates. The impact of evacuation on total income was blunted to some extent by government transfer payments and by self-employment activities. Overall, there is little evidence to support the notion that poor underemployed residents of the New Orleans area were disadvantaged by their location in a relatively depressed region.

Wang, Philip S., Michael J. Gruber, Richard E. Powers, Michael Schoenbaum, Anthony H. Wells, Kenneth B. Kessler, and Ronald C. Speier. 2008. Disruption of existing mental health treatments and failure to initiate new treatment after Hurricane Katrina. ***American Journal of Psychiatry*** **165: 34-41.**
The authors examined the disruption of ongoing treatments among individuals with preexisting mental disorders and the failure to initiate treatment among individuals with new-onset mental disorders in the aftermath of Hurricane Katrina. English-speaking adult Katrina survivors (N=1,043) responded to a telephone survey administered between January and March of 2006. The survey assessed post-hurricane treatment of emotional problems and barriers to treatment among respondents with preexisting mental disorders as well as those with new-onset disorders post-hurricane. Among respondents with preexisting mental disorders who reported using mental health services in the year before the hurricane, 22.9% experienced reduction in or termination of treatment after Katrina. Among those respondents without preexisting mental disorders who developed new-onset disorders after the hurricane, 18.5% received some form of treatment for emotional problems. Reasons for failing to continue treatment among preexisting cases primarily involved structural barriers to treatment, while reasons for failing to seek treatment among new-onset cases primarily involved low perceived need for treatment. The majority (64.5%) of respondents receiving treatment post-Katrina were treated by general medical providers and received medication but no psychotherapy. Treatment of new-onset cases was positively related to age and income, while continued treatment of preexisting cases was positively related to race/ethnicity (non-Hispanic whites) and having health insurance. Many Hurricane Katrina survivors with mental disorders experienced unmet treatment needs, including frequent disruptions of existing care and widespread failure to initiate treatment for new-onset disorders. Future disaster management plans should anticipate both types of treatment needs.

White, Michael G. 2007. Reflections of an authentic jazz life in pre-Katrina New Orleans. ***Journal of American History*** **94(3): 820-827.**

Information and Spatial Technology

Chambers, Jeffrey Q., Jeremy I. Fisher, Hongcheng Zeng, Elise L. Chapman, David B. Baker, and Geogre C. Hurtt. 2007. Hurricane Katrina's carbon footprint on U.S. Gulf Coast forests. ***Science*** **318(5853): 1107.**
Hurricane Katrina's impact on U.S. Gulf Coast forests was quantified by linking ecological field studies, Landsat and Moderate Resolution Imaging Spectroradiometer (MODIS)

image analyses, and empirically based models. Within areas affected by relatively constant wind speed, tree mortality and damage exhibited strong species-controlled gradients. Spatially explicit forest disturbance maps coupled with extrapolation models predicted mortality and severe structural damage to ~320 million large trees totaling 105 teragrams of carbon, representing 50% to 140% of the net annual U.S. forest tree carbon sink. Changes in disturbance regimes from increased storm activity expected under a warming climate will reduce forest biomass stocks, increase ecosystem respiration, and may represent an important positive feedback mechanism to elevated atmospheric carbon dioxide.

Curtis, Andrew, Jacqueline W. Kennedy, Barrett Mills, Stewart Fotheringham, and Timothy McCarthy. 2007. Understanding the geography of post-traumatic stress: An academic justification for using spatial video acquisition system in the response to Hurricane Katrina. ***Journal of Contingencies and Crisis Management*** **15(4): 208-219.**
In the aftermath of a disaster like Hurricane Katrina, remote-sensing methods are often employed in an effort to assess damage. However, their utility may be limited by the aerial perspective and image resolution. The Spatial Video Acquisition System (SVAS), in conjunction with a Geographic Information System (GIS), has the potential to be a complementary methodology for obtaining damage assessment information as well as capturing recovery related geographies associated with post-traumatic stress. An example is provided from the Lower 9th Ward of New Orleans with data that could be used to predict neighborhood post-traumatic stress. Results reveal six dimensions in which a SVAS can improve existing disaster-related data collection approaches: organization, archiving, transferability, evaluation, objectivity, and feasibility.

Deka, Ranjan, A. K Pachauri, and Bharat Bhushan. 2007. Spatial recognition of a rock fall velocity model developed in C++ using Geographic Information Sciences (GIS). ***Disaster Prevention and Management*** **16(5): 771-784.**
The purpose of this paper is to strive to develop a rock fall velocity model in C++ language and to give spatial attributes to the model using Geographic Information System (GIS) capabilities. Interaction between the parameters involved in the model is evaluated through GIS embedded techniques. The mathematical model developed in C++ is based on the physical law of gravitation pull, adjudging the potential fall between two points at different elevation. Further, parameters influencing the velocity gradient namely local relief, coefficient of land use friction, slope amount and slope length are incorporated in the model. GIS is used extensively to generate the data required for the model. GIS capabilities are also explored for visualization and interpretation of the model output. Section profiles and a co-relation coefficient further strengthen the velocity map. The rock fall velocity map generated using GIS shows variations in the velocity gradient at selected sections. It is concluded from analysis that friction values play a pivotal role in drastically changing the velocity gradient. The model presented is restricted to rock fall velocity evaluation for a rectangular matrix of input data and spatial extent, rather than for specific locations. Incorporating parameters to delineate source areas and runout zones would produce a more realistic scenario. Trials along this line are in progress and are expected to be executed successfully very shortly. The paper presents a versatile model with easily extractable parameters to compute rock fall velocity at a regional scale, conditioned for rugged terrain. The model has specific implications in infrastructure development and planning management for rocky terrain. Moreover, the model's output can be implemented effectively in preliminary investigations of the protection of forest development and erecting defensive measures in rock fall-prone areas.

Ding, Aiju , James F. Ullman, Paul W. Fashokun, Adebola O. White. 2008. Evaluation of HAZUS-MH flood model with local data and other program. ***Natural Hazards Review*** **9(1): 20-28.**
This paper presents an evaluation of the HAZUS-MH flood model conducted as part of the Harris County Risk Assessment Program completed in November, 2005. The county wide analysis proved the capability of the HAZUS-MH software for a large urban county application. For the pilot watershed study, the HAZUS-MH Level 1 analysis was quick and least costly. However, the loss estimates may be questionable. The Level 2 analysis produced much more reasonable loss estimates than the Level 1 analysis when compared with other detailed analyses. HAZUS-MH Level 2 estimated $179 million for 1% probability event and $286 million for 0.2% probability event building related economic loss for residential properties in White Oak Bayou watershed. This compares well with the results of the Section 211 Federal Flood Control Project: General Reevaluation Report study for the same area of $153 million for 1% and $292 million for 0.2% loss estimates. Both the building damage count and loss estimates from HAZUS-MH Level 2 showed a linear correlation with the Federal Flood Control Project results (R2=0.9997 for building damage count and R2=0.9786 for loss estimate). Based on comparison in this study, a HAZUS-MH Level 2 analysis appears to be a better, more cost-effective approach to achieve reliable results for risks assessment and mitigation planning.

Gordon, Janey. 2007. The mobile phone and the public sphere: Mobile phone usage in three critical situations. Convergence. ***The International Journal of Research into New Media Techniques*** **13(3): 307-319.**
This article seeks to explore the influence of the mobile phone on the public sphere, in particular with regard to its effect on news agendas, gatekeepers and primary definers. Using the examples of the Chinese SARS outbreak (2003), the southeast Asian tsunami (December 2004) and the London bombings (July 2005), the author questions the extent to which the mobile phone is challenging conventional and official sources of information. At times of national and personal calamity, the mobile phone is used to document and report events from eyewitnesses and those closely involved. Using multimedia messages (MMS) or text messages (SMS) to communities of friends and families, as well as audio phone calls, mobile phone users may precede and scoop official sources and thwart

censorship and news blackouts. They can also provide valuable evidence of what actually occurred. Users are able to take pictures and short films and transmit these rapidly to others along with reports of what is happening where they are. They are also able to access other media broadcasts and the internet. They are what have become known as `citizen journalists'. The evidence suggests that mobile phone usage is contributing to the public sphere and in some instances is circumventing official repression or inadequate information. There is also an indication that the `mobcam' is capturing images that would otherwise be lost. However, the mainstream media have been quick to take advantage of this citizen journalism and mediate it within its own parameters.

Gullu, Hamza, Atilla M. Ozbay, and Aydin Ansal. 2008. Seismic hazard studies for Gaziantep city in South Anatolia of Turkey. ***Natural Hazards*** **44(1): 19-50.**
Seismic hazard studies were conducted for Gaziantep city in the South Anatolia of Turkey. For this purpose, a new attenuation relationship was developed using the data of Zaré and Bard and accelerations were predicted employing this new equation. Deterministic approach, total probability theorem and GIS methodology were all together utilized for the seismic assessments. Seismic hazard maps with 0.25° grid intervals considering the site conditions were produced by the GIS technique. The results indicated that the acceleration values by the GIS hazard modelings were matched with the ones from the deterministic approach, however, they were underestimated comparing with the total probability theorem. In addition, the GIS based seismic hazard maps showed that the current seismic map of Turkey fairly yields conservative acceleration values for the Gaziantep region. Therefore, the constructed GIS hazard models are offered as a base map for a further modification of the current seismic hazard map.

Liu, Brooke Fisher. 2008. Online disaster preparation: Evaluation of state emergency management web sites. ***Natural Hazards Review*** **9(1): 43-48.**
The purpose of this study is to provide a baseline of information available on state emergency management Web sites. Through a content analysis of all 50 state emergency management Web sites, the study examines four variables identified in the literature as important markers of effective electronic government communication: democratic outreach, information content, outreach to special needs populations, and intergovernmental relations. The results from this study provide a baseline for future research on state emergency management communication and provide insights into how state emergency management agencies can improve their Web sites.

Marfai, Muh Aris, and Lorenz King. 2008. Tidal inundation mapping under enhanced land subsidence in Semarang, Central Java Indonesia. ***Natural Hazards*** **44(1): 93-109.**
Tidal inundation by high tide under enhanced land subsidence is a damaging phenomenon and a major threat to the Semarang urban area in Indonesia. It impacts on economic activities, as well as the cost of an emergency program, and causes interruption of pubic services, danger of infectious diseases, and injury to human lives. This study examines a spatial analysis tool on the GIS-raster system for the tidal inundation mapping based on the subsidence-benchmark data and modified detail digital elevation model. Neighborhood operation and iteration model as a spatial analysis tool have been applied in order to calculate the encroachment of the tidal inundation on the coastal area. The resulting map shows that the tidal flood spreads to the lowland area and causes the inundation of coastal settlement, infrastructure, as well as productive agricultural land (i.e., the fish-pond area). The monitoring of the vulnerable area due to the tidal inundation under the scenario of extended land subsidence plays an important role in long-term coastal zone management in Semarang.

Marincioni, Fausto. 2007. Information technologies and the sharing of disaster knowledge: The critical role of professional culture. ***Disasters*** **31(4): 459-476.**
A comparative survey of a diverse sample of 96 U.S. and Italian emergency management agencies shows that the diffusion of new information technologies (IT) has transformed disaster communications. Although these technologies permit access to and the dissemination of massive amounts of disaster information with unprecedented speed and efficiency, barriers rooted in the various professional cultures still hinder the sharing of disaster knowledge. To be effective the available IT must be attuned to the unique settings and professional cultures of the local emergency management communities. Findings show that available technology, context, professional culture and interaction are key factors that affect the knowledge transfer process. Cultural filters appear to influence emergency managers' perceptions of their own professional roles, their vision of the applicability of technology to social issues, and their perspective on the transferability of disaster knowledge. Four cultural approaches to the application of IT to disaster communications are defined: technocentric, geographic, anthropocentric, and ecocentric.

McDonnell, Sharon M., Helen N. Perry, Brooke McLaughlin, Bronwen McCurdy, and Gibson Parrish. 2007. Information for disasters, information disasters, and disastrous information. ***Prehospital and Disaster Medicine*** **22(5): 406-413.**
Information is needed to support humanitarian responses in every phase of a disaster. Participants of a multilateral working group convened to examine how best to meet these information needs. Although information systems based on routine reporting of diseases are desirable because they have the potential to identify trends, these systems usually do not deliver on their promise due to inadequate organization and management to support them. To identify organizational and management characteristics likely to be associated with successful information systems in disaster settings, evaluations of the Integrated Disease Surveillance and Response (IDSR) programs in 12 participating countries were reviewed. Characteristics that were mentioned repeatedly in the evaluations as associated with success were grouped into nine categories: 1) human resources management and supervision; 2) political support; 3) strengthened laboratory capacity; 4) communication and feedback (through many mechanisms); 5) infrastructure and resources; 6) system design and capac-

ity; 7) coordination and partnerships with stakeholders; 8) community input; and 9) evaluation. Selected characteristics and issues within each category are discussed. Based on the review of the IDSR evaluations and selected articles in the published literature, recommendations are provided for improving the short- and long-term organization and management of information systems in humanitarian responses associated with disasters. It is suggested that information systems that follow these recommendations are more likely to yield quality information and be suitable even in disaster settings.

Ruin, Isabelle, Jean-Christophe Gaillard, and Celine Lutoff. 2007. How to get there? Assessing motorists' flash flood risk perception on daily itineraries. ***Environmental Hazards*** **7(3): 235-244.**

Flash floods are characterized by their suddenness, fast and violent movement, rarity, and small scale but high level of damage. They are particularly difficult to forecast accurately, and there is little lead time for warning. This makes motorists especially vulnerable. Assuming that these flash flood hazard specificities may be significant factors leading to difficulties for drivers to perceive danger, the authors used cognitive mapping combined with GIS data processing to assess motorists' flash flood risk perception in their daily itineraries. The analysis of 200 mental maps collected allows planners to have maps highlighting dangerous areas where risk perception is weak and to identify reasons for this.

Speakman, Dorian. 2008. Mapping flood pressure points: Assessing vulnerability of the UK Fire Service to flooding. ***Natural Hazards*** **44(1): 111-127.**

A vulnerability index for the Fire Service in the UK has been designed to identify vulnerable locations during episodes of severe floods. Taking recent case studies with the UK Fire Service, the patterns of vulnerability, in terms of demand on time and resources, can be explained by investigating the environmental causes and their interaction with the adaptive capacity of the response agencies.

Insurance and Economic Impacts

De Lorenzo, Robert A. 2007. Financing hospital disaster preparedness. ***Prehospital and Disaster Medicine*** **22(5): 436-439.**

Disaster preparedness and response have gained increased attention in the United States as a result of terrorism and disaster threats. However, funding of hospital preparedness, especially surge capacity, has lagged behind other preparedness priorities. Only a small portion of the money allocated for national preparedness is directed toward health care, and hospitals receive very little of that. Under current policy, virtually the entire funding stream for hospital preparedness comes from general tax revenues. Medical payers directly fund little, if any, of the current bill. Funding options to improve preparedness include increasing the current federal grants allocated to hospitals, using payer fees or a tax to subsidize preparedness, and financing other forms of expansion capability, such as mobile hospitals. Alternatively, the status quo of marginal preparedness can be maintained. In any event, achieving higher levels of preparedness likely will take the combined commitment of the hospital industry, public and private payers, and federal, state and local governments. Ultimately, then costs of preparedness will be borne by the public in the form of taxes, higher healthcare costs, or through the acceptance of greater risk.

Ding, Aiju , James F. Ullman, Paul W. Fashokun, and Adebola O. White. 2008. Evaluation of HAZUS-MH flood model with local data and other program. ***Natural Hazards Review*** **9(1): 20-28.**

This paper presents an evaluation of the HAZUS-MH flood model conducted as part of the Harris County Risk Assessment Program completed in November 2005. The county-wide analysis proved the capability of the HAZUS-MH software for a large urban county application. For the pilot watershed study, the HAZUS-MH Level 1 analysis was quick and least costly. However, the loss estimates may be questionable. The Level 2 analysis produced much more reasonable loss estimates than the Level 1 analysis when compared with other detailed analyses. HAZUS-MH Level 2 estimated $179 million for 1% probability event and $286 million for 0.2% probability event building related economic loss for residential properties in White Oak Bayou watershed. This compares well with the results of the Section 211 Federal Flood Control Project: General Reevaluation Report study for the same area of $153 million for 1% and $292 million for 0.2% loss estimates. Both the building damage count and loss estimates from HAZUS-MH Level 2 showed a linear correlation with the Federal Flood Control Project results (R2=0.9997 for building damage count and R2=0.9786 for loss estimate). Based on comparison in this study, a HAZUS-MH Level 2 analysis appears to be a better, more cost-effective approach to achieve reliable results for risks assessment and mitigation planning.

Kunreuther, C. Howard, O. Erwann, and O. Michel-Kerjan. 2007. Climate change, insurability of large-scale disasters, and the emerging liability challenge. ***University of Pennsylvania Law Review*** **155(6): 1795-1842.**

This article focuses on the interaction between uncertainty and insurability in the context of some of the risks associated with climate change. It discusses the evolution of insured losses due to weather-related disasters over the past decade and the key drivers of the sharp increases in both economic and insured catastrophe losses over the past 20 years. In particular, the authors examine the impact of development in hazard-prone areas and of global warming on the potential for catastrophic losses in the future. In this context, the authors discuss the implications for insurance risk capital and the capacity of the insurance industry to handle large-scale events. A key question that needs to be addressed is which factors determine the insurability of a risk and the extent of coverage offered by the private sector to provide protection against extreme events when there is significant uncertainty surrounding the probability and consequences of a catastrophic loss. The authors further discuss the concepts of insurability by focusing on coverage for natural hazards, such as earthquakes, hurricanes, and floods. The article also focuses on the liability issues associated with global climate change and possible

implications for insurers, including issuers of Directors' and Officers' policies, given the difficulty in identifying potential defendants, tracing harm to their actions, and apportioning damages among them. The article concludes by suggesting ways that insurers can help mitigate future damages from global climate change by providing premium reductions and rate credits to companies investing in risk-reducing measures.

Padrone, Marzia and Kanti Donatella. 2007. Is game theory a useful tool for terrorism insurance? ***International Journal of Risk Assessment and Management*** **7(8): 1176-1190.**
This paper addresses the topic of terrorism insurance. Financial markets and international institutions believe that terrorism risk modeling falls short of making the likelihood of future attacks more predictable and quantifiable. The authors present the literature of research in the domain of game theory applied to terrorism insurance, and scrutinize the possibility of using evolutionary game theory and they put forward the theoretical and practical issues that need to be addressed before reaching a satisfactory modeling framework to be used by the sector.

Pielke, Roger A., Joel Gratz, Christopher W. Collins, Douglas Landsea, Mark A. Musulin, and Rade Saunders. 2008. Normalized hurricane damage in the United States: 1900-2005. ***Natural Hazards Review*** **9(1): 29-42.**
After more than two decades of relatively little Atlantic hurricane activity, the past decade saw heightened hurricane activity and more than $150 billion in damage in 2004 and 2005. This paper normalizes mainland U.S. hurricane damage from 1900 to 2005 values using two methodologies. A normalization provides an estimate of the damage that would occur if storms from the past made landfall under another year's societal conditions. Our methods use changes in inflation and wealth at the national level and changes in population and housing units at the coastal county level. Across both normalization methods, there is no remaining trend of increasing absolute damage in the data set, which follows the lack of trends in landfall frequency or intensity observed over the twentieth century. The 1970s and 1980s were notable because of the extremely low amounts of damage compared to other decades. The decade 1996 to 2005 has the second most damage among the past 11 decades, with only the decade 1926 to 1935 surpassing its costs. Over the 106 years of record, the average annual normalized damage in the continental United States is about $10 billion under both methods. The most damaging single storm is the 1926 Great Miami storm, with $140-157 billion of normalized damage: the most damaging years are 1926 and 2005. Of the total damage, about 85% is accounted for by the intense hurricanes (Saffir-Simpson Categories 3, 4, and 5), yet these have comprised only 24% of the U.S. landfalling tropical cyclones. Unless action is taken to address the growing concentration of people and properties in coastal areas where hurricanes strike, damage will increase, and by a great deal, as more and wealthier people increasingly inhabit these coastal locations.

Raschky, Paul A., and Hannelore Week-Hannemann. 2007. Charity hazard: A real hazard to natural disaster insurance. ***Environmental Hazards*** **7(4): 321-329.**
After the flooding in 2002, European governments provided billions of Euros of financial assistance to their citizens. Although there is no doubt that solidarity and some sort of assistance are reasonable, the question arises as to why these damages were not sufficiently insured. One explanation why individuals reject insurance coverage against natural hazards is that they anticipate governmental and private aid. This problem came to be known as "charity hazard." This present paper gives an economic analysis of the institutional arrangements on the market for natural disaster insurances focusing on imperfections caused by governmental financial relief. This paper provides a review of the scientific discussion on charity hazard, provides a theoretical analysis, and points out the existing empirical problems regarding this issue.

Rose, Adam. 2007. Economic resilience to natural and man-made disasters: Multidisciplinary origins and contextual dimensions. ***Environmental Hazards*** **7(4): 383-398.**
Economic resilience is a major way to reduce losses from disasters. Its effectiveness would be further enhanced if it could be precisely defined and measured. This paper distinguishes static economic resilience—efficient allocation of existing resources—from dynamic economic resilience—speeding recovery through repair and reconstruction of the capital stock. Operational definitions are put forth that incorporate this important distinction. The consistency of the definitions is examined in relation to antecedents from several disciplines. The effectiveness of economic resilience is evaluated on the basis of recent empirical studies. In addition, its potential to be enhanced and eroded is analyzed in various contexts.

Landslides and Avalanches

Beroya, M. A., and A. Aydin. 2007. First-level liquefaction hazard mapping of Laoag City, Northern Philippines. ***Natural Hazards*** **43(3): 415-430.**
During the 1990 Luzon earthquake, the central part of Luzon Island, Philippines, suffered much from liquefaction-related processes. Examination of inventories shows that the affected areas lie on certain geological environments that are characteristically vulnerable to liquefaction. Based on this local experience and the findings of earlier workers correlating geological setting with liquefaction susceptibility, a first-level map of liquefaction hazard for Laoag City, Northern Philippines, was produced. Distinct micro-geomorphological units were identified within the mainly fluvio-deltaic setting of the study area. The liquefaction susceptibility of each unit was then ranked as high, moderate, low, or non-liquefiable, taking also the geomorphological evolution of the area into account. The geomorphological model of the fluvio-deltaic basin was tested against the results of the georesistivity survey carried out in this study. Moreover, compatibility of the liquefaction susceptibility map with historical liquefaction records supported the validity of the proposed ranking. The study showed that microzonation based on geomorphological criteria is indeed very useful in less-developed countries

like the Philippines, where funds for a more rigorous determination of liquefaction potential are limited and not always available.

Deka, Ranjan, A. K. Pachauri, and Bharat Bhushan. 2007. Spatial recognition of a rock fall velocity model developed in C++ using geographic information sciences (GIS). ***Disaster Prevention and Management*** **16(5): 771-784.**
The purpose of this paper is to strive to develop a rock fall velocity model in C++ language and to give spatial attributes to the model using geographic information system (GIS) capabilities. Interaction between the parameters involved in the model is evaluated through GIS embedded techniques. The mathematical model developed in C++ is based on the physical law of gravitation pull, adjudging the potential fall between two points at different elevation. Further, parameters influencing the velocity gradient, namely local relief, coefficient of land use friction, slope amount and slope length are incorporated in the model. GIS is used extensively to generate the data required for the model. GIS capabilities are also explored for visualization and interpretation of the model output. Section profiles and a co-relation coefficient further strengthen the velocity map. The rock fall velocity map generated using GIS shows variations in the velocity gradient at selected sections. It is concluded from analysis that friction values play a pivotal role in drastically changing the velocity gradient. The model presented is restricted to rock fall velocity evaluation for a rectangular matrix of input data and spatial extent, rather than for specific locations. Incorporating parameters to delineate source areas and runout zones would produce a more realistic scenario. Trials along this line are in progress and are expected to be executed successfully very shortly. The paper presents a versatile model with easily extractable parameters to compute rock fall velocity at a regional scale, conditioned for rugged terrain. The model has specific implications in infrastructure development and planning management for rocky terrain. Moreover, the model's output can be implemented effectively in preliminary investigations of the protection of forest development and erecting defensive measures in rock fall-prone areas.

Gentile, Francesco, Tiziana Bisantino, and Giuliana Trisorio Liuzzi. 2008. Debris-flow risk analysis in south Gargano watersheds (Southern Italy). ***Natural Hazards*** **44(1): 1-17.**
This article describes a methodology to analyze debris-flow risk in the torrential watersheds of the southern hillside of Gargano (Puglia, Italy). The approach integrates a stability model that identifies the areas of potential shallow landslides in different meteorological conditions with a two-dimensional flood routing model that allows hazard mapping and GIS interface. The results were combined with a susceptibility map that was defined by analyzing the vulnerability conditions and the exposure of the alluvial fan. The models were calibrated on the July 1972 catastrophic event for which the distribution of rainstorm intensity was available. The geo-mechanical properties of the debris were studied by field surveys and laboratory tests while the sediment source areas and the shape of the alluvial cone were obtained using photo-aerial interpretation. The risk conditions of the areas under consideration were also investigated in order to plan and guide measures aimed at limiting the damage such hazards may cause.

Lam, Carlos, Mau-Roung Lin, Shin-Han Tsai, Cheuk-Sing Choy, and Wen-Ta Chiu. 2007. Comparison of the expectations of residents and rescue providers of community emergency medical response after mudslide disasters. ***Disasters*** **31(4): 405-416.**
The integration of community resources is critical for emergency response. A thorough understanding of a community's requirements in advance is essential. This study examines communities that suffered mudslide disasters, and discusses expectations of the emergency medical response provided to the community from the perspectives of residents and rescue groups. The questionnaire used in the study was designed to adopt the Likert Scale for quantification purposes. Its content was divided into six categories based on emergency response. Both residents and rescue providers acknowledged that finance and reimbursement were the highest priority. Public information was regarded as the least important by both groups. Significant differences existed between the groups on patient care activities and supportive activities ($P = 0.02$ and 0.03, respectively), which were more appreciated by residents. The authors conclude that residents had higher expectations of evacuation, temporary relocation, lodging, food, and sanitary management than the rescue groups.

Public Health, Mental Health, and Emergency Medicine

Ablah, Elizabeth, Annie M. Konda, Kurt Tinius, Carolyn Synovitz, and Italo Subbarao. 2007. Regional health system response to the 2007 Greensburg, Kansas, EF5 tornado. ***Disaster Medicine and Public Health Preparedness*** **1(2): 90-95.**
On May 4, 2007 an EF5 tornado hit the rural community of Greensburg, Kansas, destroying 95% of the town and resulting in 12 fatalities. Data was requested from the emergency medical services units that initially responded and the regional hospitals that received people injured in the tornado within 24 hours following the tornado. Requested data included patient age and sex, and injury severity score or ICD-9 codes. Critical mortality, or the number of deaths of critically injured patients, was also calculated. The extensive damage caused by the tornado effectively destroyed the infrastructure of the community and created enormous challenges for emergency medical services responders, who were unable to record any triage data. Area hospitals treated 90 patients, who had an average injury severity score of 6.4. Age was found to be related to injury severity, but no relationship between sex and injury severity was found. Critical mortality was found to be 18% for this event. Injury severity score has seldom been used to analyze natural disasters, especially tornadoes, although such analysis is helpful for understanding the magnitude of the disaster, comparing to other disasters, and preparing for future incidents. Advanced warning and personal preparedness are important factors in reducing tornado-related injuries and deaths.

Becker, Susan M. 2007. Psychosocial care for adult and child survivors of the tsunami disaster in India. ***Journal of Child and Adolescent Psychiatry Nursing*** **20(3): 148-155.**
The tsunami disaster in South Asia affected the mental health and livelihoods of thousands of child and adult survivors, but psychological aspects of rehabilitation efforts are frequently neglected in public health initiatives. Professional teams from the National Institute of Mental Health and Neurosciences in Bangalore, India, traveled to the worst-affected areas in south India and implemented a mental health program of psychosocial care for child and adult survivors. This descriptive report is based on observations of child and adult survivors in Tamil Nadu State of India during January and March 2005. Symptoms of emotional distress were observed in child and adult survivors. A train-the-trainer community-based model was implemented for teachers and community-level workers to respond to the emotional needs of children and adults. In resource-poor settings with few trained mental health professionals, community workers were taught basic mental health interventions by teams of psychiatrists, nurses, and social workers. This train-the-trainer, community-based approach has implications for natural and man-made disasters in developed and developing countries.

Benight, C. C., E.C. Gruntfest, M. Hayden, and L. Barnes. 2007. Trauma and short-fuse weather warning perceptions. ***Environmental Hazards*** **7(3): 220-226.**
The purpose of this research was to assess the importance of psychological trauma in understanding reactions to short lead time weather warnings. The research consisted of two case studies, one in Denver, Colorado and the other in Austin, Texas. A total of 61 individuals with 9 or greater traumas were compared to 281 non-trauma exposed individuals. Results demonstrated significant differences on questions related to general beliefs about flash floods and warning perceptions as well as reported anticipated actions during a flash flood at home. Results suggest high trauma exposure may lead to more threat sensitivity and a higher probability of initiated action in a home-based flash flood.

Bilal, Muhammad Sami, Mowadat Huassain Rana, Sajid Rahim, and Sohail Ali. 2007. Psychological trauma in a relief worker- A case report from earthquake-struck areas of north Pakistan. ***Prehospital and Disaster Medicine*** **22(5): 458-461.**
Vicarious traumatization is now a well-known entity and may have negative influences on those that are involved in rescue efforts in any disaster or traumatic event. Healthcare workers work with trauma survivors and witness an immense array of gruesome and ghastly images. This work has the potential to cause those engaged in rescue efforts to become affected subconsciously. Job-related stress may cause psychological symptoms in care providers who provide support and listen to the survivors' account of trauma. A therapist working in disaster situations may become a victim of psychological anguish undermining their physical and mental well-being as well as their profession, adversely affecting their traumatized patients, and leading to a counter-productive therapist-survivor relationship. This significant theme of secondary trauma must be recognized in relief workers at early stages and must be addressed at an individual as well as organizational level. The key may lie in turning social supports, adapting positive coping mechanisms, and subsequently seeking mental health consultation.

Bokszczanin, Anna. 2007. PTSD symptoms in children and adolescents 28 months after a flood: Age and gender differences. ***Journal of Traumatic Stress*** **20(3): 347-351.**
The present study examined the prevalence and predictors of posttraumatic stress disorder symptoms (PTSD) in a sample of 533 students (aged 11 to 21), 28 months after the 1997 flood in southwestern Poland. The results show that 18% of the participants met all diagnostic criteria for PTSD. Based on hierarchical multiple regression analyses, PTSD criteria symptoms were positively correlated with the degree of exposure to trauma experienced during the disaster. A three-way interaction of trauma, age, and gender showed that more PTSD symptoms were observed among the younger participants and girls than among the older boys. The results confirm the need of research testing culturally sensitive implementation of mental health programs for young victims of disasters, taking into account their age and gender.

Bonnett, Carl J., Tony R. Schock, Kevin E. McVaney, Christopher B. Colwell, and Christopher Depass. 2007. Task Force St. Bernard: Operational issues and medical management of a National Guard disaster response operation. ***Prehospital and Disaster Medicine*** **22(5): 440-447.**
After Hurricane Katrina struck the Gulf Coast of the United States on 29 August 2005, it became obvious that the country was facing an enormous national emergency. With local resources overwhelmed, governors across the US responded by deploying thousands of National Guard soldiers and airmen. The National Guard has responded to domestic disasters due to natural hazards since its inception, but an event with the magnitude of Hurricane Katrina was unprecedented. The deployment of more than 900 Army National Guard soldiers to St. Bernard Parish, Louisiana, in the aftermath of the hurricane was studied to present some of the operational issues involved with providing medical support for this type of operation. In doing so, the authors attempt to address some of the larger issues of how the National Guard can be incorporated into domestic disaster response efforts. A number of unforeseen issues with regard to medical operations, medical supply, communication, preventive medicine, legal issues, and interactions with civilians were encountered and are reviewed. A better understanding of the National Guard and how it can be utilized more effectively in future disaster response operations can be developed.

Bradt, David A., and Christina M. Drummond. 2007. Professionalization of disaster medicine: An appraisal of crierion-referenced qualifications. ***Prehospital and Disaster Medicine*** **22(5): 360-368.**
The landmark Humanitarian Response Review, commissioned by the United Nations Emergency Relief Coordinator in 2005, had catalyzed recent reforms in disaster response through the Inter-Agency Standing Committee. These reforms include a "cluster lead" ap-

proach to sectoral responsibilities and the strengthening of humanitarian coordination. Clinical medicine, public health, and disaster incident management are core disciplines underlying expertise in disaster medicine. Technical lead agencies increasingly provide pre-deployment training for selected health personnel. Moreover, technical innovations in disaster health sciences increasingly are disseminated to the disaster field through multi-agency initiatives, such as the Standardized Monitoring and Assessment of Relief and Transitions (SMART) initiative. The hallmark qualification of competency to render an informed opinion in the health specialties remains specialty board certification in North American healthcare traditions, or specialty society of fellowship in British and Australasian healthcare traditions. However, disaster incident management training lacks international consensus on hallmark qualifications for competency. Disaster experience is best characterized in terms of months of full-time, hands-on field service. Future practitioners in disaster medicine will see intensified efforts to define competency benchmarks across underlying core disciplines as well as key field performance indicators. Quantitative decision-support tools are emerging to assist disaster planners and medical coordinators in their personnel selection.

Burkle, Frederick M., Edbert B. Hsu, Michael Loehr, Michael D. Christian, David Markenson, Lewis Rubinson, and Frank L. Archer. 2007. Definition and functions of health unified command and emergency operations centers for large-scale bioevent disasters within the existing ICS. ***Disaster Medicine and Public Health Preparedness*** **1(2): 135-141.**

The incident command system provides an organizational structure at the agency, discipline, or jurisdiction level for effectively coordinating response and recovery efforts during most conventional disasters. This structure does not have the capacity or capability to manage the complexities of a large-scale, health-related disaster, especially a pandemic, in which unprecedented decisions at every level (e.g., surveillance, triage protocols, surge capacity, isolation, quarantine, health care staffing, deployment) are necessary to investigate, control, and prevent transmission of disease. Emerging concepts supporting a unified decision making, coordination, and resource management system through a health-specific emergency operations center are addressed, and the potential structure, function, roles, and responsibilities are described, including comparisons across countries with similar incident command systems.

Chou, Frank Huang-Chih, Hung-Chi Wu, Pesus Chou, Chao-Yueh Su, Kuan-Yi Tsdai, Shin-Shin Chao, Ming-Chao Chen, Tom tung-Ping Su, Wen-Jung Sun, and Wen-Chen Ou-Yang. 2007. Epidemiologic psychiatric studies on post-disaster impact among Chi-Chi earthquake survivors in Yu-Chi, Taiwan. ***Psychiatry and Clinical Neuroscience*** **61(4): 370-378.**

The aim of the present study was to survey a cohort population for the risk factors of post-traumatic stress disorder (PTSD) and major depression, and the prevalence of different psychiatric disorders at 6 months and 2 and 3 years after a major earthquake. The Disaster-Related Psychological Screening Test (DRPST), part I, and the Mini-International Neuropsychiatric Interview (MINI) were, respectively, administered by trained interviewers and psychiatrists in this community interview program. The prevalence of PTSD decreased from 8.3% at 6 months to 4.2% at 3 years after the earthquake. Suicidality increased from 4.2% at 6 months and 5.6% at 2 years to 6.0% at 3 years after the earthquake; drug abuse/dependence increased from 2.3% at 6 months to 5.1% at 3 years after the disaster. The risk factors for PTSD and major depression in various post-disaster stages were determined. Earthquake survivors had a high percentage of psychiatric disorders in the first 2 years, and then the prevalence declined. Following the devastation caused by the Chi-Chi earthquake, it is important to focus on treating symptoms of major depression and PTSD and eliminating the risk factors for both of these disorders in survivors to avoid the increase in suicidality.

Curtis, Andrew, Jacqueline W. Kennedy, Barrett Mills, Stewart Fotheringham, and Timothy McCarthy. 2007. Understanding the geography of post-traumatic stress: An academic justification for using spatial video acquisition system in the response to Hurricane Katrina. ***Journal of Contingencies and Crisis Management*** **15(4): 208-219.**

In the aftermath of a disaster like Hurricane Katrina, remote-sensing methods are often employed in an effort to assess damage. However, their utility may be limited by the aerial perspective and image resolution. The Spatial Video Acquisition System (SVAS), in conjunction with a geographic information system (GIS), has the potential to be a complementary methodology for obtaining damage assessment information as well as capturing recovery related geographies associated with post-traumatic stress. An example is provided from the Lower Ninth Ward of New Orleans with data that could be used to predict neighborhood post-traumatic stress. Results reveal six dimensions in which a SVAS can improve existing disaster-related data collection approaches: organization, archiving, transferability, evaluation, objectivity, and feasibility.

De Lorenzo, Robert A. 2007. Financing hospital disaster preparedness. ***Prehospital and Disaster Medicine*** **22(5): 436-439.**

Disaster preparedness and response have gained increased attention in the United States as a result of terrorism and disaster threats. However, funding of hospital preparedness, especially surge capacity, has lagged behind other preparedness priorities. Only a small portion of the money allocated for national preparedness is directed toward health care, and hospitals receive very little of that. Under current policy, virtually the entire funding stream for hospital preparedness comes from general tax revenues. Medical payers directly fund little, if any, of the current bill. Funding options to improve preparedness include increasing the current federal grants allocated to hospitals, using payer fees or a tax to subsidize preparedness, and financing other forms of expansion capability, such as mobile hospitals. Alternatively, the status quo of marginal preparedness can be maintained. In any event, achieving higher levels of preparedness likely will take the combined commitment of the hospital industry, public and private payers, and federal, state and local governments.

Ultimately then, costs of preparedness will be borne by the public in the form of taxes, higher healthcare costs, or through the acceptance of greater risk.

Eksi, Aysel, Kathryn L. Braun, Hayriye Ertem-Vehid, Gulcan Peykerli, Reyhan Saydam, Derya Toparlak, and Behiye Alyanak. 2007. Risk factors for the development of PTSD and depression among child and adolescent victims following a 7.4 magnitude earthquake. ***International Journal of Psychiatry in Clinical Practice*** **11(3): 190-199.**
PTSD and major depression occur frequently following traumatic exposure, both as separate disorders and concurrently. Although much of Turkey is under threat of severe earthquakes, risk factors for developing psychiatric disorders among Turkish children have not yet been studied. The aim of the study was to examine risk factors for PTSD and depression development in children. A total of 160 survivors (102 girls and 58 boys) severely impacted by Turkey's 7.4-magnitude quake participated in a psychiatric interview 6-20 weeks after the disaster. The mean age was 14.43. Logistic regression was used to test effects of pre-disaster, disaster-related and post-disaster factors on diagnoses, yielding odds ratios (OR). CAPS indicated that 96 (60%) had PTSD, and psychiatric interview found 49 (31%) with depression. Children diagnosed with PTSD were more likely to have witnessed death (OR=2.47) and experienced an extreme parental reaction (OR=3.45). Children with depression were more likely to be male (OR=4.48), have a higher trait anxiety score (OR=1.12 for every additional point), sustain injury (OR=4.29), and have lost a family member in the quake (OR=10.96). Focusing on the 96 children with PTSD, those with comorbid depression were more likely male, have a higher trait anxiety score, and have lost of family member. Mental health professionals should offer support to children witnessing death or losing a family member in a disaster. The ability of the family to remain calm and reassuring also may be a key factor in preventing PTSD.

Gordon, Janey. 2007. The mobile phone and the public sphere: Mobile phone usage in three critical situations. Convergence. ***The International Journal of Research into New Media Techniques*** **13(3): 307-319.**
This article seeks to explore the influence of the mobile phone on the public sphere, in particular with regard to its effect on news agendas, gatekeepers and primary definers. Using the examples of the Chinese SARS outbreak (2003), the southeast Asian tsunami (December 2004) and the London bombings (July 2005), the author questions the extent to which the mobile phone is challenging conventional and official sources of information. At times of national and personal calamity, the mobile phone is used to document and report events from eyewitnesses and those closely involved. Using multimedia messages (MMS) or text messages (SMS) to communities of friends and families, as well as audio phone calls, mobile phone users may precede and scoop official sources and thwart censorship and news blackouts. They can also provide valuable evidence of what actually occurred. Users are able to take pictures and short films and transmit these rapidly to others along with reports of what is happening where they are. They are also able to access other media broadcasts and the internet. They are what have become known as `citizen journalists'. The evidence suggests that mobile phone usage is contributing to the public sphere and in some instances is circumventing official repression or inadequate information. There is also an indication that the `mobcam' is capturing images that would otherwise be lost. However, the mainstream media have been quick to take advantage of this citizen journalism and mediate it within its own parameters.

Harrison, Rosalind M. 2007. Preliminary investigation into the role of physiotherapists in disaster response. ***Prehospital and Disaster Medicine*** **22(5): 462-465.**
Disasters and disaster response have become prominent issues in recent years, yet there have been almost no investigations into the roles of physiotherapists in emergency disaster response. Additionally, physiotherapists are not employed in emergency disaster response by many of the principle non-governmental organizations supplying such care, although they are included in military responses in the United States and United Kingdom and in Disaster Medical Assistance Teams in the U.S. This paper, based on a small qualitative study, focuses on the potential role and nature of input of physiotherapists in disaster response. Four main themes emerge: 1) descriptions of disasters; 2) current roles of the physiotherapist; 3) future roles of physiotherapists; and 4) overcoming barriers. Although the four physiotherapists who participated in this study had been ill-prepared for disaster response, they took on multiple roles, primarily in organization and treatment. However, participants identified several barriers to future involvement, including organizational and professional barriers, and gave suggestions for overcoming these. The participants had participated in disaster response, but in ill-defined roles, indicating a need for a greater understanding of disaster response among the physiotherapy community and by organizations supplying such care. The findings of this study have implications for such organizations in terms of employing skilled physiotherapists in order to improve disaster response. In future disasters, physiotherapy will be of benefit in treating and preventing rescue worker injury and treating musculoskeletal, critical, respiratory, and burn patients.

Klose, Christian D. 2007. Health risk analysis of volcanic SO2 hazard on Vulcano Island (Italy). ***Natural Hazards*** **43(3): 303-317.**
Since the last eruption of the Fossa crater in 1888–1890, intense volcanic degassing has been remaining on Vulcano Island of Sicily (Italy). Toxic sulfur dioxide (SO2) of the solfataric action in this area represents, when inhaled, a permanent natural hazard harming humans. Approximately 500 permanent residents live in the Porto village in the North of Vulcano Island, and 15,000 tourists visit during the summer time. A cross-disciplinary fuzzy logic risk assessment has been conducted to evaluate health risks of human individuals exposed to higher SO2 –concentrations, C, over certain exposure times, t. The simple approach, based on fuzzy set theory, explains health risks semantically by words rather than by numbers. Advantages of this approach are, first, experts, non-experts, decision makers, or the public are able to

understand and communicate risk degrees by words without using numbers. Second, in comparison to other risk definitions, the risk is not equal to the vulnerability; it is based on the hazard (SO2-gas clouds) and vulnerability (health effects) in combination. Third, risk levels can be still estimated even when limited or no statistical information is available (e.g., high SO2-concentrations or long exposure times). Moreover, human health risks were determined for C-t-scenarios based on threshold values of the European Union and the World Health Organization. Independently, two additional methods were used to determine the proportions of the population who are exposed to levels of SO2 at which health effects may be expected and also safety zones for civil protection around the degassing fields. In conclusion, SO2-gas concentrations in many parts of Vulcano Island go beyond the proclaimed alert threshold of the European Union and the World Health Organization. For example, the results show that sensitive individuals, such as asthmatics, young children, or elderly people, should not be exposed at any time to the degassing areas in Porto di Levante and at the NE-rim of the Fossa crater. In contrast, healthy non-sensitive individuals should be exposed to the SO2 -clouds at these degassing areas for less than 10 minutes, while hiking on the crater rim.

La Greca, Annette M. 2007. Understanding the psychological impact of terrorism on youth: Moving beyond posttraumatic stress disorder. ***Clinical Psychology: Science and Practice*** **14(3): 219-223.**

Comer and Kendall's (2007) comprehensive review of the impact of terrorism on youth organizes this important and burgeoning area of research. The present commentary focuses on youth outcomes associated with proximal contact with terrorist attacks and highlights several important issues that merit attention. Specifically, the commentary emphasizes the importance of examining youths' post-attack outcomes broadly (in addition to posttraumatic stress disorder and its symptoms), assessing traumatic grief and bereavement when mass casualties occur, and evaluating issues of comorbidity and functional impairment. Future research on the impact of terrorism on youth would benefit from adopting a developmental psychopathology perspective in understanding variables that may influence and be influenced by youths' reactions to terrorist events. Implications for research and clinical practice are discussed.

McDonnell, Sharon M., Helen N. Perry, Brooke McLaughlin, Bronwen McCurdy, and Gibson Parrish. 2007. Information for disasters, information disasters, and disastrous information. ***Prehospital and Disaster Medicine*** **22(5): 406-413.**

Information is needed to support humanitarian responses in every phase of a disaster. Participants of a multilateral working group convened to examine how best to meet these information needs. Although information systems based on routine reporting of diseases are desirable because they have the potential to identify trends, these systems usually do not deliver on their promise due to inadequate organization and management to support them. To identify organizational and management characteristics likely to be associated with successful information systems in disaster settings, evaluations of the Integrated Disease Surveillance and Response (IDSR) programs in 12 participating countries were reviewed. Characteristics that were mentioned repeatedly in the evaluations as associated with success were grouped into nine categories: 1) human resources management and supervision; 2) political support; 3) strengthened laboratory capacity; 4) communication and feedback (through many mechanisms); 5) infrastructure and resources; 6) system design and capacity; 7) coordination and partnerships with stakeholders; 8) community input; and 9) evaluation. Selected characteristics and issues within each category are discussed. Based on the review of the IDSR evaluations and selected articles in the published literature, recommendations are provided for improving the short- and long-term organization and management of information systems in humanitarian responses associated with disasters. It is suggested that information systems that follow these recommendations are more likely to yield quality information and be suitable even in disaster settings.

McKiven Jr., Henry M. 2007. The political construction of a natural disaster: The Yellow Fever epidemic of 1853. ***Journal of American History*** **94(3): 734-742.**

Myer, Rick A., Christian Conte, and Sarah E. Peterson. 2007. Human impact issues for crisis management in organizations. ***Disaster Prevention and Management*** **16(5): 761-770.**

The purpose of this article is to describe the adaptation of an assessment model, the Triage Assessment System (TAS), which is widely used in crisis intervention to understand the human impact of a crisis within an organization. Following a literature review, the Triage Assessment System is adapted to be applicable to organizations in crisis. Nine characteristics associated with the impact of crises on employees of an organization are discussed. Suggestions are made for ways in which organizations can use the TAS to improve their preparation for recovery efforts after a crisis. These suggestions outline approaches that consultants may employ when working with organizations. Suggestions are also made for future research using the TAS with organizations. Although developed for individuals, the concepts used in the TAS can also be applied to organizations in crisis. The article offers practical suggestions to help organizations manage the impact of organizational crises on their employees. Research in this area should help to refine the TAS for organizations, particularly assessment of the severity of organizational reactions.

Montoya, Isaac D., and Olive M. Kimball. 2007. The Laboratory Response Network: Its role in times of disaster. ***Journal of Emergency Management*** **5(6): 45-52.**

The Laboratory Response Network (LRN) was established by the Centers for Disease Control and Prevention. Today, the LRN is charged with the task of maintaining an integrated network of state and local public health, federal, military, and international laboratories that can respond to bioterrorism, chemical terrorism, and other public health emergencies. The more than 150 laboratories that make

up the current LRN are affiliated with federal agencies, military installations, international partners, and state and local public health departments. Laboratories in the network may accept samples from hospitals, clinics, the Federal Bureau of Investigation, other law enforcement groups, emergency medical services, and the military and other agencies. All of the LRN laboratories use the same protocols and validated methods to ensure rapid and certain identification of dangerous biologic agents that cause anthrax, botulism, plague, tularemia, brucellosis, and other illnesses.

Moses, Marina S., Donna S. Caruso, Timothy G. Otten, Sam Simmens, and Tee L. Guidotti. 2007. Community ready! Assessing and meeting the needs of parents in Arlington County, VA. ***Journal of Emergency Management*** **5(6): 53-60.**

In March 2006, three elementary schools, composed of at least 50 percent Latino populations, were selected in Arlington County, VA, to participate in a multi-tiered survey to evaluate parents' emergency preparedness needs. This article describes how to identify vulnerable populations and tailor specific information and services to their public health needs. An oral survey was administered to parents in their preferred language, English or Spanish, regarding their questions, concerns, preferences, and needs pertaining to public health emergency preparedness. Major themes that emerged included the need for language and culturally sensitive preparedness information; the merit of using established community venues for parents to gather; and the importance of using group-specific preferred modes of information dissemination. Significant differences were observed between vulnerability, level of preparedness, and preferences for acquiring information. An important similarity that presented itself was that all parents surveyed regard the public school system as safe, trustworthy, and best suited for providing public health prepareparedness information to the community. Based on this study, an innovative model is being developed called Community Ready! which will be an all-hazards approach to public health preparedness outreach that will be reproducible in other municipalities and school districts.

Proctor, Laura J., Angele Fauchier, Pamella H. Oliver, Michelle C. Ramos, Martha A. Rios, and Gayla Margolin. 2007. Family context and young children's responses to earthquake. ***Journal of Child Psychology and Psychiatry*** **48(9): 941-949.**

Family context can affect children's vulnerability to various stresses, but little is known regarding the role of family variables on children's reactions to natural disaster. This prospective study examined the influence of pre-disaster observed parenting behaviors and post-disaster parental stress on young children's distress following an earthquake. Participants were 117 two-parent families with a child age 4-5 at the initial assessment. The families experienced different degrees of impact from the earthquake. Pre-earthquake family context comprised observations of parents' positive and negative behaviors during a parent-child play task. Eight months after the earthquake, mothers reported symptoms of parental stress and children's distress. Earthquake impact and children's distress symptoms were moderately correlated (r ¼ .44), but certain pre-earthquake parental behaviors moderated the relationship. The dose response association between earthquake impact and children's symptoms did not hold for families in which fathers showed high levels of negative behaviors with daughters, or mothers showed low levels of positive behaviors with sons. In addition, results consistent with full mediation for boys (and partial mediation for girls) indicated that 86% of the total effect of earthquake impact on boys' distress (and 29% on girls' distress) occurred through the mediator of reported parental stress. These findings demonstrate that young children's responses to an abrupt, negative environmental event, such as an earthquake, are influenced in part by the nature of the parent-child relationship prior to the event as well as by the responses parents exhibit following the event.

Schultz, Carl H, Kristi L Koenig, and Roger J. Lewis. 2007. Decision making in hospital earthquake evacuation: Does distance from the epicenter matter? ***Annals of Emergency Medicine*** **50(3): 320-326.**

Over large expanses, the risk for hospital damage from an earthquake attenuates as the distance from the epicenter increases, which may not be true within the immediate disaster zone (near field), however. The following study examines the impact of epicenter distance and ground motion on hospital evacuation and closure for those structures near the epicenter of the 1994 Northridge earthquake and the implications for patient evacuation. This is a retrospective case-control study of all hospitals reporting off-site evacuations or permanent closure because of damage from the January 17, 1994, earthquake in Northridge, California. Control hospitals were randomly identified from those facilities that did not evacuate patients. Distances from the epicenter and peak ground accelerations were calculated for each hospital from Trinet ShakeMap data and compared. Eight hospitals evacuated patients (study group); 4 of these hospitals were condemned. These were compared to 8 hospitals that did not evacuate patients (control group). The median epicenter-to-hospital distance for evacuated facilities was 8.1 miles (interquartile range [IQRs] 4.0 to 17.2 miles), whereas that for nonevacuated facilities was 14.1 miles (IRQ 10.5 to 17.0 miles). The difference in the median distances was 6.0 miles (95% confidence interval 4.8 to 11.9 miles). The peak ground acceleration had a median of 0.77g (IQR 0.53 to 0.85g) for study hospitals and a median of 0.36g (IQR 0.24 to 0.50g) for control hospitals, where 1g equals the force of gravity. The difference in median acceleration of 0.41g (95% CI 0.14 to 0.55g) was significant (P=.009). The distances from the epicenter for evacuated or condemned facilities and control hospitals do not appear to differ in the near field. Peak ground acceleration is a superior indicator of the risk for hospital damage and evacuation. Physicians can obtain these data in real time from the Internet and should transfer patients to facilities in areas of lower recorded peak ground acceleration regardless of distance from the epicenter.

Slepski, Lynn A. 2007. Emergency preparedness and professional competency among health care providers during Hurricanes Katrina and Rita: Pilot study results. ***Disaster Management & Response*** **5(4): 99-110.**

To date, no systematic examination of the preparedness of individual health care providers and their response capabilities during a large-scale disaster has been conducted. As a result, very little is known about what knowledge, skills and abilities, or professional competencies are needed, or how professional competency requirements may change depending on the circumstances of a disaster. The objective of this pilot study was to collect, explore, and describe background data on professional competencies from health care providers who were involved in the Hurricanes Katrina and/or Rita disaster responses. Utilizing an anonymous survey of a convenience sample, 200 health care providers attending two disaster conferences were asked to respond to open-ended questions about the competencies they needed and performed during their disaster response. Of the 200 respondents, registered nurses (37%) and physicians (24%) were the largest categories of providers. Basic clinical care (39%) and triage (26%) were the most frequent response skills reported; the areas wherein respondents felt least prepared were disaster-specific response skills (22%) and systems issues (34%). Only 22% of respondents reported that they did not know a specific skill. The 200 respondents made 495 individual recommendations for future responders, including actions to improve the respondent's personal preparedness (23%) and the need for training (25%). However, only 3% of the recommendations (n = 15) actually identified a specific type of training such as Advanced Cardiac Life Support or triage. Few respondents reported knowledge deficits. Rather, what they described was an abrupt change or transition from their everyday practice worlds that required accommodation in order to practice effectively. Current training programs generally focus on providing skills information. Further research is required to determine if training programs should address facilitating the transition process.

Wang, Philip S., Michael J. Gruber, Richard E. Powers, Michael Schoenbaum, Anthony H. Wells, Kenneth B. Kessler, and Ronald C. Speier. 2008. Disruption of existing mental health treatments and failure to initiate new treatment after Hurricane Katrina. ***American Journal of Psychiatry*** **165: 34-41.**

The authors examined the disruption of ongoing treatments among individuals with preexisting mental disorders and the failure to initiate treatment among individuals with new-onset mental disorders in the aftermath of Hurricane Katrina. English-speaking adult Katrina survivors (N=1,043) responded to a telephone survey administered between January and March of 2006. The survey assessed post-hurricane treatment of emotional problems and barriers to treatment among respondents with preexisting mental disorders as well as those with new-onset disorders post-hurricane. Among respondents with preexisting mental disorders who reported using mental health services in the year before the hurricane, 22.9% experienced reduction in or termination of treatment after Katrina. Among those respondents without preexisting mental disorders who developed new-onset disorders after the hurricane, 18.5% received some form of treatment for emotional problems. Reasons for failing to continue treatment among preexisting cases primarily involved structural barriers to treatment, while reasons for failing to seek treatment among new-onset cases primarily involved low perceived need for treatment. The majority (64.5%) of respondents receiving treatment post-Katrina were treated by general medical providers and received medication but no psychotherapy. Treatment of new-onset cases was positively related to age and income, while continued treatment of preexisting cases was positively related to race/ethnicity (non-Hispanic whites) and having health insurance. Many Hurricane Katrina survivors with mental disorders experienced unmet treatment needs, including frequent disruptions of existing care and widespread failure to initiate treatment for new-onset disorders. Future disaster management plans should anticipate both types of treatment needs.

Wetta-Hall, Ruth, Gina M. Jost, Janet Cusick Berg-Copas, and Gary Jost. 2007. Preparing for burn disasters: Predictors of improved perceptions of competency after mass burn care training. ***Prehospital and Disaster Medicine*** **22(5): 448-453.**

Prehospital and community hospital healthcare providers in the United States must be prepared to respond to burn disasters. Continuing education (CE) is the most frequently utilized method of updating knowledge, skills, and competence among healthcare professionals. Since preparedness training must meet multiple educational demands, it is vital to understand how participants' work and educational experience and the program's content and delivery methods impact knowledge acquisition, and how learning influences confidence and competence to perform new skills. The purpose of this exploratory, convenience sample study was to identify healthcare provider characteristics and continuing education training content areas that were predictive of self-reported improvement in competence after attending a mass-casualty burn disaster continuing education program. Logistic regression analysis of data from a post-training evaluation from nine one-day continuing education conferences on mass burn care was used to identify factors associated with improved self-reported competency to respond to mass burn casualties. Interventions used to train healthcare providers for burn disasters must cover a broad range of topics. However, learning needs may vary by practice setting, work experience, and previous exposure to disaster events. This evaluation research provides three-fold information for continuing education research: 1) to identify content areas that should be emphasized in future burn care training; 2) to be used as a model for CE evaluation in other domains; and 3) to provide support that many factors must be considered when designing a CE program. Results may be useful to others who are planning CE training programs.

Risk and Decision Making

Cheng, Chang-Chi, Nien-Sheng Hsu, and Chih-Chiang Wei. 2008. Decision-tree analysis on optimal release of reservoir storage under typhoon warnings. *Natural Hazards* 44(1): 65-84.

The wet and dry seasons are distinctive in Taiwan as the amount of precipitation in wet seasons accounts for over three-fourths of the total rainfall. And the water-resources management relies pretty much on the rainfall brought in by typhoons as it accounts for a significant portion of the precipitation during wet seasons. Furthermore, as the storage of reservoirs is limited due to topographical factors, the management of typhoon rainfall has always been an important issue in Taiwan. The technique of decision-tree analysis is applied in this article to determine the optimal reservoir release in advance upon the issuance of a typhoon warning by the Central Weather Bureau (CWB), and the proposed methodology may provide solution to the trade-off judgment of reservoir operations between flood control and water supply according to economic efficiency. In this article, the economic loss functions of flooding damage and water-supply shortage are assumed in linear and nonlinear conditions, and the respective expected optimal releases based on the predicted precipitation as issued by CWB are derived. The proposed methodology has been applied to the Shihmen Reservoir System, and the capabilities of the model as an aid to real-time decision making as well as the evaluation of the economic worth of forecasts is presented.

Daley, Dorothy M. 2008. Public participation and environmental policy: What factors shape state agencies' public participation provisions? *Review of Policy Research* 25(1): 21-35.

Public participation is becoming increasingly common in environmental decision making. While researchers have focused on understanding why individuals get involved and the impact of their engagement, less is known about the forces that shape agency and legislative decision making regarding participation. This paper uses multinomial logistic regression to explore the determinants of public participation provisions in state hazardous waste programs over time. The results suggest that states with more liberal citizenry, higher levels of manufacturing, and urban areas are more likely to formalize the participation provisions in their hazardous waste programs. Comparatively, states with fewer democratic representatives are more likely to informally engage in public participation procedures in their states programs.

Gill, Brendan Patrick. 2007. Risk communication and its importance in disaster management. *Journal of Emergency Management* 5(6):11-16.

During the onslaught of Hurricane Katrina on the United States Gulf Coast in August 2005, local emergency planning officials, state agencies, and federal entities came together to impress upon those still left in the danger zone to evacuate. Unfortunately, more than 100,000 people remained in the danger zone. In this article, the author examines Protective Action Recommendations, proper and poor risk communications, and the need for emergency management officials to keep the pulse of those that they serve.

Gopalakrishnan, Chennat, and Norio Okada. 2007. Designing new institutions for implementing integrated disaster risk management: Key elements and future directions. *Disasters* 31(4): 353-372.

The goal of integrated disaster risk management is to promote an overall improvement in the quality of safety and security in a region, city or community at disaster risk. This paper presents the case for a thorough overhaul of the institutional component of integrated disaster risk management. A review of disaster management institutions in the United States indicates significant weaknesses in their ability to contribute effectively to the implementation of integrated disaster risk management. Our analysis and findings identify eight key elements for the design of dynamic new disaster management institutions. Six specific approaches are suggested for incorporating the identified key elements in building new institutions that would have significant potential for enhancing the effective implementation of integrated disaster risk management. The authors have developed a possible blueprint for effective design and construction of efficient, sustainable and functional disaster management institutions.

McCarthy, Simon, Sylvia Tunstall, Dennis Parker, Hazel Faulkner, and Joe Howe. 2007. Risk communication in emergency response to a simulated extreme flood. *Environmental Hazards* 7(3): 179-192.

Risk communication in flood incident management can be improved through developing hydrometeorological and engineering models used as tools for communicating risk between scientists and emergency management professionals. A range of such models and tools was evaluated by participating flood emergency managers during a 4-day, real-time simulation of an extreme event in the Thamesmead area in the Thames estuary close to London, England. Emergency managers have different communication needs and value new tools differently, but the indications are that a range of new tools could be beneficial in flood incident management. Provided they are communicated, large model uncertainties are not necessarily unwelcome among flood emergency managers. Even so, they are cautious about sharing the ownership of weather and flood modeling uncertainties.

McSpirit, Stephanie, Shaunna Scott, Duane Gill, Sharon Hardesty, and Dewayne Sims. 2007. Risk perceptions after a coal waste impoundment failure: A survey assessment. *Southern Rural Sociology* 22(2):83-110.

In mid October of 2000, a rupture occurred at the bottom of a coal waste reservoir owned by Martin County Coal Corporation (MCCC-Massey). Impounded slurry and sludge materials from the reservoir traveled through underground mine works and burst through two mine portals on opposite sides of the mountain releasing more than 300 million gallons of coal waste into creeks and waterways of Martin County, KY. This paper examines people's reactions to the Martin County coal waste disaster by examining levels of reported concern and perceptions of risk across the impacted community of

Martin County in comparison to similar coal mining communities in the same watershed as well as elsewhere in Kentucky and West Virginia. Door-to-door, drop-off/pick-up methods were used to survey people's perceptions. As predicted, findings show a significant difference in public opinion over the risks associated with coal waste impoundments between the impacted county in comparison to other counties. The other robust predictors of perceived risks were quality of life and trust measures. Other factors found to be significant in some previous studies of risk perceptions, such as home ownership and occupation could also account for some differences in risk perceptions within and across counties. Overall, the authors conclude that their survey findings on trust are consistent with others who have theorized about the institutional interconnection between public trust and risk concerns regarding technological hazards. In their discussion, the authors address the need for government agencies, that are responsible for responding to and mitigating environmental hazards, to act in ways that merit public trust, restore public confidence, and alleviate public anxiety.

Morss, Rebecca E., and Eugene Wahl. 2007. An ethical analysis of hydrometeorological prediction and decision making: The case of the 1997 Red River flood. ***Environmental Hazards*** **7(4): 342-352.**

Weather, climate, and flood predictions are incorporated into human decisions in a wide variety of situations, including decisions related to hazardous hydrometeorological events. This article examines ethical aspects of such predictions and decisions, focusing on the case of the 1997 Red River flood in Grand Forks, North Dakota, and East Grand Forks, Minnesota (US). The analysis employs a formal ethical framework and analytical method derived from medical and business ethics. The results of the analysis highlight issues related to forecast generation, communication of forecast meaning and uncertainty, responsibility for the use of forecasts in decision making, and trade-offs between the desire for forecast certainty and the risk of missed events. Implications of the analysis for the broader arenas of weather, climate, and flood prediction and disaster management are also discussed.

Pelling, Mark. 2007. Learning from others: The scope and challenges for participatory disaster risk assessment. ***Disasters*** **31(4): 373-385.**

This paper develops a framework based on procedural, methodological, and ideological elements of participatory vulnerability and risk assessment tools for placing individual approaches within the wide range of work that claims a participatory, local, or community orientation. In so doing it draws on relevant experience from other areas of development practice from which the disasters field can learn. Participatory disaster risk assessments are examined for their potential to be empowering, to generate knowledge, to be scaled up, to be a vehicle for negotiating local change, and as part of multiple-methods approaches to disaster risk identification and reduction. The paper is a response to an international workshop on Community Risk Assessment organized by ProVention Consortium and the Disaster Mitigation for Sustainable Livelihoods Program, University of Cape Town. The workshop brought together practitioners and academics to review the challenges and opportunities for participatory methodologies in the field of disaster risk reduction. In conclusion, the contribution made by participatory methodologies to global disaster risk reduction assessment and policy is discussed.

Ruin, Isabelle, Jean-Christophe Gaillard, and Celine Lutoff. 2007. How to get there? Assessing motorists' flash flood risk perception on daily itineraries. ***Environmental Hazards*** **7(3): 235-244.**

Flash floods are characterized by their suddenness, fast and violent movement, rarity, and small scale but high level of damage. They are particularly difficult to forecast accurately, and there is little lead time for warning. This makes motorists especially vulnerable. Assuming that these flash flood hazard specificities may be significant factors leading to difficulties for drivers to perceive danger, the authors used cognitive mapping combined with GIS data processing to assess motorists' flash flood risk perception in their daily itineraries. The analysis of 200 mental maps collected allows planners to have maps highlighting dangerous areas where risk perception is weak and to identify reasons for this.

Schultz, Carl H., Kristi L. Koenig, and Roger J. Lewis. 2007. Decision making in hospital earthquake evacuation: Does distance from the epicenter matter? ***Annals of Emergency Medicine*** **50(3): 320-326.**

Over large expanses, the risk for hospital damage from an earthquake attenuates as the distance from the epicenter increases, which may not be true within the immediate disaster zone (near field), however. This study examines the impact of epicenter distance and ground motion on hospital evacuation and closure for those structures near the epicenter of the 1994 Northridge earthquake and the implications for patient evacuation. This is a retrospective case-control study of all hospitals reporting off-site evacuations or permanent closure because of damage from the January 17, 1994, earthquake in Northridge, California. Control hospitals were randomly identified from those facilities that did not evacuate patients. Distances from the epicenter and peak ground accelerations were calculated for each hospital from Trinet ShakeMap data and compared. Eight hospitals evacuated patients (study group); four of these hospitals were condemned. These were compared to eight hospitals that did not evacuate patients (control group). The median epicenter-to-hospital distance for evacuated facilities was 8.1 miles (interquartile range [IQRs] 4.0 to 17.2 miles), whereas that for nonevacuated facilities was 14.1 miles (IRQ 10.5 to 17.0 miles). The difference in the median distances was 6.0 miles (95% confidence interval 4.8 to 11.9 miles). The peak ground acceleration had a median of 0.77g (IQR 0.53 to 0.85g) for study hospitals and a median of 0.36g (IQR 0.24 to 0.50g) for control hospitals, where 1g equals the force of gravity. The difference in median acceleration of 0.41g (95% CI 0.14 to 0.55g) was significant (P=.009). The distances from the epicenter for evacuated or condemned facilities and control hospitals do not appear to differ in the near field. Peak ground acceleration is a superior indicator of the risk for hospital damage and evacuation. Physicians can obtain these data in real time from the Internet and should

transfer patients to facilities in areas of lower recorded peak ground acceleration regardless of distance from the epicenter.

Sjoberg, Lennart. 2008. Antagonism, trust and perceived risk. ***Risk Management*** **10(1): 32-55.**
Components of social trust were studied with regard to 23 different actors or organizations. Perceived antagonism was found to be an important factor in social trust, getting a higher (negative) weight than the traditional trust components such as honesty or competence. The relation between competence and trust was moderated by the level of perceived antagonism. With a high level of antagonism, competence was a negative factor. Antagonism was more important than social trust in accounting for perceived risk. In a second study concerned with nuclear waste, SEM models were estimated, and epistemic trust (trust in science as distinguished from trust in experts and scientists) was found to be an important factor in accounting for perceived risk and acceptance of a nuclear waste repository. Antagonism also contributed to accounting for perceived risk. The role of social trust was minor. Its effects were mediated by epistemic trust, but it accounted for only part of the variance of epistemic trust. Implications for risk communication are discussed.

Technological Hazards

Caragliano, Simona and Davide Manca. 2007. Emergency management and land use planning in industrial hazardous areas: Learning from an Italian experience. ***Journal of Contingencies and Crisis Management*** **15(4):194-207.**
This paper discusses some methodological and organizational issues characterizing local policies for industrial risk prevention in Italy. These include both emergency preparedness and land use control as strategic activities aimed at risk reduction in areas where Seveso facilities are located. The article discusses an Italian case study in the Lombardia region. It covers the development of a so-called Local Operating Manual for external industrial emergency management, as well as a so-called Technical Study for land use control around hazardous plants. After these documents were revised, a real accident occurred, showing the limitations of planning. The lessons learned from this experience suggested some multi-organizational directions and methodological procedures for further research on risk management and communication.

Daley, Dorothy M. 2008. Public participation and environmental policy: What factors shape state agencies' public participation provisions? ***Review of Policy Research*** **25(1): 21-35.**
Public participation is becoming increasingly common in environmental decision making. While researchers have focused on understanding why individuals get involved and the impact of their engagement, less is known about the forces that shape agency and legislative decision making regarding participation. This paper uses multinomial logistic regression to explore the determinants of public participation provisions in state hazardous waste programs over time. The results suggest that states with more liberal citizenry, higher levels of manufacturing, and urban areas are more likely to formalize the participation provisions in their hazardous waste programs. Comparatively, states with fewer democratic representatives are more likely to informally engage in public participation procedures in their states programs.

Glotzer, David, Walter Psoter, Rudolph St. Jean, and Kera Weiserbs. 2007. The shelter-in-place decision: All things considered. ***Australian Journal of Emergency Management*** **22(4): 8-12.**
In the event of a serious accident or intentional chemical or radiological incident, the emergency management system must move in a quick and coordinated manner. Furthermore, emergency management must be prepared to advise the public on how to best protect themselves and be able to manage large number of casualties among disaster victims and the worried well. The ability of emergency management to coordinate a response is based upon their ability in pre-incident planning and preparedness education to quickly detect an incident, to determine its impact and spread rate, and to inform the public whether the best protective action is to evacuate or to shelter-in-place. Effectiveness of the response should be optimized through community education.

McSpirit, Stephanie, Shaunna Scott, Duane Gill, Sharon Hardesty, and Dewayne Sims. 2007. Risk perceptions after a coal waste impoundment failure: A survey assessment. ***Southern Rural Sociology*** **22(2): 83-110.**
In mid October of 2000, a rupture occurred at the bottom of a coal waste reservoir owned by Martin County Coal Corporation (MCCC-Massey). Impounded slurry and sludge materials from the reservoir traveled through underground mine works and burst through two mine portals on opposite sides of the mountain releasing more than 300 million gallons of coal waste into creeks and waterways of Martin County, KY. This paper examines people's reactions to the Martin County coal waste disaster by examining levels of reported concern and perceptions of risk across the impacted community of Martin County in comparison to similar coal mining communities in the same watershed, as well as elsewhere in Kentucky and West Virginia. Door-to-door, drop-off/pick-up methods were used to survey people's perceptions. As predicted, findings show a significant difference in public opinion over the risks associated with coal waste impoundments between the impacted county in comparison to other counties. The other robust predictors of perceived risks were quality of life and trust measures. Other factors found to be significant in some previous studies of risk perceptions, such as home ownership and occupation, could also account for some differences in risk perceptions within and across counties. Overall, the authors conclude that their survey findings on trust are consistent with others who have theorized about the institutional interconnection between public trust and risk concerns regarding technological hazards. In their discussion, the authors address the need for government agencies, which are responsible for responding to and mitigating environmental hazards, to act in ways that merit public trust, restore public confidence, and alleviate public anxiety.

Tornadoes

Ablah, Elizabeth, Annie M. Konda, Kurt Tinius, Carolyn Synovitz, and Italo Subbarao. 2007. Regional health system response to the 2007 Greensburg, Kansas, EF5 tornado. ***Disaster Medicine and Public Health Preparedness*** **1(2): 90-95.**

On May 4, 2007, an EF5 tornado hit the rural community of Greensburg, Kansas, destroying 95% of the town and resulting in 12 fatalities. Data were requested from the emergency medical services units that initially responded and the regional hospitals that received people injured in the tornado within 24 hours following the tornado. Requested data included patient age and sex, and injury severity score or ICD-9 codes. Critical mortality, or the number of deaths of critically injured patients, was also calculated. The extensive damage caused by the tornado effectively destroyed the infrastructure of the community and created enormous challenges for emergency medical services responders, who were unable to record any triage data. Area hospitals treated 90 patients, who had an average injury severity score of 6.4. Age was found to be related to injury severity, but no relationship between sex and injury severity was found. Critical mortality was found to be 18% for this event. Injury severity score has seldom been used to analyze natural disasters, especially tornadoes, although such analysis is helpful for understanding the magnitude of the disaster, comparing to other disasters, and preparing for future incidents. Advanced warning and personal preparedness are important factors in reducing tornado-related injuries and deaths.

Simmons, Kevin M., and Daniel Sutter. 2007. Tornado shelters and the manufactured home parks market. ***Natural Hazards*** **43(3): 365-378.**

Manufactured or mobile homes represent a fast growing portion of the housing market but are particularly vulnerable to tornadoes. In the United States, over 40% of tornado fatalities occur in mobile homes even though they comprise about 8% of U.S. housing units. This article examines the market for tornado shelters in manufactured home parks in Oklahoma. Almost 60% of parks in the state have shelters, with 90% of the shelters underground. Parks with shelters are not concentrated in urban areas but spread across the state, with parks with shelters in 32 counties. The authors find that rents for lots in parks with shelters are 5–8% higher, which generates sufficient revenue to approximately pay for shelters, but the point estimate is statistically significant in only one specification.

Tsunamis

Annunziato, Alessandro. 2007. The tsunami assessment modeling system by the joint research center. ***Science of Tsunami Hazards*** **26(2): 76-92.**

The Tsunami Assessment Modeling System was developed by the European Commission, Joint Research Center, in order to serve tsunami early warning systems such as the Global Disaster Alerts and Coordination System (GDACS) in the evaluation of possible consequences by a tsunami of seismic nature. The Tsunami Assessment Modeling System is currently operational and is calculating in real time all the events occurring in the world, calculating the expected tsunami wave height and identifying the locations where the wave height should be too high. The first part of the paper describes the structure of the system, the underlying analytical models, and the informatics arrangement; the second part shows the activation of the system and the results of the calculated analyses. The final part shows future development of this modeling tool.

Ashlin, Alison, and Richard J. Ladle. 2007. 'Natural disasters' and newspapers: Post-tsunami environmental discourse. ***Environmental Hazards*** **7(4): 330-341.**

This paper explores the concept of 'natural disasters' as opportunities for influencing public perceptions of the environment through the media. It provides a critical analysis of the discourse in a selection of newspaper articles and identifies the way in which various actors have utilized UK national newspaper coverage of the Asian tsunami to promote particular agendas and to legitimize policies and actions. A systematic and iterative sampling approach was developed that allowed the authors to combine quantitative and qualitative methods to search for articles that contained content directly related to the environmental aspects of the tsunami. Three main themes emerged: coastal ecosystems, the fisheries sector, and redevelopment. The discourse within these areas was markedly different. While the coastal ecosystems discourse was hegemonic in terms of narratives and actor coalitions, the fisheries and redevelopment discourse incorporated a more diverse set of actors and storylines that perhaps reflects the lack of consensus on the best way of achieving sustainable solutions. The authors also contrast the limited discussion and representation of tsunami-related environmental issues within UK national newspapers with the more detailed discussion within the peer-reviewed literature and the grey literature. The authors argue that 'natural disasters' provide both opportunities and risks for raising awareness of environmental issues, mobilizing funding, and directing action to environmentally and socially vulnerable areas of the world, and that consequently NGOs, intergovernmental bodies, and government departments should be mindful of the long-term consequences of global media attention.

Becker, Susan M. 2007. Psychosocial care for adult and child survivors of the tsunami disaster in India. ***Journal of Child and Adolescent Psychiatry Nursing*** **20(3): 148-155.**

The tsunami disaster in South Asia affected the mental health and livelihoods of thousands of child and adult survivors, but psychological aspects of rehabilitation efforts are frequently neglected in public health initiatives. Professional teams from the National Institute of Mental Health and Neurosciences in Bangalore, India, traveled to the worst-affected areas in south India and implemented a mental health program of psychosocial care for child and adult survivors. This descriptive report is based on observations of child and adult survivors in Tamil Nadu State of India during January and March 2005. Symptoms of emotional distress were observed in child and adult survivors. A train-the-trainer, community-based model was

implemented for teachers and community-level workers to respond to the emotional needs of children and adults. In resource-poor settings with few trained mental health professionals, community workers were taught basic mental health interventions by teams of psychiatrists, nurses, and social workers. This train-the-trainer, community-based approach has implications for natural and man-made disasters in developed and developing countries.

Burbidge, David, and Phil Cummons. 2007. Assessing the threat to Western Australia from tsunami generated by earthquakes along the Sunda Arc. ***Natural Hazards*** **43(3): 319-331.**

A suite of tsunamis spaced evenly along the subduction zone to the south of Indonesia (the Sunda Arc) were numerically modeled in order to make a preliminary estimate of the level of threat faced by western Australia from tsunamis generated along the Arc. Offshore wave heights from these tsunamis were predicted to be significantly higher along the northern part of the west Australian coast than for the rest of the coast south of the town of Exmouth. In particular, the area around Exmouth may face a higher tsunami hazard than other areas of the west Australian coast nearby. Large earthquakes offshore of Java and Sumbawa are likely to be a greater hazard to western Australia than those offshore of Sumatra. The authors' numerical models indicate that a magnitude 9 or above earthquake along the eastern part of the Sunda Arc has the potential to significantly impact a large part of the west Australian coastline.

Clark, Nigel. 2007. Living through the tsunami: Vulnerability and generosity on a volatile earth. ***Geoforum*** **38(6): 1127-1139.**

How might geographers respond 'generously' to a disaster on the scale of the Indian Ocean tsunami? Critical geographers and other left intellectuals have chosen to stress the way pre-existing social forces conditioned human vulnerability, and have implied that ordinary people 'here' were implicated in the suffering of others 'there' through their positioning in chains of causality. Critics have also sought to expose the bias, unjustness, and inappropriateness of post-tsunami patterns of donation and programs of aid and recovery. A supplement to this mode of critique is offered in the form of a view of disasters and human vulnerability that hinges on the idea of the self as 'radically passive'; that is, as inherently receptive to both the stimuli that cause suffering, and to the demands of others who are suffering. All forms of thought, including geography and disaster studies, should themselves be seen as 'vulnerable' and responsive to the impact to disasters. The idea that every 'self' bears the trace of past disasters and past gifts of others forms the basis of a vision of bodies and communities as always already 'fractured' by disaster in ways which resist being 'brought to light'. This offers a way of integrating human and physical geographies through a shared acknowledgement of what is unknowable and absent. It is also suggestive that gratitude might be an appropriate response to a sense of indebtedness to others for who we are, as much as for what we have done.

De Silva, D. A. M., and Masahiro Yamao. 2007. Effects of the tsunami on fisheries and coastal livelihood: A case study of tsunami-ravaged southern Sri Lanka. ***Disasters*** **31(4): 386-404.**

Beyond the death toll, the tsunami of December 26, 2004, crippled many of the livelihood assets (human, social, physical, financial, and natural) available to assist those directly affected. Drawing on surveys of three villages in three districts in the south of Sri Lanka, this paper describes the livelihood asset building capacity of the fishing communities. Assessments are also made of the impact of the tsunami on coastal communities and the impact of government policy on rebuilding. A livelihood asset score was calculated for each village by comparing strengths in capacity building. In all aspects of capital building, including human, social, financial, physical, and natural capital, the fishing community in Tangalle was significantly ahead of the fishing communities in Hikkaduwa and Weligama. Experienced fishermen with better educational backgrounds had a significant influence on the capacity building of livelihood assets. Relocation and resettlement plans brought persistent uncertainty to fishermen in Hikkaduwa and Weligama and threatened to disrupt their community bonds and social networks.

Gordon, Janey. 2007. The mobile phone and the public sphere: Mobile phone usage in three critical situations. Convergence. ***The International Journal of Research into New Media Techniques*** **13(3): 307-319.**

This article seeks to explore the influence of the mobile phone on the public sphere, in particular with regard to its effect on news agendas, gatekeepers and primary definers. Using the examples of the Chinese SARS outbreak (2003), the southeast Asian tsunami (December 2004) and the London bombings (July 2005), the author questions the extent to which the mobile phone is challenging conventional and official sources of information. At times of national and personal calamity, the mobile phone is used to document and report events from eyewitnesses and those closely involved. Using multimedia messages (MMS) or text messages (SMS) to communities of friends and families, as well as audio phone calls, mobile phone users may precede and scoop official sources and thwart censorship and news blackouts. They can also provide valuable evidence of what actually occurred. Users are able to take pictures and short films and transmit these rapidly to others along with reports of what is happening where they are. They are also able to access other media broadcasts and the internet. They are what have become known as `citizen journalists'. The evidence suggests that mobile phone usage is contributing to the public sphere and in some instances is circumventing official repression or inadequate information. There is also an indication that the `mobcam' is capturing images that would otherwise be lost. However, the mainstream media have been quick to take advantage of this citizen journalism and mediate it within its own parameters.

Kumaraperumal, R., S. Natarajan, R. Sivasamy, S. Chellamuthu, S. S. Ganesh, and G. Anandakumar. 2007. Impact of tsunami 2004 in coastal villages of Nagapattinam District, India. ***Science of Tsunami Hazards*** **26(2): 93-114.**

A quake-triggered tsunami lashed the Nagapattinam coast of southern India on December 26, 2004, at around 9:00 a.m. (IST). The tsunami caused heavy damage to houses, tourist resorts, fishing boats, prawn culture ponds, soil, and crops, and consequently affected the livelihood of large numbers of the coastal communities. The study was carried out in the tsunami-affected villages in the coastal Nagapattinam with the help of remote sensing and geographical information science tools. Through the use of the IRS 1D PAN and LISS 3 merged data and quick bird images, it was found that 1,320 hectares of agricultural and non-agricultural lands were affected by the tsunami. The lands were affected by soil erosion, salt deposition, water logging, and other deposited sediments and debris. The maximum run-up height of 6.1 meters and the maximum seawater inundation distance of 2.2 kilometers were observed at Vadakkupoyyur village in coastal Nagapattinam. Pre- and post-tsunami surveys on soil quality showed an increase in pH and EC values, irrespective of distance from the sea. The water reaction was found to be in alkaline range (> 8.00) in most of the wells. Salinity levels are greater than 4 dS m-1 in all the wells except the ring well. The effect of summer rainfall on soil and water quality showed the dilution of soluble salts. Pumping of water has reduced the salinity levels in the well water samples and as well as in the open ponds. Following the 2004 event, it has become apparent to know the relative tsunami hazard for this coastal Nagapattinam. So, the tsunami hazard maps are generated using a geographical information systems (GIS) approach and the results showed 20.6%, 63.7%, and 15.2% of the study area fall under high hazard, medium hazard, and low hazard category, respectively.

Moore, G. F., N. L. Bangs, A. Taira, S. Kuramoto, E. Pangborn, and H. J. Tobin. 2007. Three-dimensional splay fault geometry and implications for tsunami generation. ***Science*** **318(5853): 1128-1131.**

Megasplay faults, very long thrust faults that rise from the subduction plate boundary megathrust and intersect the sea floor at the landward edge of the accretionary prism, are thought to play a role in tsunami genesis. The authors imaged a megasplay thrust system along the Nankai Trough in three dimensions, which allowed them to map the splay fault geometry and its lateral continuity. The megasplay is continuous from the main plate interface fault upwards to the sea floor, where it cuts older thrust slices of the frontal accretionary prism. The thrust geometry and evidence of large-scale slumping of surficial sediments show that the fault is active and that the activity has evolved toward the landward direction with time, contrary to the usual seaward progression of accretionary thrusts. The megasplay fault has progressively steepened, substantially increasing the potential for vertical uplift of the sea floor with slip. The authors conclude that slip on the megasplay fault most likely contributed to generating devastating historic tsunamis, such as the 1944 moment magnitude 8.1 Tonankai event, and it is this geometry that makes this margin and others like it particularly prone to tsunami genesis.

Volcanoes

Alparone, Salvatore, Daniele Andronico, Tiziana Sgroi, Ferruccio Ferrari, Luigi Lodato, and Danilo Reitano. 2007. Alert system to mitigate tephra fallout hazards at Mt. Etna Volcano, Italy. ***Natural Hazards*** **43(3): 333-350.**

Volcanic eruptions may create a wide range of risks in inhabited areas and, as a consequence, major economic damage to the surrounding territory. An example of volcanic hazard was given between 1998 and 2001 by Mt. Etna volcano in Italy, with its frequent paroxysmal explosive activity that caused more than 100 fire-fountain episodes. In the period of January–June 2000, in particular, 64 lava fountains took place at the Southeast Crater. During the most intense explosive phase of each episode, a sustained column often formed, reaching up to 6 kilometers above the eruptive vent. Then, the column started to expand laterally causing more or less copious tephra fallout on the slopes of Etna; ash and lapilli, therefore, constituted a serious danger for vehicular and air traffic. A software and hardware warning system was developed to mitigate the volcanic hazard indicating the areas affected by potential ash and lapilli fallout. The alert system was mainly based on the good correspondence between the pattern of volcanic tremor amplitude and the evolution of explosive activity. When a fixed tremor threshold was exceeded, a semiautomatic process started to send faxes to Civil Defense and municipalities directly affected by tephra fallout, together with information on wind directions from the Meteorological Office. The application of this methodology, during the last 14 eruptive episodes in 2000 and the 14 events occurred in 2001, demonstrated the good correspondence between the forecasts on the areas affected by tephra fallout and the effective tephra distribution on land. Despite the integrity of the performance provided by the alert system, small discrepancies occurred in the technical procedure of alerting, for which possible solutions have been discussed. The improvement of this type of system, could become basic for the Etnean region and be proposed for similar volcanic areas throughout the world.

Klose, Christian D. 2007. Health risk analysis of volcanic SO2 hazard on Vulcano Island (Italy). ***Natural Hazards*** **43(3): 303-317.**

Since the last eruption of the Fossa crater in 1888–1890, intense volcanic degassing has been remaining on Vulcano Island of Sicily (Italy). Toxic sulfur dioxide (SO2) of the solfataric action in this area represents, when inhaled, a permanent natural hazard harming humans. Approximately 500 permanent residents live in the Porto village in the North of Vulcano Island, and 15,000 tourists visit during the summer time. A cross-disciplinary fuzzy logic risk assessment has been conducted to evaluate health risks of human individuals exposed to higher SO2 –concentrations, C, over certain exposure times, t. The simple approach, based on fuzzy set theory, explains health risks semantically by words rather than by numbers. Advantages of this approach are, first, experts,

non-experts, decision makers, or the public are able to understand and communicate risk degrees by words without using numbers. Second, in comparison to other risk definitions, the risk is not equal to the vulnerability; it is based on the hazard (SO2-gas clouds) and vulnerability (health effects) in combination. Third, risk levels can be still estimated even when limited or no statistical information is available (e.g., high SO2-concentrations or long exposure times). Moreover, human health risks were determined for C-t-scenarios based on threshold values of the European Union and the World Health Organization. Independently, two additional methods were used to determine the proportions of the population who are exposed to levels of SO2 at which health effects may be expected and also safety zones for civil protection around the degassing fields. In conclusion, SO2-gas concentrations in many parts of Vulcano Island go beyond the proclaimed alert threshold of the European Union and the World Health Organization. For example, the results show that sensitive individuals, such as asthmatics, young children, or elderly people, should not be exposed at any time to the degassing areas in Porto di Levante and at the NE-rim of the Fossa crater. In contrast, healthy non-sensitive individuals should be exposed to the SO2 -clouds at these degassing areas for less than 10 minutes, while hiking on the crater rim.

Warnings and Evacuations

Alparone, Salvatore, Daniele Andronico, Tiziana Sgroi, Ferruccio Ferrari, Luigi Lodato, and Danilo Reitano. 2007. Alert system to mitigate tephra fallout hazards at Mt. Etna Volcano, Italy. ***Natural Hazards*** **43(3): 333-350.**
Volcanic eruptions may create a wide range of risks in inhabited areas and, as a consequence, major economic damage to the surrounding territory. An example of volcanic hazard was given between 1998 and 2001 by Mt. Etna volcano in Italy, with its frequent paroxysmal explosive activity that caused more than 100 fire-fountain episodes. In the period of January–June 2000, in particular, 64 lava fountains took place at the Southeast Crater. During the most intense explosive phase of each episode, a sustained column often formed, reaching up to 6 kilometers above the eruptive vent. Then, the column started to expand laterally causing more or less copious tephra fallout on the slopes of Etna; ash and lapilli, therefore, constituted a serious danger for vehicular and air traffic. A software and hardware warning system was developed to mitigate the volcanic hazard indicating the areas affected by potential ash and lapilli fallout. The alert system was mainly based on the good correspondence between the pattern of volcanic tremor amplitude and the evolution of explosive activity. When a fixed tremor threshold was exceeded, a semiautomatic process started to send faxes to Civil Defense and municipalities directly affected by tephra fallout, together with information on wind directions from the Meteorological Office. The application of this methodology, during the last 14 eruptive episodes in 2000 and the 14 events occurred in 2001, demonstrated the good correspondence between the forecasts on the areas affected by tephra fallout and the effective tephra distribution on land. Despite the integrity of the performance provided by the alert system, small discrepancies occurred in the technical procedure of alerting, for which possible solutions have been discussed. The improvement of this type of system, could become basic for the Etnean region and be proposed for similar volcanic areas throughout the world.

Annunziato, Alessandro. 2007. The tsunami assessment modeling system by the joint research center. ***Science of Tsunami Hazards*** **26(2): 76-92.**
The Tsunami Assessment Modeling System was developed by the European Commission, Joint Research Center, in order to serve Tsunami early warning systems such as the Global Disaster Alerts and Coordination System (GDACS) in the evaluation of possible consequences by a Tsunami of seismic nature. The Tsunami Assessment Modeling System is currently operational and is calculating in real time all the events occurring in the world, calculating the expected tsunami wave height and identifying the locations where the wave height should be too high. The first part of the paper describes the structure of the system, the underlying analytical models and the informatics arrangement; the second part shows the activation of the system and the results of the calculated analyses. The final part shows future development of this modeling tool.

Asgary, Ali, Jason K. Levy, and Nader Mehregan. 2007. Estimating the willingness to pay for a hypothetical earthquake early warning systems. ***Environmental Hazards*** **7(4): 311-320.**
The development of reliable, accessible, and transparent earthquake early warning systems (EEWSs) for disaster reduction have been given increased priority at local, national, and international levels. Accurately quantifying the social and economic benefits accrued to households and businesses from EEWSs are a challenging and difficult task. In this paper, the Contingent Valuation Method (CVM) is used to evaluate the benefits of a hypothetical EEWS to the citizens of Tehran Metropolitan. This study clarifies public willingness to pay (WTP) for EEWS in Tehran, and the dominant factors involved in WTP through a CVM analysis. The survey, completed by more than 504 households, showed that on average households are willing to pay 367,471 Rials (38 US$) per month for the hypothetical EEWS. Those willing to pay the most for EEWS are households, which currently possess a fire alarm. Also the more educated the respondents and the more children the respondents have, the more willing they are to pay for EEWS. These results could be used by policy makers and technology firms in order to determine the optimal investments in early warning systems for earthquake disaster reduction.

Barnes, Paul, Michael B. Charles, Mark Branagan, and Alistair Knight. 2007. Intelligence and anticipation: Issues in security, risk and crisis management. ***International Journal of Risk Assessment and Management*** **7(8): 1209-1223.**
This article deals with the way in which intelligence flows and other critical information can be embedded into a risk framework that will facilitate the early warning of

emerging threat scenarios. That is, an organization should be able to anticipate crisis triggers and know when a crisis situation will manifest itself. As an outcome, a conceptual framework that defines how to make sense of complex situations, datasets, and real world anomalies is suggested.

Benight, C. C., E.C. Gruntfest, M. Hayden, and L. Barnes. 2007. Trauma and short-fuse weather warning perceptions. *Environmental Hazards* 7(3): 220-226.
The purpose of this research was to assess the importance of psychological trauma in understanding reactions to short lead time weather warnings. The research consisted of two case studies: one in Denver, Colorado, and the other in Austin, Texas. A total of 61 individuals with 9 or greater traumas were compared to 281 non-trauma exposed individuals. Results demonstrated significant differences on questions related to general beliefs about flash floods and warning perceptions as well as reported anticipated actions during a flash flood at home. Results suggest that high trauma exposure may lead to more threat sensitivity and a higher probability of initiated action in a home-based flash flood.

Drobot, Sheldon and Dennis J. Parker. 2007. Advances and challenges in flash flood warnings. *Environmental Hazards* 7(3): 173-178.

Hayden, M. H., S. Drobot, S. Radil, C. Benight, E. C. Gruntfest, and L. R. Barnes. 2007. Information sources for flash flood warnings in Denver, CO and Austin, TX. *Environmental Hazards* 7(3): 211-219.
This research examines sources of information for flash floods in two large metropolitan areas, Denver, CO, and Austin, TX. Previous research has noted that information delivery systems for weather forecasts are geared toward the cultural majority and suggests that inadequate warnings are a primary contributor to deaths and injuries from hazards. This investigation used chi-square analysis to determine the prime warning source preferences and preferred time of day for receiving different media. Results indicate that successful warning messages need to be targeted toward specific sub-populations if the warning is to be received, understood, and responded to properly.

He, Xueqin Elaine, John P. Tiefenbacher, and Eric L. Samson. 2007. Hurricane evacuation behavior in domestic and international college students: The influences of environmental familiarity, expressed hurricane evacuation, and personal experience. *Journal of Emergency Management* 5(6): 61-69.
This study examines the cultural variation of risk perception and attitudes toward emergency evacuation. Although evacuation behavior is a direct consequence of perceived risk, few attempts have been made to consider the cross-cultural differences of evacuation behavior. This article compares domestic American and international university students' familiarity with their residential environments, their expressions of intent to evacuate in advance of hurricanes of varying strength, and their personal experiences with hurricanes and evacuations by examining related variables. Logistic regression was used to analyze the 2007 survey data. Results indicate that international students are more familiar with their residential risk conditions than domestic students. Environmental familiarity correlates positively with students' certainty of future evacuations. The expressed likelihood of evacuation under voluntary order also correlates positively with international and domestic students' certainty of future hurricane evacuation. Past disaster and evacuation experiences contribute to international students' certainty about future responses, but do not affect those of domestic students. Experiences with false alarms determine domestic students' certainty more than international students' future behaviors. Evacuation experiences associated with Hurricane Rita in 2005, increased all students' certainty of future hurricane evacuation.

Ladd, Anthony E., Duane A. Gill, and John Marszalek. 2007. Riders from the storm: Disaster narratives of relocated New Orleans college students in the aftermath of Hurricane Katrina. *Journal of Public Management and Social Policy* 13(2): 50-80.
Hurricane Katrina forced the evacuation of some 50,000 college students from New Orleans, as well as the closing of universities and the relocation of over 18,000 of these students to new colleges and universities around the country. While qualitative studies and oral histories of Katrina survivors have recently begun to appear, no research to date has examined the narrative accounts and experiences of college students who evacuated from New Orleans in the wake of this historic disaster. Utilizing qualitative data drawn from a Web-based survey of college students (N=7,100) displaced from their universities in the aftermath of the storm, this paper analyzes a diverse array of individual narratives that illustrate the disaster's salient impacts on their lives and education. These accounts thematically highlight traumatic events associated with students' evacuation and relocation, personal and financial loss, psychological stress, perceptions of recreancy, satisfaction with official disaster responses, educational impacts, and feelings about returning to New Orleans. It concludes by discussing the implications of this work for current disaster research, as well as the value of qualitative research for understanding the "voices of Katrina."

Loh, Elsie. 2007. Evacuation powers of emergency workers and emergency-service organizations in Australia. *Australian Journal of Emergency Management* 22(4): 3-7.
Every Australian state and territory has adopted the Australasian Fire Authorities Council's 'Prepare, Stay and Defend or Leave Early' policy (the Policy), which outlines how emergency service organizations (ESOs) and their members should respond to fire emergencies. As emergency response in Australia falls within state/territory jurisdiction, the powers given to ESOs and their members differ in each jurisdiction, which means the implementation of this nationally recognized policy will also be different in each state and territory. How it will be implemented will depend in part on the common law and in part on what powers (in particular evacuation powers) are provided to them by their respective state/territory legislation. This paper summarizes the powers of ESOs and their members to forcibly remove people from their homes for each state and territory in Australia. Victoria is generally

described as having a pecuniary interest evacuation model and the other states and territories as having the mandatory evacuation model. As described in the paper, such a dichotomy is simplistic.

Parker, Dennis, Sue Tapsell, and Simon McCarthy. 2007. Enhancing the human benefits of flood warnings. ***Natural Hazards*** **43(3): 397-414.**
This article evaluates some of the factors which limit the human benefits of hazard warnings, with specific reference to flood warnings, and concludes by suggesting ways of enhancing these benefits. The authors focus mainly upon the economic benefits generated by flood damage savings by households that warnings facilitate; health effects of flooding and flood warnings; and the effects of warnings on loss of life and physical injury. The results, based partly upon surveys of flooded households, reveal that economic benefits are currently more limited than previously thought, but that for several reasons these benefits are likely to be under-estimated. They argue that the intangible benefits to public health, safety and security must also be taken into account in decisions about investment in flood warnings. In England and Wales, the public's response to flood warnings is currently low and is a key benefit-limiting factor which could begin to undermine a recent major shift in national flood risk management policy towards a more people-centered, portfolio approach in which changing human behavior is viewed as important. Using a trans-disciplinary approach, the authors discuss the evidence and literature surrounding this poor response, and suggest a number of ways in which the issue may be addressed in future.

Parker, Dennis J., Sylvia M. Tunstall, and Simon McCarthy. 2007. New insights into the benefits of flood warnings: Results from a household survey in England and Wales. ***Environmental Hazards*** **7(3): 193-210.**
The flood defense agency in England and Wales has been pursuing a program of flood warning systems enhancement, engaging householders at risk in improving their warning responses. The immediate aim of this paper is to test and revise a model of economic benefits of warnings, but the survey data also generate insights into the constraints acting on flood warning responses. Damage saving is less than previously anticipated: warning reliability and householder availability problems limit savings. Warnings are less likely to be received by those in lower social grades, and flood warning lead time is a factor in avoiding damage. The survey data indicate the complexities involved in improving flood warning response and provide policy pointers.

Rashid, Harun, Wolfgand Haider, and Doug McNeil. 2007. Urban riverbank residents' evaluation of flood evacuation policies in Winnipeg, Manitoba, Canada. ***Environmental Hazards*** **7(4): 372-382.**
The results of a discrete choice experiment (DCE) as a part of a survey among the urban riverbank residents on the Red River in Winnipeg, Manitoba, Canada, indicated that the risk of over-dike flooding, set at 2 ft. above the 1997 flood water level, was a significant determinant of both voluntary and mandatory evacuation, compared to those set at the 1996 or 1997 levels. Mandatory evacuation was more preferred over voluntary evacuation when the likelihood of flooding was at its most severe, and the opposite relationship was the case when the likelihood was low. The notification time for evacuation, suggested as 1, 2, and 4 days, proved to be an insignificant attribute, whereas the respondents indicated significant preference for full flood compensation over an offer of either 80% or 90% flood relief, irrespective of the alternatives of voluntary or mandatory evacuation.

Rosenkoetter, Marlene M., Elanor K. Jrassen, Brenda K. Cobb, Sheila Bunting, and Martin Weinrich. 2007. Perceptions of older adults regarding evacuation in the event of a natural disaster. ***Public Health Nursing*** **24(2):160-168.**
This article investigates the evacuation needs and beliefs of older adults in two counties in Georgia; identifies health risk factors; and provides public health and emergency management officials with planning information. A descriptive survey using The Older Adult Disaster Evacuation Assessment was given to 139 lower socioeconomic participants at congregate meal sites. Over 70% said they would definitely evacuate in the future and nearly 16% would probably evacuate, yet over 13% reported 'maybe'' or 'no.'' Multiple logistic regressions suggest that those who do not trust the media and county officials' information would have only 1/4 the odds of definitely evacuating. Those who say they would not follow their county officials' advice have only 1/3 the odds of definitely evacuating. Primary health problems were decreased mobility (40.1%), hypertension (70.5%), and arthritis (53.2%). Forty-six percent would need transportation; approximately 40% lived alone; and about 40% had fair or poor health. Trust and belief in county officials and the media were the best predictors of willingness to evacuate. Participants in this study would need assistance with transportation, preparation, and support for serious health problems in order to evacuate. Further study is needed with a larger, more representative sample.

Schultz, Carl H, Kristi L Koenig, and Roger J. Lewis. 2007. Decision making in hospital earthquake evacuation: Does distance from the epicenter matter? ***Annals of Emergency Medicine*** **50(3): 320-326.**
Over large expanses, the risk for hospital damage from an earthquake attenuates as the distance from the epicenter increases, which may not be true within the immediate disaster zone (near field), however. The following study examines the impact of epicenter distance and ground motion on hospital evacuation and closure for those structures near the epicenter of the 1994 Northridge earthquake and the implications for patient evacuation. This is a retrospective case-control study of all hospitals reporting off-site evacuations or permanent closure because of damage from the January 17, 1994, earthquake in Northridge, California. Control hospitals were randomly identified from those facilities that did not evacuate patients. Distances from the epicenter and peak ground accelerations were calculated for each hospital from Trinet ShakeMap data and compared. Eight hospitals evacuated patients (study group); 4 of these hospitals were con-

demned. These were compared to 8 hospitals that did not evacuate patients (control group). The median epicenter-to-hospital distance for evacuated facilities was 8.1 miles (interquartile range [IQRs] 4.0 to 17.2 miles), whereas that for nonevacuated facilities was 14.1 miles (IRQ 10.5 to 17.0 miles). The difference in the median distances was 6.0 miles (95% confidence interval 4.8 to 11.9 miles). The peak ground acceleration had a median of 0.77g (IQR 0.53 to 0.85g) for study hospitals and a median of 0.36g (IQR 0.24 to 0.50g) for control hospitals, where 1g equals the force of gravity. The difference in median acceleration of 0.41g (95% CI 0.14 to 0.55g) was significant (P=.009). The distances from the epicenter for evacuated or condemned facilities and control hospitals do not appear to differ in the near field. Peak ground acceleration is a superior indicator of the risk for hospital damage and evacuation. Physicians can obtain these data in real time from the Internet and should transfer patients to facilities in areas of lower recorded peak ground acceleration regardless of distance from the epicenter.

Tibbits, Amalie, and Josh Whittaker. 2007. Stay and defend or leave early: Policy problems and experiences during the 2003 Victorian bushfires. ***Environmental Hazards*** **7(4): 283-290.**

Australian state and territory fire authorities advise residents to make a decision to prepare, stay and defend their properties from bushfires or leave well before the fire arrives in their area. The 'Stay and defend or leave early' policy is underpinned by strong evidence that well-prepared houses can be successfully defended and that late evacuation is a dangerous strategy. This paper presents the results of a study of the policy's implementation during the 2003 bushfires in North East Victoria and East Gippsland. Results suggest that despite high levels of awareness and support for the policy, there is some confusion over what it means to 'stay and defend' and 'leave early'.

Yi, Wei, and Linet Ozdamar. 2007. A dynamic logistics coordination model for evacuation and support in disaster response activities. ***European Journal of Operational Research*** **179(3): 1177-1193.**

This paper describes an integrated location-distribution model for coordinating logistics support and evacuation operations in disaster response activities. Logistics planning in emergencies involves dispatching commodities (e.g., medical materials and personnel, specialized rescue equipment and rescue teams, food, etc.) to distribution centers in affected areas and evacuation and transfer of wounded people to emergency units. During the initial response time it is also necessary to set up temporary emergency centers and shelters in affected areas to speed up medical care for less heavily wounded survivors. In risk mitigation studies for natural disasters, possible sites where these units can be situated are specified according to risk based urban structural analysis. Logistics coordination in disasters involves the selection of sites that result in maximum coverage of medical need in affected areas. Another important issue that arises in such emergencies is that medical personnel who are on duty in nearby hospitals have to be re-shuffled to serve both temporary and permanent emergency units. Thus, an optimal medical personnel allocation must be determined among these units. The proposed model also considers this issue. The proposed model is a mixed integer multi-commodity network flow model that treats vehicles as integer commodity flows rather than binary variables. This results in a more compact formulation whose output is processed to extract a detailed vehicle route and load instruction sheet. Post processing is achieved by a simple routing algorithm that is pseudo-polynomial in the number of vehicles utilized, followed by the solution of a linear system of equations defined in a very restricted domain. The behavior and solvability of the model is illustrated on an earthquake scenario based on Istanbul's risk grid as well as larger size hypothetical disaster scenarios.

Wildfires

Hughes, Peter, Peter B. White, and Erez Cohen. 2007. Bushfires and the media: A cultural perspective. ***Australian Journal of Emergency Management*** **22(4): 14-20.**

Indian, Jenny. 2007. The use of local knowledge in the Australian high country during the 2003 bushfires. ***Australian Journal of Emergency Management*** **22(4): 27-33.**

The concept of local knowledge in fire management has long been recognized as important. Rural communities carry most of the burden of bushfire; yet, fire managers have often proceeded in the absence of key local knowledge held within these communities. Despite this, the significance of local knowledge in bushfire management, its meaning, and practical application remain vague. Here, the role of local knowledge is discussed as a tool in fire planning and explored as a crucial part of the community engagement process, allowing rural communities the chance to play a more active role in fire management. In turn, by way of two case studies in the high country, the impact of this involvement, or otherwise, is considered in relation to the resilience of two specific rural communities.

Tibbits, Amalie, and Josh Whittaker. 2007. Stay and defend or leave early: Policy problems and experiences during the 2003 Victorian bushfires. ***Environmental Hazards*** **7(4): 283-290.**

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Wind Storms, Winter Storms, Lightning, and Other Severe Weather

King, Vereda Johnson, and Cynthia Davis. 2007. A case study of urban heat islands in the Carolinas. ***Environmental Hazards*** **7(4): 353-359.**

Urbanization tends to aggravate the negative effects of climate. The objective of this research is to aid in the understanding of the spatial variation of urban heat islands within selected cities in North and South Carolina. This understanding will help guide efforts to cool cities in order to increase human comfort, conserve energy and resources, and reduce air pollution in both of these states.

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