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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The Natural Hazards Center is funded through a National Science Foundation grant and supplemented by contributions from a consortium of federal agencies and nonprofit organizations dedicated to reducing vulnerability to disasters. Visit the Center at www.colorado.edu/hazards/.

All Hazards

Anastario, Michael, Nadine Shehab, and Lynn Lawry. 2009. Increased gender-based violence among women internally displaced in Mississippi two years post-Hurricane Katrina. *Disaster Medicine and Public Health Preparedness* 3 (1): 18-26.

Although different types of gender-based violence (GBV) have been documented in disaster-affected populations, no studies have documented a quantitative increase in rates of GBV among populations living in protracted displacement after a disaster. The authors assessed the change in rates of GBV after Hurricane Katrina among internally displaced people (IDPs) living in travel trailer parks in Mississippi. The study design included successive cross-sectional randomized surveys, conducted in 2006 and 2007, among IDPs in Mississippi using a structured questionnaire. The authors sampled 50 travel trailer parks in nine counties in Mississippi in 2006, and 69 parks in 20 counties in 2007. A total of 420 female respondents comprised the final sample. The authors measured respondent demographics, forms of GBV including sexual and physical violence further subtyped by perpetrator, suicidal ideation, suicide attempt, and Patient Health Questionnaire-assessed depression. Respondents had a mean age of 42.7 years. The crude rate of new cases of GBV among women increased from 4.6/100,000 per day to 16.3/100,000 per day in 2006, and remained elevated at 10.1/100,000 per day in 2007. The increase was primarily driven by the increase in intimate partner violence. GBV experience was significantly associated with increased risk for poor mental health outcomes. Overall, the rate of GBV, particularly intimate partner violence, increased within the year following Hurricane Katrina and did not return to baseline during the protracted phase of displacement. Disaster planning efforts should incorporate plans to decrease the incidence of GBV following a disaster, and to ensure adequate services to people with post-disaster GBV experience.

Angeletti, Michelle A. 2009. Breastfeeding support in emergencies: Policy implications for humanitarian relief agencies. *Journal of Emergency Management* 7 (1): 39-44.

While breastfeeding provides numerous benefits to infants and young children, these benefits are especially evident during and after emergencies. This article describes the benefits of breastfeeding

in emergencies and provides guidelines that can be implemented by humanitarian relief agencies to protect, promote, and support breastfeeding.

Aziz, Zeeshan, Feniosky Pena-Mora, Albert Chen, and Timothy Lantz. 2009. Supporting urban emergency response and recovery using RFID-based building assessment. ***Disaster Prevention and Management*** **18 (1): 35-48.**

This paper focuses on improving mobile computing support during a disaster response and recovery operation to aid in the assessment of building damage, as well as making assessments available for to ensure a safe, efficient and effective disaster response process. The research method involved the use of scenario-based, user needs analysis for studying end-user needs and requirements. The Rational Unified Process for software design and implementation was also used. An IT-supported collaboration platform was developed to enable first responders to communicate using hand-held devices and laptops, as well as to share critical building evaluation information using a ad hoc mobile network. A trial of the system was conducted at Illinois Fire Services Institute. Mobile devices with Radio Frequency Identification (RFID) and tags can be used for posting, gathering, storing, and sharing assessments with fewer errors, which leads to improved emergency response effectiveness. The key research contribution includes analysis of the first responder information needs, development of a collaborative framework for urban preparedness and emergency response, demonstration using realistic disaster scenarios, and implementation and validation of the prototype system.

Currion, Paul. 2009. Only connect: Problem sciences, information systems and humanitarian reform. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 29-40.**

The introduction of information systems and the humanitarian reform process have a tremendous impact on how humanitarian assistance is delivered, yet the two processes are weakly connected. As a result, the humanitarian community fails to realize the potential of information technology in supporting key reform aspects and doesn't recognize technology is likely to render many reform discussions moot. The balance of knowledge is shifting toward those affected by disaster, implying that technology will increasingly empower them to cope more effectively with disaster impact. Traditional actors in the humanitarian community must incorporate this reality into its processes or risk being overtaken by newer and more agile institutions that might not be concerned with humanitarian principles.

Gyo-hua, Chen, Liang Tao, and Zhang Hua-wen. 2009. Study on the methodology for evaluating urban and regional disaster carrying capacity and its application. ***Safety Science*** **47 (1): 50-58.**

During the past several decades, most cities and regions in the world have experienced constant growing rates of congregation of population, production, and wealth, thus becoming more vulnerable and fragile when facing sudden accidents and disasters. Hence there is an urgent necessity for innovation to provide better quantitative assessment techniques for evaluating the capacity of a city or region to carry accidents and disasters. The paper aims to put forward a quantitative evaluation approach for urban & regional disaster carrying capacity (UR-DCC) from the viewpoint of disaster prevention, resistance, rescue, and recovery. Based on the analysis of urban and regional disaster theory, and influencing factors of carrying capacity, a structured, layered evaluation index system was established. Through multi-factor modeling theory, the weight of each factor as well as its influence on the whole system was analyzed, the method of index weight analysis was also improved, and an evaluation model for disaster carrying capacity (DCC) was found. Finally, an application of the model was demonstrated to determine the parameters of all indices by using numerous first-hand data and information obtained from field investigations. It's proven that the results of the research correspond with reality, reflecting the weakest points during the process of disaster management. The model can be of significant value to improve UR-DCC.

Kessler, Ronald C., Terence M. Keane, Robert J. Ursano, Ali Mokdad, and Alan M. Zaslavsky. 2008. Sample and design considerations in post-disaster mental health needs assessment tracking surveys. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys*** **17 (S2): S6-S20.**

Although needs assessment surveys are carried out after many large natural and man-made disasters, synthesis of findings across these surveys and disaster situations about patterns and correlates of need is hampered by inconsistencies in study designs and measures. Recognizing this problem, the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA) assembled a task force in 2004 to develop a model study design and interview schedule for use in post-disaster needs assessment surveys. The U.S. National Institute of Mental Health subsequently approved a plan to establish a center to implement post-disaster mental health needs assessment surveys in the future using an integrated series of measures and designs of the sort proposed by the SAMHSA task force. A wide range of measurement, design, and analysis issues will arise in developing this center. Given that the least widely discussed of these issues concerns study design, the current report focuses on the most important sampling and design issues proposed for this center based on our experiences with the SAMHSA task force, subsequent Katrina surveys, and earlier work in other disaster situations.

Kessler, Ronald C., and Hans-Ulrich Wittchen. 2008. Post-disaster mental health needs assessment surveys: The challenge of improved future research. ***International Journal of Methods in Psychiatric***

Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys **17 (S2): S1-S5.**
Disasters are very common occurrences, becoming increasingly prevalent throughout the world. The number of natural disasters either affecting more than 100 people or resulting in a call for international assistance, increased from roughly 100 per year worldwide in the late 1960s, to over 500 per year in the past decade. Population growth, environmental degradation, and global warming all play parts in accounting for these increases. There is also the possibility of a pandemic. This paper covers a topic of growing worldwide importance: mental health needs assessment in the wake of large-scale disasters. Although natural and human-made disasters are known to have substantial effects on the mental health of the people who experience them, research shows that the prevalence of post-disaster psychopathology varies enormously from one disaster to another in ways that are difficult to predict merely by knowing the objective circumstances of the disaster. Mental health needs assessment surveys are consequently carried out after many large-scale natural and human-made disasters to provide information for service planners on the nature and magnitude of need for services. These surveys vary greatly, though, in the rigor with which they assess disaster-related stressors and post-disaster mental illness. Synthesis of findings across surveys is hampered by these inconsistencies. The typically limited focus of these surveys with regard to the inclusion of risk factors, follow-up assessments, and evaluations of treatment, also limit insights concerning post-disaster mental illness and treatment response. The papers in this issue discuss methodological issues in the design and implementation of post-disaster mental health needs assessment surveys aimed at improving on the quality of previous such surveys. The many recommendations in these papers will help to foster improvements in the next generation of post-disaster mental health surveys.

Li, Yue, and Bruce R. Ellingwood. 2009. Framework for multihazard risk assessment and mitigation for wood-frame residential construction. ***Journal of Structural Engineering*** **135 (2): 159-168.**
Wood-frame residential construction represents a major investment in the United States which, when exposed to hurricanes, earthquakes, and other natural hazards, may sustain substantial damage. Although in many parts of the country one natural hazard dominates, in certain areas multiple hazards may pose a significant threat to buildings. Building design and construction practices should address the overall risk to residential construction from multiple hazards to achieve design strategies and risk levels that are consistent with occupant expectations and social objectives. This paper presents a framework for multihazard risk assessment using hurricane and earthquake hazards as an example. Structural reliability-based methods that describe natural hazard and structural system response probabilistically are essential for quantifying expected losses from natural disasters and for developing appropriate strategies to manage risk. The framework permits the main sources of uncertainty that affect building performance to be identified, and provides insight on strategies for effective multihazard mitigation efforts.

Pathiraja, Milinda, and Paolo Tombesi. 2009. Towards a more "robust" technology? Capacity building in post-tsunami Sri Lanka. ***Disaster Prevention and Management*** **18 (1): 55-65.**
In fast urbanizing economies such as Sri Lanka, the construction industry tends to fragment into almost separate spheres of production with little or no reciprocation in training, know-how, and career development. Consequently internal knowledge dissemination and technology transfer are limited. This type of industrial compartmentalization is detrimental to the social acquisition of skills and restricts the operational frameworks of given technologies, especially in low-cost sectors. Against this backdrop, this paper speculated on how design can act as an engine of social and economic growth for those involved in its production. Based on government statistics and building output analysis, the paper argues architects can build labor policy-making into the design of their buildings. Such an agenda would have to be developed strategically, by examining a region's industrial base and by defining a design and technological vocabulary that feeds off the analysis of place-specific conditions, limitations, and ambitions. The integration of technological development and broad socioeconomic growth can be facilitated by "open" (or incremental) industrial design strategies that connect construction markets. To this end, it is posited that technological contamination and compromise can help the labor force increase skills progressively. In practical terms, this objective translates to the definition of building techniques that adapt to the complexity required and expenditure possible without compromising the expected performance of the building, i.e. they must be inherently robust—as opposed to precise—and therefore more sensitive. The paper is the initial result of a thesis-in-progress that, on the basis of a technical review carried out on a small sample of ideal-type projects in Sri Lanka, is considering ways to create and link labor development opportunities through architectural design.

Rosborough, Stephanie, Jennifer L. Chan, and Parveen Parmar. 2009. Responding to gender-based violence in disasters: Grappling with research methods to clear the way for planning. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 8-10.**

Schwartz, Jeffrey A. 2009. Planning for the last disaster: Correctional facilities and emergency preparedness. ***Journal of Emergency Management*** **7 (1): 75-79.**
This study uses hurricanes Katrina and Rita to illustrate the phenomenon of "planning for the last disaster," in which public agencies become so transfixed by a profound crisis or disaster that they begin to prepare for another occurrence of the same event. In doing so, they abandon or ignore their ongoing

and more generic emergency planning and deny the obvious, that the next emergency or disaster has a high probability of being a very different situation. The same counterproductive results can be obtained if an organization is swept up in media hype and public concern about an "emergency du jour," such as Y2K or pandemic flu. Although this article examines these issues in correctional organizations, the same principles apply to almost all public agencies.

Somers, Scott. 2009. Measuring resilience potential: An adaptive strategy for organizational crisis planning. ***Journal of Contingencies and Crisis Management*** **17 (1): 12-23.**

There are questions whether a causal relationship exists between crisis planning and effective adaptive behaviors in crisis. Traditional planning has viewed the plan as an outcome of a process to be utilized in a step-by-step fashion during a crisis. This article challenges this orthodox view suggesting a new paradigm, focusing on creating organizational structures and processes to build organizational resilience potential. The objective is to develop a scale to measure latent resilience in organizations. This exploratory research builds a critical foundation of knowledge to consider a move towards a new paradigm in disaster planning, one based on building organizational resilience potential as the focus of future research.

Thanurjan, Rajendram, and Indunil P. Seneviratne. 2009. The role of knowledge management in post-disaster housing reconstruction. ***Disaster Prevention and Management*** **18 (1): 66-77.**

A disaster is a serious disruption for the operation of a society, causing extensive life and property losses. Since construction activities are highly knowledge intensive, knowledge management (KM) practices will encourage continuous improvement, distribute best practices, quick response to beneficiaries, share valuable tacit knowledge, reduce rework, improve competitiveness and innovations, and reduce complexities in post-disaster housing reconstruction. This research explores the degree to which KM is involved in post-disaster housing reconstruction and the effect that KM has on post-disaster housing reconstruction in the Sri Lanka. The study was conducted by systematically reviewing the literature in KM to highlight the basic principles. Data collection mode for the study was close-end questionnaires and semi-structured interviews. Data were collected from donor and consultancy organizations which are involved in post-disaster housing reconstruction in Sri Lanka. The results show that most of the donors and consultancy organizations carry out permanent disaster housing reconstruction for tsunami devastation. Further, the study reveals that organizations use competencies and repositories as the main sources of knowledge internal and external to the organization. Project reviews, task teams, face-to-face interactions, and electronic mail systems were greatly used to support KM. Even though the performance of the work was improved through KM, lack of compiling and synthesizing the accumulated data, information and knowledge, storing, and organizing would be the main challenge faced by these organizations. It is evident that a more concerted and formal approach will improve disaster housing reconstruction. Since knowledge gatekeepers have extensive tacit and explicit knowledge, the organizations must use it. Even though the majority of the donors and consulting organizations used competencies and repositories as main sources of knowledge, the identification and exploitation of a variety of appropriate sources are of central importance. Organizations must focus on a variety of IT tools to store knowledge for future use. Finally, the organizations have to provide an appropriate rewards system to encourage their employees in participating in KM. Disaster housing reconstruction will not end on a certain point. It is a continuous process. Formal KM systems will improve the present state and provide proper knowledge in the future. There should be a standardized practice to improve the performance and provide value for beneficiaries. Proper KM will improve the status of post-disaster housing reconstruction.

Youmans, Jeff. 2009. An introduction to netcentric operations and services-oriented architectures for emergency managers. ***Journal of Emergency Management*** **7 (1): 71-74.**

The winds of change are upon us (once again). In the computer world, it seems changes like this happen every other day. In this case, however, it really is revolutionary. The flow of information within your department and within other departments is going to move faster than ever before. It's a wholesale architectural change that, for once, will not affect the computer in your car or on your desk, but will affect how the data are accessed. The objective of the services-oriented architecture is to obtain the overall goal of netcentric operations and speed the flow of data. The end goal is to resolve disastrous situations, get help to the victims, and track suspects faster than ever before.

Business Continuity

Alpaslan, Can M., Sandy E. Green, and Ian I. Mitroff. 2009. Corporate governance in the context of crises: Towards a stakeholder theory of crisis management. ***Journal of Contingencies and Crisis Management*** **17 (1): 38-49.**

This article takes a step towards developing a stakeholder theory of crisis management. It argues that, in the context of crises, adopting the principles of a stakeholder model of corporate governance will lead companies to engage more frequently in proactive and/or accommodating crisis management behavior even if these crisis management behaviors are not perceived to maximize shareholder value. The article also proposes a mechanism to explain why the stakeholder model may be associated with more successful crisis

management outcomes. It concludes by challenging the efficacy of the shareholder view in crisis situations, and calls for further theoretical and empirical research.

Doocy, Shannon, Amy Daniels, and Daniel Aspilcueta. 2009. Mortality and injury following the 2007 Ica earthquake in Peru. ***American Journal of Disaster Medicine*** **4 (1): 15-22.**

This paper quantifies earthquake injury and mortality from the 2007 Ica earthquake in Peru and assesses earthquake-related risk and vulnerability. The design was a population-based cluster survey of households in the region most affected by the quake. A stratified cluster survey design was used to allow for comparison between urban, peri-urban, and rural areas, where different outcomes were anticipated as a result of variation in building practices and access to post-earthquake assistance. A total of 42 clusters of 16 households were planned to allow for comparison between the location types and to ensure adequate spatial coverage. The four affected provinces are in southern Peru: Ica, Pisco, Chincha, and Canete. A total of 672 randomly selected households with a combined population of 3,608 individuals, of which 3,484 (97 percent) were reported as household members on the day of the earthquake. Mortality and injury rates in the four most affected provinces were estimated at 1.4 deaths per 1,000 exposed (95 CI: 0.5-3.3) and 29 injuries per 1,000 exposed (95 CI: 6-52). Older adults and members of households of lower socioeconomic status faced increased risk of injury. No significant differences in injury rates were observed between rural, urban, and peri-urban residence areas. Populations of lower socioeconomic status faced increased risk of injury. However, no differences in injury rates were observed between rural, urban, and peri-urban communities. Study findings suggest that earthquake preparedness and mitigation efforts should focus on population subgroups of lower socioeconomic in both rural and urban areas of earthquake-prone regions.

Eisenman, David P., Qiong Zhou, Michael Ong, Steven Asch, Deborah Glik, and Amy Long. 2009. Variations in disaster preparedness by mental health, perceived general health, and disability status. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 33-40.**

Chronic medical problems, mental illness, and disability increase vulnerability to disasters. National efforts have focused on preparing people with disabilities. Studies find them to be increasingly prepared, but less is known about people with chronic mental and medical illnesses. The authors examined the relationship between health status (mental health, perceived general health, and disability) and disaster preparedness (home disaster supplies and family communication plan). A random digit-dial telephone survey of the Los Angeles County population was conducted from October 2004 to January 2005 in 6 languages. Separate multivariate regressions modeled determinants of disaster preparedness, adjusting for sociodemographic covariates then sociodemographic variables and health status variables. Only 40.7 percent of people who rated their health as fair/poor have disaster supplies compared with 53.1 percent of those who rate their health as excellent ($P < 0.001$). Only 34.8 percent of people who rated their health as fair/poor have an emergency plan compared with 44.8 percent of those who rate their health as excellent ($P < 0.01$). Only 29.5 percent of people who have a serious mental illness have disaster supplies compared with 49.2 percent of those who do not have a serious mental illness ($P < 0.001$). People with fair/poor health remained less likely to have disaster supplies (adjusted odds ratio [AOR] 0.69, 95 percent confidence interval [CI] 0.500.96) and less likely to have an emergency plan (AOR 0.68, 95 percent CI 0.510.92) compared with those who rate their health as excellent, after adjusting for the sociodemographic covariates. People with serious mental illness remained less likely to have disaster supplies after adjusting for the sociodemographic covariates (AOR 0.67, 95 percent CI 0.480.93). Disability status was not associated with lower rates of disaster supplies or emergency communication plans in bivariate or multivariate analyses. Finally, adjusting for the sociodemographic and other health variables, people with fair/poor health remained less likely to have an emergency plan (AOR 0.66, 95 percent CI 0.480.92) and people with serious mental illness remained less likely to have disaster supplies (AOR 0.67, 95 percent CI 0.470.95). People who report fair/poor general health and probable serious mental illness are less likely to report household disaster preparedness and an emergency communication plan. The results could add to our understanding of why people with preexisting health problems suffer disproportionately from disasters. Public health may consider collaborating with community partners and health services providers to improve preparedness among people with chronic illness and people who are mentally ill.

Hochrainer, Stefan, Reinhard Mechler, and Georg Pflug. 2008. Climate change and financial adaptation in Africa: Investigating the impact of climate change on the robustness of index-based microinsurance in

Malawi. ***Mitigation and Adaptation Strategies for Global Change*** **14 (3): 231-250.**
This paper discusses the applicability of crop insurance for the case of Malawi. It explores the potential impact of climate change on the viability of the Malawi weather insurance program, using of scenarios of climate change-induced variations in rainfall patterns. By combining catastrophe insurance modeling with climate modeling, the methodology demonstrates the feasibility, albeit with large uncertainties, of estimating the effects of climate variability and climate change on the near- and long-term future of microinsurance schemes serving the poor. By providing a model-based estimate of insurance back-up capital necessary to avoid ruin under climate variability and climate change, along with the associated uncertainties and data limitations, this methodology can quantitatively demonstrate the need for financial assistance to protect micro-insurance pools against climate-induced insolvency. This is of major concern to donors, nongovernmental organizations and others supporting these innovative systems, those actually at-risk and insurers providing insurance. A quantitative estimate of the additional burden that climate change imposes on weather insurance for poor regions is of interest to organizations funding adaptation. Further, by linking catastrophe modeling to regionalized climate modeling, the analysis identifies key modeling inputs necessary as well as important constraints. The article ends with a discussion of the opportunities and limits to similar modeling and weather predictability for Sub-Saharan Africa beyond the case of Malawi.

Nakamura, Karen. 2009. Disability, destitution, and disaster: Surviving the 1995 Great Hanshin Earthquake in Japan. ***Human Organization*** **68 (1): 82-88.**
On the morning of January 17, 1995, a magnitude 7.3 earthquake struck the port city of Kobe, Japan. 6,400 people died and over $80 billion in property damage occurred. Among those rendered homeless was a small group of people with severe disabilities. Over the next decade, this group leveraged discourses surrounding civil society, disability, poverty, and the role of government in natural disasters, to become one of the most powerful and vocal proponents of disability rights in Japan. This article discusses what lessons we can learn to make disability advocacy a leading, rather than trailing, element of social policy.

O'Dempsey, Tim. 2009. Fair training: A new direction in humanitarian assistance. ***Progress in Development Studies*** **9 (1): 81-86.**
Major catastrophes appear to be inevitable given the growth of mega-cities in disaster hotspots, the predicted effects of global climate change, and the crucial relationship between natural disasters and complex political emergencies. Disaster prevention, preparedness, and contingency planning will be effective only if trained personnel are available to develop these plans and implement them in a timely manner. Workforce migration— driven by poverty, insecurity, and lack of opportunity—creates a vacuum of leadership and skills that increases the remaining population's vulnerability even further. Sustainable solutions to the problems of disasters and development will only be achieved when poor people have local access to fair training.

Climate Change, Drought & El Nino

Bissell, Richard A., Andrew Bumbak, Matthew Levy, and Patrick Echebi. 2009. Long-term global threat assessment: Challenging new roles for emergency managers. ***Journal of Emergency Management*** **7 (1): 19-37.**
Based on currently available published data and literature from multiple disciplines, this article introduces medium- and long-term global developments and changes that will likely impact human society in disastrous or even catastrophic fashion, with significant impact on the roles and challenges of emergency managers. Some of the phenomena described include the following: (1) loss of fresh water, (2) significant sea level rise with resultant flooding, (3) increased heat leading to desertification and crop losses, (4) storms that are both more frequent and more violent, (5) massive food emergencies as crops fail for lack of water and/or saltwater inundation, (6) loss of the petroleum-based economy, and (7) massive population relocations on a level the world has never experienced. The perspective used is global, in that the trends described do not respect political boundaries. We also recognize that mitigation and response activities may well involve many nations simultaneously. The article concludes with suggestions of steps emergency management should take in preparing to serve new and more complex tasks to meet coming challenges, and a "call to action" for emergency managers to assume a more active role in confronting the risks imposed by forces that are now underway.

Blennow, Kristina, and Johannes Persson. 2009. Climate change: Motivation for taking measure to adapt. ***Global Environmental Change*** **19 (1): 100-104.**
The authors tested two consequences of a currently influential theory based on the notion of seeing adaptations to climate change as local adjustments to deal with changing conditions within the constraints of the broader economic, social, and political arrangements. The notion leaves no explicit role for the strength of personal beliefs in climate change and adaptive capacity. The consequences were: (1) adap-

tive action to climate change taken by an individual who is exposed to and sensitive to climate change is not influenced to a considerable degree by their strength of belief in climate change, and; (2) adaptive action to climate change taken by an individual who is exposed to and sensitive to climate change is not influenced to a considerable degree by their strength of belief in an adaptive capacity. Data from a 2004 questionnaire of 1,950 Swedish private individual forest owners, who were assumed exposed to and sensitive to climate change, were used. Strength of belief in climate change and adaptive capacities were found to be crucial factors for explaining observed differences in adaptation among Swedish forest owners.

Chang, Heejun, Jon Franczyk, and Changhwan Kim. 2009. What is responsible for increasing flood risks? The case of Gangwon Province, Korea. ***Natural Hazards*** **48 (3): 339-354.**

The authors examined the anthropogenic and natural causes of flood risks in six representative cities in the Gangwon Province of Korea. Flood damage per capita is mostly explained by cumulative upper five percent summer precipitation amount and the year. The increasing flood damage is also associated with deforestation in upstream areas and intensive land use in lowlands. Human encroachment on floodplains made these urban communities more vulnerable to floods. Without changes in the current flood management systems of these cities, their vulnerability to flood risks will remain and may even increase under changing climate conditions.

Chhibber, Ajay, and Rachid Laajaj. 2008. Disasters, climate change and economic development in Sub-Saharan Africa: Lessons and directions. ***Journal of African Economics*** **17 (2): 7-49.**

This paper explores the links among natural disasters, climate change, and economic development and attempts to outline a framework for their consideration. The paper summarizes the limited knowledge of long-term economic impacts of natural disasters. Linking disasters, resource management, conflicts, and other transmission channels is necessary to develop an appropriate response. The paper argues African governments, along with their development partners, need to develop a more robust disaster adaptation and response capability as part of development planning. The paper makes the case for more market-based financing mechanisms and for emphasizing forecasting research. It also argues for more work linking climate change and disasters and for looking at disaster resilience as a continuum to development strategy.

Fontaine, Matthew M., and Anne C. Steinemann. 2009. Assessing vulnerability to natural hazards: Impact-based method and application to drought in Washington State. ***Natural Hazards Review*** **10 (1): 11-18.**

This article presents a vulnerability assessment technique using measures of exposure, sensitivity, and adaptive capacity. Historically, vulnerability assessments focused on analyzing the hazard without considering causes or mitigation. The vulnerability assessment method (VAM), presented here, acquires data and information from affected stakeholders to assess not only the hazard, but also the causes of vulnerability, potential for adaptation, previous impacts, and ways to mitigate future impacts. Researchers applied the VAM to a case study of Washington State that assessed drought vulnerability across 34 subsectors. Results indicate the highest vulnerability for dry land farmers, farmers with junior water rights, fisheries, ski area operators, berry farmers, and the green industry. Through validation exercises, they demonstrate the VAM's internal consistency and external applicability. Contributions of the VAM include incorporation of stakeholder data, integrated and quantitative assessments of vulnerability components, and applicability to other regions, scales, and types of hazards.

Forbes, Bruce C., and Florian Stammler. 2009. Arctic climate change discourse: The contrasting politics of research agendas in the West and Russia. ***Polar Research*** **28 (1): 28-42.**

This paper explores how Western scientific concepts and attitudes towards indigenous knowledge, as they pertain to resource management and climate change, differ from the prevailing view in modern Russia. Western indigenous leaders representing the Inuit and Saami peoples are actively engaged in the academic and political discourse surrounding climate change, whereas their Russian colleagues tend to focus more on legislation and self-determination, as a post-Soviet legacy. The article contributes to the debate with data from the Nenets tundra, showing how different research has employed the three crucial Western research paradigms of climate change, wildlife management, and indigenous knowledge on the ground. It suggests that the daily practice of tundra nomadism involves permanent processes of negotiating one's position in a changing environment, which is why "adaptation" is woven into the society and cosmology as a whole, rather than being separable into distinct "bodies" of knowledge or Western-designed categories. The article also argues that research agendas should be placed in their proper local and regional context, and temporal framework: for example, by collaborating with herders on the topics of weather instead of climate change; herding skills instead of wildlife management; and ways of engaging with the tundra instead of traditional ecological knowledge.

Geertsema, M., J.W. Schwab, A. Blais-Stevens, and M.E. Sakals. 2009. Landslides impacting linear infrastructure in west central British Columbia. ***Natural Hazards*** **48 (1): 59-72.**

Destructive landslides are common in west central British Columbia. Landslides include debris flows and slides, earth flows and flowslides, rock falls, slides, and avalanches, and complex landslides involving both rock and soil. Pipelines, hydrotrans-

mission lines, roads, and railways have all been impacted by these landslides, disrupting service to communities. This article provides examples of the destructive landslides, their impacts, and the climatic conditions associated with the failures. It also considers future landsliding potential for west central British Columbia under climate change scenarios.

Gonen, Amnon, and Naomi Zeitouni. 2008. Using risk management to increase the flexibility of transboundary water conflict resolutions. ***International Journal of Risk Assessment and Management*** **10 (4): 373-385.**
With the increase in world population and the diminishing water quality and quantity, water scarcity is increasing. As access to water is essential to the prosperity of communities, the threat of conflict over the use of transboundary water is increasing. Surface and groundwater that cross international boundaries present increased challenges to regional stability because hydrologic needs can often be overwhelmed by political considerations. The success of an agreement over water conflicts greatly depends on the flexibility of the agreement in the presence of new risks and challenges. This flexibility may be accomplished through the establishment of formal institutions and/or legislation set up for the purpose of problem solving. These institutions are essential for the maintenance of cooperative interactions over water. This work suggests the use of the risk management method most commonly utilized in the planning and developing of complex industrialized projects to increase the flexibility of transboundary agreements.

Haruvy, Nava, Sarit Shalhevet, and Yehunda Bachmat. 2008. Risk management of transboundary water resources: Sustainable water management of the River Jordan basin area. ***International Journal of Risk Assessment and Management*** **10 (4): 339-356.**
The River Jordan basin suffers from regional water scarcity, wide economic discrepancies, and a long-lasting dispute over land ownership. Prolonged, widespread unsustainable management has significantly decreased the water flow and aggravated water pollution. The river is now seriously at risk of drying up, with the loss of a unique ecosystem with important religious and cultural significance. Sustainable management practices are needed, based on the local physical and hydrological conditions, the available technologies, the economic costs, and the potential policy options. Our multidimensional model incorporates these factors. It provides a decision-making tool that supports urban and agricultural water supply planning, with predetermined water quality for each use. A case study in Israel yielded a framework for application of the model to transboundary water management, by adjusting it for the differing costs and technologies in the various countries involved. A variety of potential interna

tional agreements were considered as scenarios for the model.

Heltberg, Rasmus, Paul Bennett Siegel, and Steen Lau Jorgensen. 2009. Addressing human vulnerability to climate change: Toward a 'no-regrets' approach. ***Global Environmental Change*** **19 (1): 89-99.**
This paper presents and applies a conceptual framework to address human vulnerability to climate change. Drawing upon social risk management and asset-based approaches, the conceptual framework provides a unifying lens to examine links between risks, adaptation, and vulnerability. The result is an integrated approach to increase the capacity of society to manage climate risks to reduce the vulnerability of households and to maintain or increase the opportunities for sustainable development. It identifies 'no-regrets' adaptation interventions, meaning actions that generate net social benefits under all future scenarios of climate change and impacts. The article also makes the case for greater support for community-based adaptation and social protection and propose a research agenda.

Hochrainer, Stefan, Reinhard Mechler, and Georg Pflug. 2008. Climate change and financial adaptation in Africa: Investigating the impact of climate change on the robustness of index-based microinsurance in Malawi. ***Mitigation and Adaptation Strategies for Global Change*** **14 (3): 231-250.**
This paper discusses the applicability of crop insurance for the case of Malawi. It explores the potential impact of climate change on the viability of the Malawi weather insurance program, using of scenarios of climate change-induced variations in rainfall patterns. By combining catastrophe insurance modeling with climate modeling, the methodology demonstrates the feasibility, albeit with large uncertainties, of estimating the effects of climate variability and climate change on the near- and long-term future of microinsurance schemes serving the poor. By providing a model-based estimate of insurance back-up capital necessary to avoid ruin under climate variability and climate change, along with the associated uncertainties and data limitations, this methodology can quantitatively demonstrate the need for financial assistance to protect micro-insurance pools against climate-induced insolvency. This is of major concern to donors, nongovernmental organizations and others supporting these innovative systems, those actually at-risk and insurers providing insurance. A quantitative estimate of the additional burden that climate change imposes on weather insurance for poor regions is of interest to organizations funding adaptation. Further, by linking catastrophe modeling to regionalized climate modeling, the analysis identifies key modeling inputs necessary as well as important constraints. The article ends with a discussion of the opportunities and limits to similar modeling and weather predictability for Sub-Saharan Africa beyond the case of Malawi.

Islam, Tanveerul, and Richard E. Peterson. 2009. Climatology of landfalling tropical cyclones in Bangladesh 1877-2003. ***Natural Hazards*** **48 (1): 115-135.**

Bangladesh is highly susceptible to tropical cyclones. Unfortunately, there is a dearth of climatological studies on the tropical cyclones there. The Global Tropical Cyclone Climatic Atlas (GTCCA) lists historical storm track information for all the seven tropical cyclone ocean basins including the North Indian Ocean. Using GIS, tropical cyclones that made landfall in Bangladesh between 1877 and 2003 are identified and examined from the climatological perspective. For the convenience of study, the coast of Bangladesh is divided into five segments and comparisons are made among the coastal segments in terms of cyclone landfall and vulnerability. There is a large variability in the year-to-year occurrence of landfalling tropical cyclones in Bangladesh. Most of the tropical cyclones (70 percent) hit in the months of May-June and October-November. They generally show the well-known pattern of pre- and post-monsoon cyclone seasons in that region.

Keskitalo, E. Carina H., and Antonina A. Kulyasova. 2009. The role of governance in community adaptation to climate change. ***Polar Research*** **28 (1): 60-70.**
The capacity to adapt to challenges such as climate change can be seen as largely determined by socio-economic context or social vulnerability. This article examines the adaptive capacity of local actors in response to globalization and climate change, asking: how much of the desirable adaptation can be undertaken at a local level, and how much is determined by actors at other levels, for instance, when resource conflicts occur? Drawing on case studies of fishing in northern Norway and north-west Russia, the paper shows that adaptive capacity beyond the immediate economic adaptations available to local actors is, to a considerable extent, politically determined within larger governance networks.

Kiker, Gregory A., Rafael Munoz-Carpena, Piotr Wolski, Anna Cathey, Andrea Gaughan, and Jongbum Kim. 2008. Incorporating uncertainty into adaptive, transboundary water challenges: A conceptual design for the Okavango River basin. ***International Journal of Risk Assessment and Management*** **10 (4): 312-338.**
The authors present a review and conceptual design to integrate hydrological/ecological models, global uncertainty and sensitivity analysis, integrative modeling, and decision analysis for complex and adaptive transboundary challenges. The research uses the transboundary issues within the Okavango River basin, a shared water resource among the nations of Angola, Namibia and Botswana, as an example for constructing these integrated tools. The objective of this paper is to present a design that integrates a set of tools that builds systematically on past basin modeling research to incorporate the inherent uncertainty within the system and its application for answering practical management questions.

Krewski, Daniel, Louise Lemyre, Michelle C. Turner, Jennifer E.C. Lee, Christine Dallaire, Louise Bouchard, Kevin Brand, and Pierre Mercier. 2009. Public perception of population health risks in Canada: Health hazards and health outcomes. ***International Journal of Risk Assessment and Management*** **11 (3/4): 299-318.**
The focus of this article is a descriptive account of the perceptions of five health hazards (motor vehicles, climate change, recreational physical activity, cellular phones, and terrorism) and five health outcomes (cancer, long-term disabilities, asthma, heart disease, and depression) from a recent survey of 1,503 Canadians. To shed light on factors that influence risk perception in Canada, the extent to which these exemplars are perceived as high in risk and controllability, as well as the extent to which knowledge and uncertainty surrounding them is high, was examined. The degree to which these exemplars are deemed acceptable and generate worry among Canadians was also examined. Variation was observed in the extent to which different health hazards and outcomes are perceived on the various dimensions. Perceptions of health hazards and outcomes also vary significantly by gender, age, and education. Findings are compared to existing research on risk perception.

Kron, W. 2009. Flood insurance: From clients to global financial markets. ***Journal of Flood Risk Management*** **2 (1): 68-75.**
Weather-related natural catastrophes are increasing worldwide in number and intensity, and losses have reached new levels. This represents a challenge that must be faced by governments, the people concerned, and the financial sector, both nationally and globally. Flood insurance is rare in most countries, but the development of solutions to make flood risk more insurable has gained momentum. There is no ideal flood insurance scheme, as each situation is influenced by factors such as risk-adequate premium structure, adverse selection, and general risk awareness. Solutions tailored to the situation in each respective country must be found. While rich countries have to find ways to handle record losses of $100 billion and more, poor countries need micro-insurance to provide people with at least a minimum of financial security. The insurance industry has through the reinsurance sector established a system to pay local monetary losses globally. In the wake of extremely expensive catastrophes, a system involving the whole financial market has great potential.

Levner, Eugene, David Alcaide Lopez de Pablo, and Jacques Ganoulis. 2008. Risk management of transboundary water resources using the green supply chain approach. ***International Journal of Risk Assessment and Management*** **10 (4): 357-372.**
The problem considered is the coordination of the ecological risks of all stakeholders in a transboundary river basin using the "green" (environmental) Supply Chain (SC) approach. Using a combination of two managerial concepts "the environmental SC" and "the house-of-quality," a decision-making model that quantitatively estimates the integrated risk level is constructed. A mathematical model is proposed that allows the integrated risk to population and society in a transboundary river basin under geo-hydrologi-

cal, economic, technological and social constraints to be mitigated.

Li, Geraldine M. 2009. Tropical cyclone risk perceptions in Darwin, Australia: A comparison of different residential groups. ***Natural Hazards*** **48 (3): 365-382.**
Different individuals and groups perceive risk differently. This can significantly affect risk management and mitigation practices and requirements. This paper presents findings from a study of tropical cyclone risk perceptions in the city of Darwin in the Northern Territory of Australia. Primary in-depth interview data and other secondary data are analyzed, focusing in particular on wind damage, storm surge, and life safety risk perceptions of residents since Cyclone Tracy—which struck in 1974—and perceptions of future climate change as it relates to tropical cyclone risk. The analysis reveals that a number of perceptions prevail. In particular, the study reveals a wide difference of perceptions between short-term residents (Group 1) and long-term and expert residents (Group 2) in relation to wind damage, storm surge and life safety risk. It also reveals a large division between laypersons (Group 3) and expert residents' (Group 4) perceptions of climate change risk as it relates to tropical cyclone risk. The author recommends that flexible, multiple and integrative management and mitigation approaches are required to deal with such different perceptions and divisions in the resident population.

Moreno, Alvaro, and Susanne Becken. 2009. A climate change vulnerability assessment methodology for coastal tourism. ***Journal of Sustainable Tourism*** **(ePub).**
Coastal and marine environments are among the most popular areas for outdoor recreation and tourism. Coastal areas have also been identified as the most vulnerable to climate change, for example as a result of extreme events and sea-level rise. It will be increasingly important for coastal tourism destination managers to understand their vulnerability to climatic changes and to devise appropriate adaptation. This paper presents a five-step vulnerability assessment methodology for tourism in coastal areas. The five steps include (1) system analysis, (2) identification of activity and hazard subsystems, (3) vulnerability assessments for the different sub-systems at risk, (4) integration for the destination as a whole and scenario analysis and (5) communication. The framework is illustrated by an example of how it might be applied to Fiji. The paper concludes that a consistent methodology, like the one proposed, will facilitate vulnerability assessments in a range of coastal destinations, allow comparison to be made of vulnerabilities across different situations, provide a basis for more research into specific adaptation measures and assist destinations to develop a more sustainable tourism industry.

Mortreux, Colette, and Jon Barnett. 2009. Climate change, migration and adaptation in Funafuti, Tuvalu. ***Global Environmental Change*** **19 (1): 105-112.**
This paper shows the extent to which people in Funafuti, the main island of Tuvalu, are intending to migrate in response to climate change. It presents evidence collected from Funafuti to challenge the widely held assumption that climate change is, will, or should result in large-scale migration from Tuvalu. It shows that for most people climate change is not a reason for concern, let alone a reason to migrate, and that would-be migrants do not cite climate change as a reason to leave. People in Funafuti wish to stay in Funafuti for reasons of lifestyle, culture, and identity. Concerns about the impacts of climate change are not currently a significant driver of migration from Funafuti, and do not appear to be a significant influence on those who intend to migrate in the future.

Nelson, Valerie, and Tanya Stathers. 2009. Resilience, power, culture, and climate: A case study from semi-arid Tanzania, and new research directions. ***Gender & Development*** **17 (1): 81-94.**
Rapid changes to the climate are predicted over the next few years, presenting challenges for women's empowerment and gender equality on a completely new scale. There is little evidence or research to provide a reliable basis for gender-sensitive approaches to agricultural adaptation to climate change. This article explores the gender dimensions of climate change, in relation to participation in decision-making, divisions of labor, access to resources, and knowledge systems. It draws on insights from recent research on agricultural adaptation to climate change in Tanzania. The article then explains why future gender-sensitive climate-adaptation efforts should draw upon insights from "resilience thinking," "political ecology," and environmental anthropology as a way of embedding analysis of power struggles and cultural norms in the context of the overall socio-ecological system.

Pearce, Tristan D., James D. Ford, Gita J. Laidler, Barry Smit, Frank Duerden, Mishak Allarut, Mark Andrachuk, Steven Baryluk, Andre Dialla, Pootoogoo Elee, Annie Goose, Theo Ikummaq, Eric Joamie, Fred Kataoyak, Eric Loring, Stephanie Meakin, Scott Nickels, Kip Shappa, Jamal Shirley, and Johanna Wandel. 2009. Community collaboration and climate change research in the Canadian Arctic. ***Polar Research*** **28 (1): 10-27.**
Research on climate change impacts, vulnerability, and adaptation—particularly projects aiming to contribute to practical adaptation initiatives—requires active involvement and collaboration with community members along with local, regional, and national organizations that use this research for policy making. Arctic communities are already experiencing and adapting to environmental and socio-cultural changes, and researchers have a practical and ethical responsibility to engage with communities that are the focus of the research. This paper draws on the experiences of researchers working with communities across the Canadian Arctic, together with the expertise of Inuit organizations, northern research institutes, and community partners, to outline key considerations for effectively engaging Arctic communities in collaborative research. These considerations include: initiating early and ongoing communication with communities, and regional and national contacts; involving communities in research design and development; facilitating opportunities for local employment;

and disseminating research findings. Examples of each consideration are drawn from climate change research conducted with communities in the Canadian Arctic.

Preston, B.L., C. Brooke, T.G. Measham, T.F. Smith, and R. Gorddard. 2009. Igniting change in local government: Lessons learned from a bushfire vulnerability assessment. ***Mitigation and Adaptation Strategies for Global Change*** **14 (3): 251-283.**
Local governments and communities have a critical role to play in adapting to climate variability and change. Spatial vulnerability assessment is one tool that can facilitate engagement between researchers and local stakeholders through the visualization of climate vulnerability and the integration of its biophysical and socio-economic determinants. This has been demonstrated by a case study from Sydney, Australia, where a bushfire vulnerability assessment was undertaken as the first step in a project to investigate local government perceptions of climate vulnerability and adaptive capacity. A series of relevant biophysical and socioeconomic indicators was identified that represented the region's exposure, sensitivity, and adaptive capacity with respect to bushfires. These indicators were then combined to develop maps of net landscape vulnerability to bushfire. When presented in a workshop setting, vulnerability maps were successful in capturing the attention of stakeholders while simultaneously conveying information about the diversity of vulnerability contributors. Stakeholders, however, were reluctant to embrace representations of vulnerability that differed from their own understanding of hazard, necessitating the demonstration of agreement between the vulnerability assessment and more conventional hazard assessment tools. This validation opened the door for public dissemination of vulnerability maps, the use of the assessment in local government risk planning, and more focused case studies on barriers to adaptation.

Stringer, Lindsay C., S. Serban Scrieciu, and Mark S. Reed. 2009. Biodiversity, land degradation, and climate change: Participatory planning in Romania. ***Applied Geography*** **29 (1): 77-90.**
This paper considers the role of stakeholder participation in drawing together the three Rio Conventions, exploring how participatory activities to combat desertification in southern Romania can both support and hinder efforts to conserve biodiversity and mitigate the effects of climate change. It suggests that Romania's growing civil society sector has a potentially vital role to play in promoting synergy through participation, and that participatory pact as an important mechanism for harnessing multiple benefits. The paper argues that participation needs to be further institutionalized within the Romanian context and in doing so, should emphasize empowerment, equity, trust and learning, integrating different knowledge bases to allow the development of sustainable and synergistic environmental solutions.

Trainor, Sarah F., Monika Calef, David Natcher, F. Stuart Chaplin, A. David McGuire, Orville Huntington, Paul Duffy, T. Scott Rupp, La'Ona DeWilde, Nancy Fresco, and Amy Lauren Lovecraft. 2009. Vulnerability and adaptation to climate-related fire impacts in rural and urban interior Alaska. ***Polar Research*** **28 (1): 100-118.**
This paper explores whether fundamental differences exist between urban and rural vulnerability to climate-induced changes in the fire regime of interior Alaska. It examines how communities and fire managers have responded to these changes and what additional adaptations could be put in place. It also engages a variety of social science methods, including demographic analysis, semi-structured interviews, surveys, workshops, and observations of public meetings. This work is part of an interdisciplinary study of feedback and interactions between climate, vegetation, fire, and human components of the boreal forest social-ecological system of interior Alaska. Findings show that although urban and rural communities in interior Alaska face similar increased exposure to wildfire as a result of climate change, important differences exist in their sensitivity to these biophysical, climate-induced changes. In particular, reliance on wild foods, delayed suppression response, financial resources, and institutional connections vary between urban and rural communities. These differences depend largely on social, economic, and institutional factors, and are not necessarily related to biophysical climate impacts per se. Fire management and suppression action motivated by political, economic, or other pressures can serve as unintentional or indirect adaptation to climate change. However, this indirect response alone may not sufficiently reduce vulnerability to a changing fire regime. More deliberate and strategic responses may be required, given the magnitude of the expected climate change and the likelihood of an intensification of the fire regime in interior Alaska.

Wenzel, George W. 2009. Canadian Inuit subsistence and ecological instability if the climate changes, must the Inuit? ***Polar Research*** **28 (1): 89-99.**
Considerable attention has been devoted to the possible effects of global climate change on the environment of the circumpolar world. With regard to the Inuit, the aboriginal culture of Arctic Canada, research interest has focused principally on the vulnerability of the hunting and harvesting component of the traditional food system, otherwise frequently referred to as the subsistence system, if wild terrestrial and marine resources become less available. Although also concerned with the traditional Inuit food economy, this paper concentrates on the customary institutional mechanisms by which the Inuit distribute and share the products obtained from hunting. After analyzing this social economy, a review of the data on recent climate-related range changes of a number of Arctic animal populations is carried out, in terms of how projected environmental changes may affect this other aspect of Inuit subsistence. After tentatively concluding that some species substitution and/or replacement will occur, the final aspect of the paper considers the potential for the possible exclusion of these "replacements" as a result of the political aspect of climate change.

Critical Infrastructure

Escudero, Laureano F., and Juan F. Monge. 2008. A model for risk minimization on water resource usage failure. ***International Journal of Risk Assessment and Management*** **10 (4): 386-403.**
The authors present a framework for solving the strategic problem of assigning transboundary water resources to demand centers under uncertainty in the water exogenous inflow in the reservoirs and other segments of the basin system along the time horizon. The function to maximize is the probability of satisfying different targets on the stored water and different demands over a set of scenarios. A scenario tree-based scheme is used to represent the Deterministic Equivalent Model (DEM) of the stochastic mixed 0-1 program with complete recourse. The constraints are modeled by a splitting variable representation via scenarios and, so, a Stochastic Integer Programming (SIP) scheme can be used to exploit the excess probability functional structure as well as the non-anticipativity constraints for the water assignment.

Ganoulis, Jacques, and Eugene Levner. 2008. Risk-based integrated management of transboundary water resources: A general framework. ***International Journal of Risk Assessment and Management*** **10 (4): 291-311.**
Integrated management of transboundary surface waters and groundwater aquifers faces not only difficult problems and uncertainties at a national level, but also because these water bodies cross international borders. After showing the importance of internationally shared waters at the global scale in terms of spatial extension, quantity, and water uses, this paper develops an integrated risk-based framework for managing shared waters at the basin scale. The definition of risk as a performance index in achieving four different objectives—technical reliability, environmental security, economic efficiency, and social equity—allows different management options to be compared and the most sustainable one to be selected. The Risk-based Integrated Transboundary Water Resources Management (RITWRM) framework is based on the quantification of the four different risk indices, which can be evaluated by combining expert opinions, available data and information, and mathematical modeling. The RITWRM problem can be set as a multiportfolio choice problem, which allows a scientifically motivated compromise to be found between the individual interests of stakeholders where technological, economic and social conditions are taken into account.

Disaster & Emergency Management

Alpaslan, Can M., Sandy E. Green, and Mitroff Ian I. 2009. Corporate governance in the context of crises: Towards a stakeholder theory of crisis management. ***Journal of Contingencies and Crisis Management*** **17 (1): 38-49.**
This article takes a step towards developing a stakeholder theory of crisis management. It argues that, in the context of crises, adopting the principles of a stakeholder model of corporate governance will lead companies to engage more frequently in proactive and/or accommodating crisis management behavior even if these crisis management behaviors are not perceived to maximize shareholder value. The article also proposes a mechanism to explain why the stakeholder model may be associated with more successful crisis management outcomes. It concludes by challenging the efficacy of the shareholder view in crisis situations, and calls for further theoretical and empirical research.

Bass, Ellen J., Leigh Baumgart, Kevin Kloesel, Kathleen Dougherty, Havidan Rodriguez, Walter Diaz, William Donner, Jennifer Santos, and Michael Zink. 2009. Incorporating emergency management needs in the development of weather radar networks. ***Journal of Emergency Management*** **7 (1): 45-52.**
The Center for Collaborative Adaptive Sensing of the Atmosphere (CASA) is developing networks of low-power, low-cost radars that adaptively collect, process, and visualize high-resolution data in the lowest portion of the atmosphere. CASA researchers are working with emergency managers, ensuring the network concept is designed with their needs in mind. Interviews, surveys, product usage log analysis, and simulated scenarios are used to solicit input. Results indicate the need for products for both high- and low-bandwidth, velocity products that are more easily interpreted, and enhanced training. CASA researchers are developing interventions to address these needs.

Bedford, Jennifer, and James Kendra. 2009. Security as subversion: Undermining access, agency, and voice through the discourse of security. ***Journal of Emergency Management*** **7 (1): 53-63.**
This article describes a case in which local emergency planning was thwarted by indifference and concern about security. It argues that excessive security concerns can impede the cooperation and information sharing that is essential to good planning, suggesting that concerns about less likely terrorist attacks undercut preparation for more likely emergencies arising from natural or technological sources.

Benn, Suzanne, Dexter Dunphy, and Andrew Martin. 2009. Governance of environmental risk: New approaches to managing stakeholder involvement. ***Journal of Environmental Management*** **90 (4): 1567-1575.**
Disputes concerning industrial legacies such as the disposal of toxic wastes illustrate changing pressures on corporations and governments. Businesses and governments are now confronted with managing the expectations of a society increasingly aware of the social and environmental impacts and risks associated with economic development, demanding more equitable distribution and democratic management of such risks. The closed managerialist decision making of the powerful bureaucracies and corporations of the industrial era is informed by traditional management theory which cannot provide a framework for the adequate governance of these risks. Recent socio-political theories have conceptualized some key themes that must be addressed in a more appropriate approach to governance. This article identifies recent management and governance theory addressing these themes and develops a process-based approach to governance of environmental disputes,

allowing for the evolving nature of stakeholder relations in a highly complex multiple stakeholder arena.

Bissell, Richard A., Andrew Bumbak, Matthew Levy, and Patrick Echebi. 2009. Long-term global threat assessment: Challenging new roles for emergency managers. ***Journal of Emergency Management*** **7 (1): 19-37.**
Based on currently available published data and literature from multiple disciplines, this article introduces medium- and long-term global developments and changes that will likely impact human society in disastrous or even catastrophic fashion, with significant impact on the roles and challenges of emergency managers. Some of the phenomena described include the following: (1) loss of fresh water, (2) significant sea level rise with resultant flooding, (3) increased heat leading to desertification and crop losses, (4) storms that are both more frequent and more violent, (5) massive food emergencies as crops fail for lack of water and/or saltwater inundation, (6) loss of the petroleum-based economy, and (7) massive population relocations on a level the world has never experienced. The perspective used is global, in that the trends described do not respect political boundaries. The article also recognizes that mitigation and response activities may well involve many nations simultaneously. It concludes with suggestions of steps emergency management should take in preparing to serve new and more complex tasks to meet coming challenges, and a "call to action" for emergency managers to assume a more active role in confronting the risks imposed by forces that are now underway.

Bosher, Lee, Andrew Dainty, Patricia Carillo, Jacqueline Glass, and Andrew Price. 2009. Attaining improved resilience to floods: A proactive multi-stakeholder approach. ***Disaster Prevention and Management*** **18 (1): 9-22.**
There is a need to proactively address strategic weaknesses in protecting the built environment from a range of hazards. This paper seeks to focus on the mitigation for flood hazards in the United Kingdom, particularly in understanding the extent of the problem, collating key guidance and legislation related to flood hazard mitigation, identifying who the key construction decision makers are, and the most opportune stages of the design-construction-operation process when key decisions are needed. A pluralistic research design was adopted for the study, which included a UK-wide questionnaire survey and a set of semi-structured interviews involving a range of professionals from construction, planning, insurance, emergency management and local/national government agencies was undertaken. Despite the publication of a range of guidance on flood hazard mitigation in the UK, there is still insufficient evidence that key construction stakeholders are playing an active role in mitigating flood risk. The preconstruction phase of a building's life cycle is identified as the critical stage at which key stakeholders must adopt flood hazard mitigation strategies. The socio-institutional constraints to the proactive attainment of built-in resilience are highlighted, as are recommendations about how these constraints can be addressed. The paper reports on the provisional findings of an ongoing project but these findings nonetheless provide essential foundations for the latter development of the PRE-EMPT toolkit and raise some important considerations about flood resilience in the UK. The findings presented reveal how stakeholders should be more involved, and what issues must be addressed regarding the integration of built-in resilience into construction decision making.

Broz, Dita, Elise C. Levin, Amy P. Mucha, Darlene Pelzel, William Wong, Victoria Persky, and Ronald C. Hershow. 2009. Lessons learned from Chicago's emergency response to mass evacuations caused by Hurricane Katrina. ***American Journal of Public Health*** **99 (8): 1-9.**
This article analyzes the response of the Chicago Department of Public Health with respect to its effectiveness in providing health care to Hurricane Katrina evacuees arriving in the city. Between September 12 and October 21, 2005, researchers conducted a real-time qualitative assessment of a medical unit in Chicago's Hurricane Victim Welcome and Relief Center. A semi-structured guide was used to interview 33 emergency responders to identify key operational successes and failures. The medical unit functioned at a relatively high level, primarily as a result of the flexibility, creativity, and dedication of its staff and the presence of strong leadership. Chronic health care services and prescription refills were the most commonly mentioned services provided, and collaboration with a national pharmacy proved instrumental in reconstructing medication histories. The lack of a comprehensive and well-communicated emergency response plan resulted in several preventable inefficiencies. Findings highlight the need for improved planning for care of evacuee populations after a major emergency event and the importance of ensuring continuity of care for the most vulnerable. The article provides an emergency response preparedness checklist for local public health departments.

Byrne, Gerry. 2009. I-Zone planning: Supporting frontline firefighters. ***The Australian Journal of Emergency Management*** **24 (1): 17-24.**
This paper focuses on bushfires that impact on the built environment in the bushland-urban interface or I-Zone. These fires are transitional by nature with the fuel source of the fire changing from vegetation to structural, as the fire travels from a bushfire prone area to an urban area. It is this transitional nature that causes the greatest challenges for a largely urban fire service such as the NSW Fire Brigades. A simple definition of an interface area is "any area where structures (whether residential, industrial, recreational or agricultural) are located adjacent to or among combustible (bushland) fuels." NSW Fire Brigades use I-Zone as an abbreviated term for any bushland urban interface.

Calver, A., E. Stewart, and G. Goodsell. 2009. Comparative analysis of statistical and catchment modeling approaches to river flood frequency estimation. ***Journal of Flood Risk Management*** **2 (1): 24-31.**
This paper compares the quantification of British river floods using two approaches—the Flood Estimation Handbook (FEH) flood peak and event-based method and recently developed continuous simulation tech-

niques that use parameter-sparse modeling of flood catchment flood runoff. The methods were applied to over 100 sites in Britain and treated as if there were no flow data. Although such observations did exist; they were used only for testing. Errors of =20 percent in peak flows at ungauged sites are very good in this hydrologically challenging context; errors of up to around 35 percent might have to be addressed by flood management practice. The results from the FEH statistical method reinforced its established role in peak-flow estimation. The emerging continuous simulation approaches show considerable potential for peaks and flow time series. The errors associated with the FEH-unit hydrograph approach reflect the additional challenge of incorporating ungauged rainfall estimation and ungauged discharge.

Chaffee, Mary. 2009. Willingness of health care personnel to work in a disaster: An integrative review of the literature. *Disaster Medicine and Public Health Preparedness* 3 (1): 42-56.
Effective hospital surge response in disaster depends largely on an adequate number of personnel to provide care. Studies appearing since 1991 indicate health care personnel may not be willing to work in all disaster situations. If so, this could degrade surge response. A systematic review of the literature was conducted to determine the state of the evidence concerning the willingness of health care personnel to work in disaster. This review collates and assesses the literature concerning willingness of health care personnel to work during a disaster, to identify gaps in the literature as areas for future investigation, and to facilitate evidence-based disaster planning. Twenty-seven studies met inclusion criteria (25 quantitative and two qualitative studies). The current evidence indicates there may be certain factors related to willingness to work (or lack of willingness) in disaster including the type of disaster, concern for family, and concerns about personal safety. Barriers to willingness to work have been identified including pet care needs and the lack of personal protective equipment. This review describes the state of an emerging area of science. These findings have significant implications for community and organizational emergency planning and policy making in an environment defined by limited resources.

Crichton, Margaret T., Cameron G. Ramsay, and Terence Kelly. 2009. Enhancing organizational resilience through emergency planning: Learnings from cross-sectoral lessons. *Journal of Contingencies and Crisis Management* 17 (1): 24-37.
Reports that attempt to identify lessons learned are generally circulated after most emergency exercises and incidents. This paper identifies recurring themes that can be applied across sectors. Typically, lessons are expressed in a form specific to the event, the sector where it occurred, and the aim of the reporting organization. Reports were reviewed from seven international incidents, covering a range of sectors with varying parameters. The authors concluded that organizations can gain insight by examining incidents outside their sector and by using recurring themes to explore their emergency plan resilience. Recommendations are also made for improving lessons learned in organizations.

Cruz, Ana Maria, and E. Krausman. 2009. Hazardous-materials releases from offshore oil and gas facilities and emergency response following Hurricanes Katrina and Rita. *Journal of Loss Prevention in the Process Industries* 22 (1): 59-65.
Hurricanes Katrina and Rita triggered numerous hazardous materials releases from industrial and storage facilities on shore, as well as from offshore oil and gas facilities in the Gulf of Mexico. This paper identifies and analyze over 600 hazardous materials releases triggered by Hurricanes Katrina and Rita from offshore platforms and pipelines. The results of the study could assist offshore industry owners/operators, government officials, and policy makers by providing lessons learned and recommendations for better disaster planning for major storms and flood events.

Eisenman, David P., Qiong Zhou, Michael Ong, Steven Asch, Deborah Glik, and Amy Long. 2009. Variations in disaster preparedness by mental health, perceived general health, and disability status. *Disaster Medicine and Public Health Preparedness* 3 (1): 33-40.
Chronic medical problems, mental illness, and disability increase vulnerability to disasters. National efforts have focused on preparing people with disabilities. Studies find them to be increasingly prepared, but less is known about people with chronic mental and medical illnesses. The authors examined the relationship between health status (mental health, perceived general health, and disability) and disaster preparedness (home disaster supplies and family communication plan). A random digit-dial telephone survey of the Los Angeles County population was conducted from October 2004 to January 2005 in 6 languages. Separate multivariate regressions modeled determinants of disaster preparedness, adjusting for sociodemographic covariates then sociodemographic variables and health status variables. Only 40.7 percent of people who rated their health as fair/poor have disaster supplies compared with 53.1 percent of those who rate their health as excellent ($P < 0.001$). Only 34.8 percent of people who rated their health as fair/poor have an emergency plan compared with 44.8 percent of those who rate their health as excellent ($P < 0.01$). Only 29.5 percent of people who have a serious mental illness have disaster supplies compared with 49.2 percent of those who do not have a serious mental illness ($P < 0.001$). People with fair/poor health remained less likely to have disaster supplies (adjusted odds ratio [AOR] 0.69, 95 percent confidence interval [CI] 0.500.96) and less likely to have an emergency plan (AOR 0.68, 95 percent CI 0.510.92) compared with those who rate their health as excellent, after adjusting for the sociodemographic covariates. People with serious mental illness remained less likely to have disaster supplies after adjusting for the sociodemographic covariates (AOR 0.67, 95 percent CI 0.480.93). Disability status was not associated with lower rates of disaster supplies or emergency communication plans in bivariate or multivariate analyses. Finally, adjusting for the sociodemographic and other health variables, people with fair/

poor health remained less likely to have an emergency plan (AOR 0.66, 95 percent CI 0.480.92) and people with serious mental illness remained less likely to have disaster supplies (AOR 0.67, 95 percent CI 0.470.95). People who report fair/poor general health and probable serious mental illness are less likely to report household disaster preparedness and an emergency communication plan. The results could add to our understanding of why people with preexisting health problems suffer disproportionately from disasters. Public health may consider collaborating with community partners and health services providers to improve preparedness among people with chronic illness and people who are mentally ill.

El-Anwar, Omar, Khaled El-Rayes, and Amr Elnashai. 2009. Optimizing large-scale temporary housing arrangements after natural disasters. ***Journal of Computing in Civil Engineering*** **23 (2): 110-118.**
Natural disasters—hurricanes, earthquakes, and tsunamis—often cause large-scale destruction in residential areas. In the aftermath of these disasters, emergency management agencies must rapidly develop and implement a temporary housing plan providing displaced families with satisfactory and safe accommodations. This paper presents the computational implementation of a newly developed multi-objective optimization model to support decision makers in emergency management agencies in optimizing large-scale temporary housing arrangements. The model is capable of simultaneously minimizing: (1) post-disaster social and economic disruptions suffered by displaced families; (2) temporary housing vulnerabilities to post-disaster hazards; (3) adverse environmental impacts on host communities; and (4) public expenditures on temporary housing. The model is implemented in four main phases. It incorporates four modules to optimize each of the aforementioned objectives. A large-scale temporary housing application example is presented to demonstrate the unique capabilities of the model and illustrate the computations performed in each of the implementation phases.

Ferrer, Rizaldy R., Marizen Ramirez, Kori Sauser, Ellen Iverson, and Jeffrey S. Upperman. 2009. Emergency drills and exercises in healthcare organizations: Assessment of pediatric population involvement using after-action reports. ***American Journal of Disaster Medicine*** **4 (1): 23-32.**
The evaluation of pediatric disaster preparation is often lacking, even though the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) requires healthcare organizations to demonstrate disaster preparedness through the use of disaster exercises. This investigation identified, described, and assessed the involvement of pediatric victims in healthcare organization disaster drills using data from the after-action reports generated by healthcare organizations per JCAHO regulations. Forty-nine reports were voluntarily supplied. The authors analyzed the data using quantitative and qualitative approaches. Only nine reports suggested pediatric involvement. Hospitals with large bed capacity (M = 465.6) tended to include children in exercises more often compared with smaller facilities (M = 350.8). Qualitative content analysis revealed a lack of parent-child identification and family reunification systems, ineffective communication strategies, lack of pediatric resources and specific training, and unfamiliarity with altering standards of pediatric care during a disaster. Although many organizations are performing disaster exercises, most do not include pediatric concerns. More work is needed to understand the basis of this emergency preparedness gap. Overall, pediatric emergency planning should be a high priority for this vulnerable population.

French, Simon, Clare Bayley, and Nan Zhang. 2009. Web-based group decision support for crisis management. ***International Journal of Information Systems for Crisis Response and Management*** **1(1): 41-53.**
The early designs for crisis management decision support systems used data-based or model-based methodologies and architectures. This article argues that the complexity of crisis management situations means that a greater emphasis on collaboration is needed. Moreover, modern interactive Web 2.0 technologies allow group decision support to be offered to geographically dispersed teams. Given that crisis management often requires teams to be drawn together from a number of organizations sited at different locations, the article reflects upon the potential of these technologies to support the early stages of crisis management without the need to draw the team together at a common location. It also reports on a small scale experiment using GroupSystems ThinkTank to manage an emerging food safety event. Such systems have potential and deserve more careful evaluation.

Harrald, John R. 2009. Achieving agility in disaster management. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 1-11.**
A significant body of social science research has concluded that improvisation in distributed, collaborative, open systems is the key to success in responding to and recovering from extreme events. The evolution of emergency management in the United States since the September 11, 2001, attacks has emphasized the development of doctrine, process, and structure. In earlier work, the author concluded that both the agility desired by the social sciences and the discipline created by the professional practitioners are essential. This article explores how agility can be developed within a disciplined system and concludes that the keys are the development of outcome-based goals, adaptive leadership, and technology that supports collaborative decision making in open, organizational systems.

Ikeda, Keiko. 2009. How women's concerns are shaped in community-based disaster risk management in Bangladesh. ***Contemporary South Asia*** **17 (1): 65-78.**
This article elaborates on how concerns regarding gender in community-based disaster risk management are shaped through interaction between local agents of development and communities in Bangladesh. Since women and men have different experiences in disaster, gender concerns should be fully addressed by the community and integrated into the action they take up to

reduce disaster risks. The term "local agents of development" refers to individuals engaged in implementation of development policy in their own community. Recent trends in community-based disaster risk management policy seek what is called a "whole community approach," engaging various stakeholders such as traditional village elite, "local civil society," and leaders of community-based organizations—mostly poor villagers supported by non-governmental organizations. Within the context of the historical evolution of community development approaches in Bangladesh, this is quite new in terms of bringing together traditional leaders and poor target groups, including women's groups. By drawing from the experience of women and focusing on the functioning of local agents of development during the flood of 2004, the author assesses the gaps between the primary concerns of women and those taken up in the risk-reduction action, to see whether, why, and when they have widened or been bridged.

Kapucu, Naim, Maria-Elena Augustin, and Vener Garayev. 2009. Interstate partnerships in emergency management: Emergency management assistance compact in response to catastrophic disasters. ***Public Administration Review*** **69 (2): 297-313.**
The Emergency Management Assistance Compact (EMAC) is a mutual aid agreement and partnership allowing states to assist one another in responding to natural and man-made disasters, often in advance of federal disaster assistance. This article examines EMAC's response to Hurricanes Katrina and Rita in order to address the significant need for analysis of emergency management at the state level. A content analysis of news reports, government documents, and reports from a number of institutions was performed to determine the volume and direction of EMAC's performance and its transactions during the response operations. The authors find a lack of EMAC training among responders, potentially reducing communication and coordination and the efficiency and effectiveness of response operations. A network analysis assessed the relationships among the responding organizations to coordinate their emergency response operations.

Lazar, Eliot J., Nicholas V. Cagliuso, and Kristine M. Gebbie. 2009. Are we ready and how do we know? The urgent need for performance metrics in hospital emergency management. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 57-60.**
An extraordinary number of health care quality and patient safety indicators have been developed for hospitals and other health care institutions. However, few meaningful indicators exist for comprehensive assessment of hospital emergency management. Although health care institutions have invested considerable resources in emergency management preparedness, the need for universally accepted, evidence-based performance metrics to measure these efforts remains largely unfulfilled. The authors suggest that this can be remediated through the application of traditional health care quality paradigms, coupled with novel analytic approaches to develop meaningful performance data in hospital emergency management.

McAdoo, Brian, Andrew Moore, and Jennifer Baumwoll. 2009. Indigenous knowledge and the near field population response during the 2007 Solomon Islands tsunami. ***Natural Hazards*** **48 (1): 73-82.**
The magnitude 8.1 earthquake and subsequent tsunami killed 52 people when it hit the Solomon Islands on April 2, 2007. That number would have likely been higher were it not for the appropriate reaction of the indigenous coastal populations and a helpful physical geography. Buffering coral reefs reflected some wave energy back to sea, reducing the power of the wave. Hills a short distance behind the coastal villages provided accessible havens. Despite this beneficial physiography, immigrant populations died at disproportionately high rates in comparably damaged areas because they did not recognize the signs of the impeding tsunami. The indigenous population of Tapurai, which lacks a steep barrier reef to reflect the incoming energy, experienced a much more powerful wave, and the population suffered heavy losses. Indigenous knowledge as an integral tool in basin wide tsunami warning systems has the potential to mitigate disasters in the near field. Community-based disaster management plans must be cognizant of educating diverse populations that have different understandings of their environment.

McGuirl, J., N. Sarter, and D. Woods. 2009. Effects of real-time imaging on decision-making in a simulated incident command task. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 54-69.**
Eight incident commanders (ICs) took part in a simulation exercise to determine the impact of real-time imaging feedback on situation assessment and decisiomaking in an uncertain and high tempo environment. The imaging feedback simulated the video feed from an unmanned aerial vehicle (UAV) that allows incident command centers to monitor developments at the crisis site. Nearly all of the ICs failed to detect important changes in the situation that were not captured in the imaging but that were available via other, more traditional data sources. It appears that the ICs placed an inappropriately high level of trust in the imaging data, resulting in a narrowing of their data search activities and limited cross-checking between the data sources being used. This research helps anticipate and guard against undesirable effects of introducing similar technologies on training and operational procedures in a variety of domains.

Nicolopoulos, Nick, and Emily Hansen. 2009. How well prepared are Australian communities for natural disasters and fire emergencies? ***The Australian Journal of Emergency Management*** **24 (1): 60-66.**
Results from the Australian Bureau of Statistics surveys on household and community preparedness for natural disasters and fire emergencies are presented within the context of published research into factors that influence preparedness. The results provide a better understanding of the characteristics of householders who prepare for natural disasters and fire emergencies, and how prepared householders are in the event of an emergency.

Palm, Jenny. 2009. Emergency management in the Swedish electricity grid from a household perspective. ***Journal of Contingencies and Crisis Management*** **17 (1): 55-63.**
This article focuses on household action space and perceived responsibilities during power outages, as well as how municipalities and grid companies understand their and the households' responsibilities and action space. Results from a case study in the county of Östergötland showed households were unclear about their responsibility for outage preparedness. Both municipalities and grid companies expect households to be somewhat prepared. Households, however, believed they were not responsible for being prepared for power outages, even though they need to be prepared to survive. Often the preparedness concerns material factors, such as investment in auxiliary generating capacity. How the households perceive outages is important to their ability to handle and feel comfortable in such situations.

Slattery, Cole, Robert Syvertson, and Stephen Krill. 2009. The eight step training model: Improving disaster management leadership. ***Journal of Homeland Security and Emergency Management*** **(ePub).**
In the aftermath of public tragedies such as the terrorist attacks of 9/11 and Hurricane Katrina, intense scrutiny was placed upon the emergency management community throughout all levels of government. Clearly, it is imperative that emergency managers understand the scope and scale of these events and subsequently the depth of planning required to execute coordinated preparedness, response, and relief efforts. However, plans are merely a step in the overarching requirement of coordinating disaster response and delivering relief. One method for emergency managers to achieve success may be through the implementation of a disciplined training methodology, developed in the United States Army, known as the "Eight Step Training Model." At its essence, the eight step training model provides a logical, structured and repeatable framework for developing and executing training that is designed to build confident and competent emergency managers and improve the individual and collective training proficiency of primary and secondary responders (training participants). A time investment in this planning and training methodology will increase preparedness, response and recovery efforts and desired outcomes immeasurably. The model can focus upon local, state or federal levels, incorporating private volunteer organizations, nongovernmental organizations or industry whether local, regional, or national. The steps are as follows: 1. Study/teach the literature/doctrine (certify leaders); 2. Survey the training site; 3. Develop the training plan; 4. Issue the plan; 5. Rehearse the plan (tabletop exercise); 6. Execute the training; 7. Evaluate the training; and 8. Retrain as needed to meet goals. At a minimum, the model acquaints participants with divergent organizational roles and missions and at its best instills confidence in participating organizations' ability to work together in a simulated setting before they are forced to collaborate during emergency response. The article describes the steps in detail and provides a fundamental understanding of the model as it may relate to future training needs.

Somers, Scott, and James H. Svara. 2009. Assessing and managing environmental risk: Connecting local government management with emergency management. ***Public Administration Review*** **69 (2): 181-193.**
Ensuring that a community is prepared to deal with a disaster is among the many tasks public managers are charged with addressing. Disaster preparedness and response requires adherence to standard planning practices, yet disasters are typically unpredictable. Dealing with disasters, therefore, requires a blend of traditional management skills and improvisation. Furthermore, like other aspects of administrative leadership, the top administrator must blend initiation and responsiveness in interactions with elected officials and a careful delineation of responsibility in handling actual emergencies. This article discusses how local administrators assess risk and balance preparedness needs within a universe of daily operational needs. Managing environmental risk is also explored from a political and legal context.

Turoff, Murray, Starr Roxanne Jiltz, Connie White, Linda Plotnick, Art Hendela, and Xiang Yao. 2009. The past as the future of emergency preparedness and management. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 12-28.**
Emergency preparedness, planning, and response suffer from shortcomings that impede the potential for effectiveness. This article provides an overview of emergency preparedness and management, including insights into the shortcomings of current practices, a discussion of relevant theories (e.g., High Reliability Organizations, muddling through), and recommendations to promote more effective planning, management, and response. The recommendations include system support for the principles of High Reliability Organizations, muddling through, and rethinking risk analysis to have a longer-term view. They reflect more than just monetary loss, creating ways to better inform and involve the public and encouraging collaboration and collective intelligence through such means as a dynamic Delphi voting system.

Youmans, Jeff. 2009. An introduction to netcentric operations and services-oriented architectures for emergency managers. ***Journal of Emergency Management*** **7 (1): 71-74.**
The winds of change are upon us (once again). In the computer world, it seems changes like this happen every other day. In this case, however, it really is revolutionary. The flow of information within your department and within other departments is going to move faster than ever before. It's a wholesale architectural change that, for once, will not affect the computer in your car or on your desk, but will affect how the data are accessed. The objective of the services-oriented architecture is to obtain the overall goal of netcentric operations and speed the flow of data. The end goal is to resolve disastrous situations, get help to the victims, and track suspects faster than ever before.

Disaster Relief

Angeletti, Michelle A. 2009. Breastfeeding support in emer-

gencies: Policy implications for humanitarian relief agencies. ***Journal of Emergency Management*** **7 (1): 39-44.**
While breastfeeding provides numerous benefits to infants and young children, these benefits are especially evident during and after emergencies. This article describes the benefits of breastfeeding in emergencies and provides guidelines that can be implemented by humanitarian relief agencies to protect, promote, and support breastfeeding.

Cuddeback, Marsha R., and Frank M. Bosworth. 2008. Rebuilding community block by block. ***Cityscape: A Journal of Policy Development and Research*** **10 (3): 77-100.**
In 2003, the Louisiana State University (LSU) Office of Community Design and Development was awarded a U.S. Department of Housing and Urban Development grant to investigate new prototypes for sustainable affordable housing. Following Hurricane Katrina, the grant focus shifted to developing a home-building training program for New Orleans residents, which resulted in constructing the first new post-Hurricane Katrina houses on the north side of the Lower 9th Ward. The work was completed by a team of previously unskilled workers and 13 fourth-year undergraduate architecture students. This enterprise is discussed in the context of community participation, service learning, and the capital market for affordable housing in New Orleans at the time of the project. The demonstration project has not secured funding for continuation at this timebut was considered successful. The authors suggest six actions for replicating the program.

Currion, Paul. 2009. Only connect: Problem sciences, information systems and humanitarian reform. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 29-40.**
The introduction of information systems and the humanitarian reform process have a tremendous impact on how humanitarian assistance is delivered, yet the two processes are weakly connected. As a result, the humanitarian community fails to realize the potential of information technology in supporting key reform aspects and doesn't recognize technology is likely to render many reform discussions moot. The balance of knowledge is shifting toward those affected by disaster, implying that technology will increasingly empower them to cope more effectively with disaster impact. Traditional actors in the humanitarian community must incorporate this reality into its processes or risk being overtaken by newer and more agile institutions that might not be concerned with humanitarian principles.

Laraby, Patrick R., Margaret Bourdeaux, S. Ward Casscells, David J. Smith, and Lynn Lawry. 2009. Humanitarian assistance and disaster relief: Changing the face of defense. ***American Journal of Disaster Medicine*** **4 (1): 33-40.**
The U.S. Department of Defense (DOD) is evolving to meet new security challenges in the twenty-first century. Today's challenges result from growing political, environmental, and economic instability in important areas of the globe that threaten national and global security. Immediate outreach to foreign nations in times of violent instability or natural disaster fosters security and stability both for the affected country and for the United States. Foreign humanitarian assistance (FHA) is a rapidly evolving military mission that addresses conflict prevention, conflict, post-conflict, and natural disasters. With DOD's extensive global medical resources, it is often uniquely qualified to play a critical role in relief and/or public health efforts. When and how the American military will act in FHA and disaster relief is a still-evolving doctrine with three issues deserving particular attention: aligning operations with host government leadership; preserving humanitarian space; and tailoring the military's unique resources to the specific political and medical situation at hand. The DOD's response to a large-scale earthquake in Peru suggests useful approaches to these three issues, provides a template for future FHA mission, and points to strategic decisions and operational capabilities that need further development to establish the FHA mission firmly within DOD's repertoire of security engagement activities.

Lee, A.C.K. 2008. Local perspectives on humanitarian aid in Sri Lanka after the tsunami. ***Public Health*** **122 (12): 1410-1417.**
This article examines the impact of humanitarian aid from the perspective of local stakeholders in Sri Lanka following the tsunami disaster of December, 2004. Key informant and focus group interviews were conducted with tsunami survivors, community leaders, the local authorities, and aid workers. Collected data were analyzed using thematic analysis. Researchers found that aid aggravated social tensions and the lack of community engagement led to grievances. There was a perceived lack of transparency, beneficiary expectations were not always met, and it was difficult to match aid to needs. Rapid participatory approaches to obtain beneficiary feedback in post-disaster settings are possible but have limitations due to respondent bias. In order to mitigate adverse social impacts of their programs, humanitarian aid agencies need to better understand the context in which aid is delivered. Beneficiary feedback is essential in disaster planning and response so that disaster response can be better matched to the needs of beneficiaries.

Moss, Mitchell, Charles Schellhamer, and David A. Berman. 2009. The Stafford Act and priorities for reform. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-21.**
During the past fifty years, federal disaster policy in the United States has been shaped by an ongoing conflict between proponents who favor federal intervention following a disaster and those who believe disaster response should be the responsibility of state and local governments and charities. This article explores the existing federal disaster policy landscape within the United States with a focus on the Stafford Act, the cultural and political forces that produced it, and how the current system is ill equipped to aid in the response and recovery from major catastrophes. The Stafford Act defines how federal disasters are declared, determines the types of assistance to be provided by the federal

government, and establishes cost sharing arrangements among federal, state, and local governments. The Federal Emergency Management Agency (FEMA) carries out the provisions of the Stafford Act and distributes much of the assistance provided by the Act. With the establishment of the U.S. Department of Homeland Security, the threat of domestic terrorism, and large-scale natural disasters like Hurricane Katrina, the limits of the Stafford Act and FEMA have been shown. The article looks at several areas where the shortcomings of the Stafford Act have emerged and propose directions for reform.

O'Dempsey, Tim. 2009. Fair training: A new direction in humanitarian assistance. ***Progress in Development Studies*** **9 (1): 81-86.**
Major catastrophes appear to be inevitable given the growth of mega-cities in disaster hotspots, the predicted effects of global climate change, and the crucial relationship between natural disasters and complex political emergencies. Disaster prevention, preparedness, and contingency planning will be effective only if trained personnel are available to develop these plans and implement them in a timely manner. Workforce migration— driven by poverty, insecurity, and lack of opportunity—creates a vacuum of leadership and skills that increases the remaining population's vulnerability even further. Sustainable solutions to the problems of disasters and development will only be achieved when poor people have local access to fair training.

Earthquake

Anbazhagan, P., J.S. Vinod, and T.G. Sitharam. 2009. Probabilistic seismic hazard analysis for Bangalore. ***Natural Hazards*** **48 (2): 145-166.**
This article presents the results of probabilistic seismic hazard analysis (PSHA) for Bangalore, South India. Analyses have been carried out considering the seismotectonic parameters of the region covering a radius of 350 kilometers keeping Bangalore as the center. Seismic hazard parameter "b" has been evaluated considering the available earthquake data using (1) Gutenberg-Richter (GR) relationship, and (2) Kijko and Sellevoll (1989, 1992) method utilizing extreme and complete catalogs. The "b" parameter was estimated to be 0.62 to 0.98 from GR relation and 0.87±0.03 from Kijko and Sellevoll method. The results obtained are a little higher than the 'b" values published earlier for southern India. Further, probabilistic seismic hazard analysis for Bangalore region has been carried out considering six seismogenic sources. From the analysis, mean annual rate of exceedance and cumulative probability hazard curve for peak ground acceleration (PGA) and spectral acceleration (Sa) have been generated. The quantified hazard values in terms of the rock level peak ground acceleration (PGA) are mapped for 10 percent probability of exceedance in 50y ears on a grid size of 0.5km×0.5km. In addition, Uniform Hazard Response Spectrum (UHRS) at rock level is also developed for the 5 percent damping corresponding to 10 percent probability of exceedance in 50 years. The peak ground acceleration (PGA) value of 0.121g obtained from the present investigation is slightly lower (but comparable) than the PGA values obtained from the deterministic seismic hazard analysis (DSHA) for the same area. However, the PGA value obtained in the current investigation is higher than PGA values reported in the global seismic hazard assessment program (GSHAP) maps of Bhatia et al. (1999) for the shield area.

Dai, J., Y. Zhao, and G. Li. 2009. Wenchuan earthquake: Response of Chinese dental professionals. ***British Dental Journal*** **206 (5): 273-276.**
On May 12, 2008, an earthquake with a magnitude of 8.0 on the Richter scale hit Wenchuan, China. In the aftermath of this disaster, Chinese dental professionals actively participated in the first emergency medical response team, definitive dental treatment, oral health services and education, and the recovery of local oral care infrastructure and resources. Learning from the experience and first-hand data of the Wenchuan earthquake, dental professionals can increase their awareness of the importance of collaborative emergency response health services in mass casualty events. Further research and emphasis is needed to encourage the participation of dental professionals in disaster preparation training and practice.

Doocy, Shannon, Amy Daniels, and Daniel Aspilcueta. 2009. Mortality and injury following the 2007 Ica earthquake in Peru. ***American Journal of Disaster Medicine*** **4 (1): 15-22.**
This paper quantifies earthquake injury and mortality from the 2007 Ica earthquake in Peru and assesses earthquake-related risk and vulnerability. The design was a population-based cluster survey of households in the region most affected by the quake. A stratified cluster survey design was used to allow for comparison between urban, peri-urban, and rural areas, where different outcomes were anticipated as a result of variation in building practices and access to post-earthquake assistance. A total of 42 clusters of 16 households were planned to allow for comparison between the location types and to ensure adequate spatial coverage. The four affected provinces are in southern Peru: Ica, Pisco, Chincha, and Canete. A total of 672 randomly selected households with a combined population of 3,608 individuals, of which 3,484 (97 percent) were reported as household members on the day of the earthquake. Mortality and injury rates in the four most affected provinces were estimated at 1.4 deaths per 1,000 exposed (95 CI: 0.5-3.3) and 29 injuries per 1,000 exposed (95 CI: 6-52). Older adults and members of households of lower socioeconomic status faced increased risk of injury. No significant differences in injury rates were observed between rural, urban, and peri-urban residence areas. Populations of lower socioeconomic status faced increased risk of injury. However, no differences in injury rates were observed between rural, urban, and peri-urban communities. Study findings suggest that earthquake preparedness and mitigation efforts should focus on population subgroups of lower socioeconomic in both rural and urban areas of earthquake-prone regions.

Fritsche, Stefan, Donat Fah, Brian Steiner, and Domencio Giardini. 2009. Damage field and site effects: Multidisciplinary studies of the 1964 earthquake series in Central Switzerland. *Natural Hazards* 48 (2): 203-227.

Central Switzerland shows comparatively high seismic activity by Swiss standards. Many historical earthquakes are known and several of them caused damage. The last major event dates back to 1964 and has the characteristics of an earthquake swarm. Among dozens of felt shocks were two main shocks (Mw=5 and 5.7) that moderately damaged a limited area with hundreds of buildings suffering loss. Our aim here was to reconstruct the damage field and to analyze whether it was influenced by site effects. Given the existence of a contemporary damage assessment and other historical sources, we could describe the damage field in detail. For about 95 percent of the affected buildings, we could reconstruct the location and extent of loss, using assessments from the European Macroseismic Scale (EMS 98). Spatial analysis of the resulting data showed that most losses were concentrated in the villages of Sarnen and Kerns. Damage to residential houses and barns was by far most frequent (90 percent), but expensive losses to the relatively few sacral buildings were responsible for almost 50 percent of the repair costs. We compared the damage data with deposit thickness and soil composition and carried out field experiments using H/V spectral ratios to measure the fundamental frequency of ground resonance at 75 sites to estimate the frequency band in which amplification occurs. Our results show that locations on both thick fluviatile sediments and large alluvial cones showed higher intensities than did other ground types. Moreover, at some sites, intensity was probably increased by a layer of weathered rock below thin deposits.

Goenjian, Amen K., David Walling, Alan M. Steinberg, Alexandra Roussos, Haig A. Goenjian, and Robert S. Pynoos. 2009. Depression and PTSD symptoms among bereaved adolescents 6½ years after the 1988 Spitak earthquake. *Journal of Affective Disorders* 112 (1-3): 81-84.

This article compares depression and post-traumatic stress syndrome symptoms of parentally bereaved adolescents and a comparison group after a catastrophic natural disaster. Six and a half years after the Spitak earthquake, 48 parentally bereaved adolescents and a comparison group of 44 subjects with no parental loss were evaluated using the Depression Self-Rating Scale (DSRS) and Child Posttraumatic Stress Disorder Reaction Index (CPTSD-RI). Orphans scored significantly higher on depression than those who lost a father, who in turn scored significantly higher than those who lost a mother. Depression scores for orphans fell above the cutoff for clinical depression, while those who lost a father scored slightly below. PTSD scores within each group fell in the moderate range of severity, with girls scoring higher than boys. As self-report instruments were used, responses may have been over or under-reported. Participants belonged to the same ethnic group and therefore the results may not be generalizable to other populations. Loss of both parents and, to a lesser degree, loss of a father is a significant risk factor for depression, but not for PTSD. This study extends prior findings documenting post-disaster chronicity of depression and PTSD among bereaved adolescents, and underscores the need for post-disaster mental health and social programs, especially for those who suffer the loss of both parents.

Heidarzadeh, Mohammad, Moharram D. Pirooz, Nasser H. Zaker, and Ahmet C. Yalciner. 2009. Preliminary estimation of the tsunami hazards associated with the Makran subduction zone at the northwestern Indian Ocean. *Natural Hazards* 48 (2): 229-243.

The authors present a preliminary estimation of tsunami hazard associated with the Makran subduction zone (MSZ) at the northwestern Indian Ocean. Makran is one of the two main tsunamigenic zones in the Indian Ocean, producing some tsunamis in the past. The northwestern Indian Ocean remains one of the least studied regions in the world in terms of tsunami hazard assessment. Hence, a scenario-based method is employed to provide an estimation of tsunami hazard in this region for the first time. The numerical modeling of tsunami is verified using historical observations of the 1945 Makran tsunami. Then, a number of tsunamis each resulting from a 1945-type earthquake and spaced evenly along the MSZ are simulated. The results indicate that by moving a 1945-type earthquake along the MSZ, the southern coasts of Iran and Pakistan will experience the largest waves with heights of between 5 and 7 meters, depending on the location of the source. The tsunami will reach a height of about 5 m and 2 m in northern coast of Oman and eastern coast of the United Arab Emirates, respectively.

Jaiswal, R.K., A.P. Singh, and B.K. Rastogi. 2009. Simulation of the Arabian Sea Tsunami propagation generated due to 1945 Makran Earthquake and its effect on western parts of Gujarat (India). *Natural Hazards* 48 (2): 245-258.

The 1945 tsunami generated due to Makran Earthquake in the Arabian Sea was the most devastating tsunami in the history of the Arabian Sea, causing severe damage to property and loss of life. The earthquake occurred on November 28, 1945, 21:56 UTC (03:26 IST) with a magnitude of 8.0, originating off the Makran Coast of Pakistan in the Arabian Sea. It impacted as far as Mumbai in India and was noticed up to Karvar Coast, Karnataka. More than 4,000 people were killed as a result of the earthquake and the tsunami. In this paper an attempt is made for a numerical simulation of the tsunami generation from the source, its propagation into the Arabian Sea, and its effect on the western coast of India through the use of a numerical model, referred to as Tsunami-N2. The present simulation is carried out for a duration of 300 minutes. It is observed from the results that the simulated arrival time of tsunami waves at the western coast of India is in good agreement with the available data sources. The paper also presents run-up elevation maps prepared using Shuttle Radar Topographic Mission (SRTM) data, showing the possible area of inundation due to various wave heights along different parts of the Gujarat Coast. These results will

be useful in planning protection measures against inundation due to tsunami and in the implementation of a warning system.

Kasapoglu, Aytul, Feryal Turan, and Ali Donmez. 2009. Impacts of disasters: Comparisons of several worries in Turkey. ***Stress and Health*** **25 (1): 63-70.**
This paper defines respondents' levels of worries to find out the main predictors of each worry factor by comparing the results of earthquake (2001) and bird flu (2006) studies carried out in Turkey. Assuming that the critical power-conflict perspective was appropriate; several types of worries, namely, traffic accidents, natural disasters, unemployment, health and sickness, nuclear plants, war and terrorism, and environmental problems defined by Kamano have been analyzed using parametric and non-parametric statistical significance tests. The results revealed that earthquake hazards affected respondents' level of worries more than bird flu disease, mainly because of the enormous economic and human losses of the 1999 earthquake. It was also found that the main predictors were not the same for both studies: the education variable was more effective on the level of worries of earthquake survivors, and gender was more influential for the bird flu study.

Laraby, Patrick R., Margaret Bourdeaux, S. Ward Casscells, David J. Smith, and Lynn Lawry. 2009. Humanitarian assistance and disaster relief: Changing the face of defense. ***American Journal of Disaster Medicine*** **4 (1): 33-40.**
The U.S. Department of Defense (DOD) is evolving to meet new security challenges in the twenty-first century. Today's challenges result from growing political, environmental, and economic instability in important areas of the globe that threaten national and global security. Immediate outreach to foreign nations in times of violent instability or natural disaster fosters security and stability both for the affected country and for the United States. Foreign humanitarian assistance (FHA) is a rapidly evolving military mission that addresses conflict prevention, conflict, post-conflict, and natural disasters. With DOD's extensive global medical resources, it is often uniquely qualified to play a critical role in relief and/or public health efforts. When and how the American military will act in FHA and disaster relief is a still-evolving doctrine with three issues deserving particular attention: aligning operations with host government leadership; preserving humanitarian space; and tailoring the military's unique resources to the specific political and medical situation at hand. The DOD's response to a large-scale earthquake in Peru suggests useful approaches to these three issues, provides a template for future FHA mission, and points to strategic decisions and operational capabilities that need further development to establish the FHA mission firmly within DOD's repertoire of security engagement activities.

Li, Yue, and Bruce R. Ellingwood. 2009. Framework for multi-hazard risk assessment and mitigation for wood-frame residential construction. ***Journal of Structural Engineering*** **135 (2): 159-168.**
Wood-frame residential construction represents a major investment in the United States which, when exposed to hurricanes, earthquakes, and other natural hazards, may sustain substantial damage. Although in many parts of the country one natural hazard dominates, in certain areas multiple hazards may pose a significant threat to buildings. Building design and construction practices should address the overall risk to residential construction from multiple hazards to achieve design strategies and risk levels that are consistent with occupant expectations and social objectives. This paper presents a framework for multi-hazard risk assessment using hurricane and earthquake hazards as an example. Structural reliability-based methods that describe natural hazard and structural system response probabilistically are essential for quantifying expected losses from natural disasters and for developing appropriate strategies to manage risk. The framework permits the main sources of uncertainty that affect building performance to be identified, and provides insight on strategies for effective multi-hazard mitigation efforts.

Miles, S.B., and D.K. Keefer. 2009. Toward a comprehensive areal model of earthquake-induced landslides. ***Natural Hazards Review*** **10 (1): 19-28.**
This paper provides a review of regional scale modeling of earthquake-induced landslide hazard with respect to the needs for disaster risk reduction and sustainable development. It sets out important research themes and suggests computing with words (CW), a methodology that includes fuzzy logic systems, as a fruitful modeling methodology for addressing many of these research themes. A range of research, reviewed here, has been conducted applying CW to various aspects of earthquake-induced landslide hazard zonation, but none facilitate comprehensive modeling of all types of earthquake-induced landslides. A new comprehensive areal model of earthquake-induced landslides CAMEL is introduced here that was developed using fuzzy logic systems. CAMEL provides an integrated framework for modeling all types of earthquake-induced landslides using geographic information systems. CAMEL is designed to facilitate quantitative and qualitative representation of terrain conditions and knowledge about these conditions on the likely areal concentration of each landslide type. CAMEL is highly modifiable and adaptable. New knowledge can be easily added, while existing knowledge can be changed to better match local knowledge and conditions. As such, CAMEL should not be viewed as a complete alternative to other earthquake-induced landslide models. CAMEL provides an open framework for incorporating other models, such as Newmark's displacement method, together with previously incompatible empirical and local knowledge.

Nakamura, Karen. 2009. Disability, destitution, and disaster: Surviving the 1995 Great Hanshin Earthquake in Japan. ***Human Organization*** **68 (1): 82-88.**
On the morning of January 17, 1995, a magnitude 7.3 earthquake struck the port city of Kobe, Japan. 6,400 people died and over $80 billion in property damage occurred. Among those rendered homeless was a small group of people with severe disabilities. Over the next decade, this group leveraged discourses surrounding

civil society, disability, poverty, and the role of government in natural disasters, to become one of the most powerful and vocal proponents of disability rights in Japan. This article discusses what lessons we can learn to make disability advocacy a leading, rather than trailing, element of social policy.

Rosset, P., and L.E. Chouinard. 2009. Characterization of site effects in Montreal, Canada. *Natural Hazards* 48 (2): 295-308.
Recent destructive earthquakes have clearly shown that near-surface geological conditions play a major role in the level of ground shaking in urban areas. In Canada, Montreal is ranked second for seismic risk after Vancouver considering its population and regional seismic hazard. The city is largely built on recent unconsolidated marine and river deposits and most of its infrastructure is old and deteriorated. A seismic risk project that includes a combined methodology for site effects zoning in large cities, using microtremor measurements (H/V method) coupled with 1D numerical modeling (SHAKE91), has been initiated. The experimental approach gives good estimates of the fundamental frequency of soft deposits, while the numerical approach provides good estimates of the soil response in terms of amplification factor related to frequency. Main mechanical properties of soft soils were compiled from various data available, and a sample of input rock motions from real and synthetic earthquakes was used to compute soil response. The influence of marine clays on soil response is significant and is well correlated with thickness of these deposits. PGA amplification factors range from 2 to 4 at frequencies from 2 to 7Hz, with some occasional larger values. The results demonstrate that the methodology used for our study is both fast and efficient to determine the influence of soft soils in urban environments. Such studies are essential for the effective deployment of seismic instrumentation, land-use planning and seismic mitigation.

Flood

Ardalan, Ali, Kourosh Holakouie Naieni, Mohamad-Javad Kabir, Ali-Mohamad Zanganeh, Abbas-Ali Keshtkar, Mohamad-Reza Honarvar, Hanieh Khodaie, and Mehdi Osooli. 2009. Evaluation of Golestan Province's early warning system for flash floods, Iran, 2006-2007. *International Journal of Biometeorology* (ePub).
Golestan, a province located in northeastern Iran, is well known for deadly flash floods. This study evaluated the region's early warning system (EWS) for flash floods using an adapted version of the questionnaire developed by the United Nations International Strategy for Disaster Reduction (UNISDR). Golestan EWS documents were reviewed and a qualitative study using interviews of experts and affected people in Kalaleh and Minoodasht, was conducted. Results were discussed by an expert panel. Risk knowledge included a hazard map at the Provincial Disaster Taskforce (PDT), although no risk analysis was available. Local people were aware of exposure to flooding, but not aware of the hazard map or their vulnerability. In terms of monitoring and warning, PDT faced serious limitations in issuing early warnings, including the inability to make point predictions of rainfall or create a warning threshold. Meteorological Office communications followed a top-to-bottom flow and messages were not clearly understood by institutions, nor did they reach potential recipients in an appropriate time frame. A comprehensive response plan with adequate exercises was needed and no evaluation framework existed. Golestan EWS is in dire need of improvement. To fill in the gaps and ensure local people receive timely warnings, the authors propose a community-based model called Village Disaster Taskforce (VDT), in which individual villages act as operational units but are interlinked with other villages and the PDT.

Berenbrock, C., R.R. Mason, and S.F. Blanchard. 2009. Mapping Hurricane Rita inland storm tide. *Journal of Flood Risk Management* 2 (1): 76-82.
Flood inundation data are most useful for decision makers when presented in the context of maps of affected communities and areas. But because the data are scarce and rarely cover the full extent of flooding, interpolation and extrapolation of the information are needed. Many geographic information systems provide various interpolation tools, but these tools often ignore the effects of the topographic and hydraulic features that influence flooding. A barrier mapping method was developed to improve maps of storm tide produced by Hurricane Rita. Maps were developed for the maximum storm tide and at three hour intervals from midnight (00:00 hours) through noon (12:00 hours) on September 24, 2005. The improved maps depict storm tide elevations and the extent of flooding. The extent of storm tide inundation from the improved maximum storm tide map was compared with the extent of flood inundation from a map prepared by the Federal Emergency Management Agency (FEMA). The boundaries from these two maps generally compared quite well especially along the Calcasieu River. Also a cross-section profile that parallels the Louisiana coast was developed from the maximum storm tide map and included FEMA high-water marks.

Bissell, Richard A., Andrew Bumbak, Matthew Levy, and Patrick Echebi. 2009. Long-term global threat assessment: Challenging new roles for emergency managers. *Journal of Emergency Management* 7 (1): 19-37.
Based on currently available published data and literature from multiple disciplines, this article introduces medium- and long-term global developments and changes that will likely impact human society in disastrous or even catastrophic fashion, with significant impact on the roles and challenges of emergency managers. Some of the phenomena described include the following: (1) loss of fresh water, (2) significant sea level rise with resultant flooding, (3) increased heat leading to desertification and crop losses, (4) storms that are both more frequent and more violent, (5) massive food emergencies as crops fail for lack of water and/or saltwater inundation, (6) loss of the petroleum-based economy, and (7) massive population relocations on a level the world has never experienced. The perspective used is global, in that the trends described do not respect political boundaries. We also recognize that mitigation

and response activities may well involve many nations simultaneously. The article concludes with suggestions of steps emergency management should take in preparing to serve new and more complex tasks to meet coming challenges, and a "call to action" for emergency managers to assume a more active role in confronting the risks imposed by forces that are now underway.

Bosher, Lee, Andrew Dainty, Patricia Carillo, Jacqueline Glass, and Andrew Price. 2009. Attaining improved resilience to floods: A proactive multi-stakeholder approach. ***Disaster Prevention and Management*** **18 (1): 9-22.**
There is a need to proactively address strategic weaknesses in protecting the built environment from a range of hazards. This paper seeks to focus on the mitigation for flood hazards in the United Kingdom, particularly in understanding the extent of the problem, collating key guidance and legislation related to flood hazard mitigation, identifying who the key construction decision makers are, and the most opportune stages of the design-construction-operation process when key decisions are needed. A pluralistic research design was adopted for the study, which included a UK-wide questionnaire survey and a set of semi-structured interviews involving a range of professionals from construction, planning, insurance, emergency management and local/national government agencies was undertaken. Despite the publication of a range of guidance on flood hazard mitigation in the UK, there is still insufficient evidence that key construction stakeholders are playing an active role in mitigating flood risk. The preconstruction phase of a building's life cycle is identified as the critical stage at which key stakeholders must adopt flood hazard mitigation strategies. The socio-institutional constraints to the proactive attainment of built-in resilience are highlighted, as are recommendations about how these constraints can be addressed. The paper reports on the provisional findings of an ongoing project but these findings nonetheless provide essential foundations for the latter development of the PRE-EMPT toolkit and raise some important considerations about flood resilience in the UK. The findings presented reveal how stakeholders should be more involved, and what issues must be addressed regarding the integration of built-in resilience into construction decision making.

Brody, Samuel D., Sammy Zahran, Wesley E. Highfield, Sarah P. Bernhardt, and Arnold Vedlitz. 2009. Policy learning for flood mitigation: A longitudinal assessment of the Community Rating System in Florida. ***Risk Analysis*** **(ePub).**
Floods continue to inflict the most damage upon human communities among all natural hazards in the United States. Because localized flooding tends to be spatially repetitive over time, local decision makers often have an opportunity to learn from previous events and make proactive policy adjustments to reduce the adverse effects of a subsequent storm. Despite the importance of understanding the degree to which local jurisdictions learn from flood risks and under what circumstances, little if any empirical, longitudinal research has been conducted along these lines. This article addresses the research gap by examining the change in local flood mitigation policies in Florida from 1999 to 2005. It tracks 18 different mitigation activities organized into four series of activities under the Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) for every local jurisdiction in Florida participating in the FEMA program on a yearly time step. The article then identifies the major factors contributing to policy changes based on CRS scores over the seven-year study period. Using multivariate statistical models to analyze both natural and social science data, the effects of several variables are isolated and categorized into the following groups: hydrologic conditions, flood disaster history, and socioeconomic and human capital controls. Results indicate that local jurisdictions do in fact learn from histories of flood risk and this process is expedited under specific conditions.

Calver, A., E. Stewart, and G. Goodsell. 2009. Comparative analysis of statistical and catchment modeling approaches to river flood frequency estimation. ***Journal of Flood Risk Management*** **2 (1): 24-31.**
This paper compares the quantification of British river floods using two approaches—the Flood Estimation Handbook (FEH) flood peak and event-based method and recently developed continuous simulation techniques that use parameter-sparse modeling of flood catchment flood runoff. The methods were applied to over 100 sites in Britain and treated as if there were no flow data. Although such observations did exist; they were used only for testing. Errors of =20 percent in peak flows at ungauged sites are very good in this hydrologically challenging context; errors of up to around 35 percent might have to be addressed by flood management practice. The results from the FEH statistical method reinforced its established role in peak-flow estimation. The emerging continuous simulation approaches show considerable potential for peaks and flow time series. The errors associated with the FEH-unit hydrograph approach reflect the additional challenge of incorporating ungauged rainfall estimation and ungauged discharge.

Carroll, Bob, Hazel Morbey, Ruth Balogh, and Gonzalo Araoz. 2009. Flooded homes, broken bonds, the meaning of home, psychological processes and their impact on psychological health in a disaster. ***Health and Place*** **15 (2): 540-547.**
In 2005, Carlisle suffered severe flooding that affected 1,600 houses. Social and health impacts were examined in a qualitative study that interviewed those whose homes had been flooded, as well as the workers who supported them. The findings showed many people suffered from severe disruption to their lives, damage to their homes, and psychological health issues. Phenomenological and transactional perspectives were used in analyzing the psychological processes (identity, attachment, alienation, and dialectics) that underlay the meaning of home and its impact on psychological health. Proposals for policy and practice are made.

Chang, Heejun, Jon Franczyk, and Changhwan Kim. 2009. What is responsible for increasing flood risks? The case of Gangwon Province, Korea. ***Natural Hazards*** **48 (3):**

339-354.
The authors examined the anthropogenic and natural causes of flood risks in six representative cities in the Gangwon Province of Korea. Flood damage per capita is mostly explained by cumulative upper five percent summer precipitation amount and the year. The increasing flood damage is also associated with deforestation in upstream areas and intensive land use in lowlands. Human encroachment on floodplains made these urban communities more vulnerable to floods. Without changes in the current flood management systems of these cities, their vulnerability to flood risks will remain and may even increase under changing climate conditions.

De Brujin, K.M., and F. Klijn. 2009. Risky places in the Netherlands: A first approximation for floods. *Journal of Flood Risk Management* 2 (1): 58-67.
Flood risk maps are considered useful tools for flood risk management, including spatial planning. In the Netherlands, flood risk is usually assessed for large geographical units at the dike-ring scale. Flood risk differences within dike rings can be large, however. Maps providing information on flood risks and a more detailed spatial scale of risk can help prioritize flood control measures or land-use planning. This paper focuses on the identification of risky places in the Netherlands, i.e. places where many flood fatalities can be expected because of their hazards and vulnerability. The method factors the likelihood and number of fatalities into hazard, vulnerability, and exposure factors.

Freudenburg, William R., Robert Gramling, Shirley Laska, and Kai T. Erikson. 2008. Organizing hazards, engineering disasters? Improving the recognition of political-economic factors in the creation of disasters. *Social Forces* 87 (2): 1015-1038.
Disaster studies have made important progress in recognizing the unequally distributed consequences of disasters, but there has been less progress in analyzing social factors that help create "natural" disasters. Even well-known patterns of hazard creation tend to be interpreted generically—as representing "economic development" or "capitalism"—rather than through focusing on the more specific dynamics involved. This article illustrates this point with two recent and well-known cases of flooding—those in the upper Mississippi River Valley and in the Katrina-related devastation of New Orleans. In the former case, damage was caused in part by building the very kinds of higher and stronger flood walls that were shown to be inadequate in the latter. In the New Orleans case, a more important factor in the death and destruction was the excavation of a transportation canal. In both cases, and many more, the underlying causes of damage to humans as well as to the environment has involved a three-part pattern, supported by the political system: spreading the costs; concentrating the economic benefits; and hiding the real risks. In very real senses, these have been floods of folly, created not just by extreme weather events, but by deadly and avoidable patterns of political-economic choices. Comparable patterns appear to deserve greater attention in other contexts, as well.

Golding, B.W. 2009. Uncertainty propagation in a London flood simulation. *Journal of Flood Risk Management* 2 (1): 2-15.
Following recent costly flood events in the United Kingdom, there is considerable societal and political pressure to reduce flooding and improve warnings. In response to this, the Flood Risk Management Research Consortium (FRMRC) has been created to investigate the potential of several areas of existing research to be brought into operational use. In this paper, the estimation of flood impact and probability is analyzed and illustrated with examples from a simulated forecast of a Thames Estuary flood event carried out at a FRMRC workshop. The forecast modeling chain consisted of meteorology, storm surge, estuary hydrodynamics, defense failure and inundation. The workshop concluded that end-to-end propagation of probability was feasible in an integrated real-time flood forecasting system, and that the basis of such a system had been demonstrated.

Heidari, A. 2009. Structural master plan of flood mitigation measures. *Natural Hazards and Earth System Sciences* 9 (1): 61-75.
Flood protection is one of the practical methods in damage reduction. Although it not possible to be completely protected from flood disaster, a major part of the damage can be reduced by mitigation plans. In this paper, the optimum flood mitigation master plan is determined by economic evaluation, trading off construction costs and the expected value of damage reduction as the benefit. Size of certain mitigation alternatives is also obtained from risk analysis by accepting the possibility of flood overtopping. Different flood mitigation alternatives are investigated from various aspects in the Dez and Karun river floodplain areas as a case study in southwest Iran. The results show that detention dam and flood diversion are the best alternatives of flood mitigation methods, along with enforcing the flood control purpose of upstream multipurpose reservoirs. Dike and levees are not justifiable because of negative impact on downstream by enhancing routed flood peak discharge magnitude and flood damages as well.

Heitz, Carine, Sandrine Spaeter, Anne-Veronique Auzet, and Sandrine Glatron. 2009. Local stakeholders' perception of muddy flood risk and implications for management approaches: A case study in Alsace (France). *Land Use Policy* 26 (2): 443-451.
The inventory of muddy floods in France indicates that the occurrence of these events seriously increased in the northwest and east of the country. Muddy floods triggering can largely be explained by physical characteristics such as a hilly topography, soils prone to crust, or heavy rainfall in spring. Although the physical processes are well known, and despite increasing information about the need of mitigation measures, no significant reduction of these disasters has been registered. Therefore, this should be explained by factors others than scientific reasons or technical knowledge acquisition difficulties. This paper deals with a study of muddy flood risk in five municipalities belonging to three catchments (AlsaceNE France). These catchments have suffered

from several muddy flood events in the past 20 years, and, despite the implementation of mitigation measures, no decrease of their frequency has occurred. This study focuses on risk perception. The authors assume that obtaining information on risk perception contributes to the understanding of the main social factors that should be taken into account in an efficient muddy flood risk management policy. To gather data, they used surveys based on individuals' interviews and questionnaires, focusing on the local stakeholders in charge of the risk management. A sampling strategy based on a spatial distinction of runoff areas was used to select the areas to be surveyed. The survey results highlight significant differences in perception among respondents. These differences depend in particular on their location within the catchment (i.e., erosion or sedimentation area). Moreover, almost the half of the respondents trust information provided by the local authorities. The results provide some insights about the type and the source of information related to risk mitigation that should be considered when implementing an efficient regulation policy.

Karrasch, B., M. Mehrens, and U. Link. 2009. Increased incidence of saprophytic bacteria, coliforms and E. coli following severe flooding requires risk assessment for human health: Results of the River Elbe flood in August 2002. ***Journal of Flood Risk Management*** **2 (1): 16-23.**

In August 2002, flooding in the Elbe valley caused severe damage of sewage treatment plants and networks. This article investigates the impact of flooding on the bacteriological water quality (colony-forming units of saprophytic bacteria, coliform bacteria and Escherichia coli) compared with levels from previous and subsequent years. The flood introduced organic matter and elevated saprophytic bacteria levels, and a general increase of coliform bacteria. Markedly high loads of coliforms and E. coli were detected in the water column in areas where damage to sewage treatment plants was rife, exceeding the European Commission's Bathing Water Directive. The rapid disappearance from the water column may partly be caused by sedimentation creating deposits on pasture, farmland and in built-up areas, which could represent a health hazard. Future flood risk reduction should therefore be focused on the protection of sewage systems and hygienic monitoring of floodwater and flood sediments.

Kaur, Trishanjit. 2009. Disaster planning in university libraries in India: A neglected area. ***New Library World*** **110 (3/4): 175-187.**

This paper looks into the neglected area of disaster planning in university libraries in India. It is a case study of two university libraries in Punjab that were impacted by flooding in July 1993. Their experiences with the disaster, losses incurred, and action taken in the libraries is discussed. Annual reports of the universities were used along with face-to-face interviews with the librarian and the deputy librarian of the two university libraries who had experienced the floods. One university library lost just over 70 per cent of its collection in flood. The other was fortunate and only minor loss was reported. The study found that neither university library in the study had a disaster plan at the time of the flood and still don't have plans in place for future disasters.

Kron, W. 2009. Flood insurance: From clients to global financial markets. ***Journal of Flood Risk Management*** **2 (1): 68-75.**

Weather-related natural catastrophes are increasing worldwide in number and intensity, and losses have reached new levels. This represents a challenge that must be faced by governments, the people concerned, and the financial sector, both nationally and globally. Flood insurance is rare in most countries, but the development of solutions to make flood risk more insurable has gained momentum. There is no ideal flood insurance scheme, as each situation is influenced by factors such as risk-adequate premium structure, adverse selection, and general risk awareness. Solutions tailored to the situation in each respective country must be found. While rich countries have to find ways to handle record losses of $100 billion and more, poor countries need microinsurance to provide people with at least a minimum of financial security. The insurance industry has through the reinsurance sector established a system to pay local monetary losses globally. In the wake of extremely expensive catastrophes, a system involving the whole financial market has great potential.

Kurian, N.P., N. Nirupama, M. Baba, and K.V. Thomas. 2009. Coastal flooding due to synoptic scale, meso-scale and remote forcings. ***Natural Hazards*** **48 (2): 259-273.**

Coastal flooding occurs due to storm surges generated by tropical and extra-tropical cyclones on the globe. The meteorological forcing fields for the generation of storm surges are the tangential surface wind stress on the ocean surface and the normal atmospheric pressure gradients associated with the weather systems. The large scale forcing from the cyclones is referred to as the synoptic scale. Storm surge prediction from synoptic scale forcing is well developed and is reasonably satisfactory around the world. However, coastal flooding also occurs from weather systems, with forcing on a meso-scale and also from remote forcing. It is proposed here that the term "storm surge" be used to only refer to coastal flooding from synoptic scale forcing and the terminology "rissaga" be used for coastal flooding from meso-scale forcing. For flooding due to remote forcing, a new term "kallakkadal" is proposed.

Lein, Haakon. 2009. The poorest and most vulnerable? On hazards, livelihoods and labeling of riverine communities in Bangladesh. ***Singapore Journal of Tropical Geography*** **30 (1): 98-113.**

Within the field of hazard research, vulnerability studies have been central to inducing a shift in the perspective on disasters as being primarily inflicted by geophysical events to that of apprehending disasters as destructive outcomes of particular social as well as hazardous environmental conditions. However, the inherent tendency within vulnerability studies to classify certain areas or people as "vulnerable" may in some cases also serve to reinforce popular or ingrained prejudices, negative stereotypes, dubious explanations of living conditions, and the fate of specific communities that become so

labeled. The riverbanks and islands in river courses of Bangladesh have long been portrayed as home to the "poorest" and most vulnerable communities, the widespread assumption being that people would only live in such riverine environments because they have no other options. Drawing on an examination of existing literature on char settlements in Bangladesh and data from a field site in the Jamuna River, this paper argues that the prevailing perceptions and labeling of char dwellers as "vulnerable" people is based on a far too simplistic understanding of both rural migration patterns and the livelihoods obtained in these riverine areas.

Maantay, Juliana, and Andrew Maroko. 2009. Mapping urban risk: Flood hazards, race, and environmental justice in New York. ***Applied Geography*** **29 (1): 111-124.**
This paper demonstrates the importance of disaggregating population data aggregated by census tracts or other units, for more realistic population distribution and location. A newly developed mapping method, the Cadastral-based Expert Dasymetric System (CEDS), calculates population in hyper-heterogeneous urban areas better than traditional mapping techniques. A case study estimating population potentially impacted by flood hazard in New York City compares the impacted population determined by CEDS with that derived by centroid-containment method and filtered areal-weighting interpolation. Compared to CEDS, 37 percent and 72 percent fewer people are estimated to be at risk from floods citywide, using conventional areal weighting of census data, and centroid-containment selection, respectively. Undercounting of impacted population could have serious implications for emergency management and disaster planning. Ethnic and racial populations are also spatially disaggregated to determine any environmental justice impacts with flood risk. Minorities are disproportionately undercounted using traditional methods. Underestimating more vulnerable subpopulations impairs preparedness and relief efforts.

Meyer, Volker, Sebastian Scheuer, and Dagmar Haase. 2009. A multicriteria approach for flood risk mapping exemplified at the Mulde River, Germany. ***Natural Hazards*** **48 (1): 17-39.**
This paper develops a GIS-based multicriteria flood risk assessment and mapping approach. This approach includes flood risks which are not measured in monetary terms. It shows the spatial distribution of multiple risks, and it is able to deal with uncertainties in criteria values to show their influence on the overall flood risk assessment. The approach demonstrates the spatial allocation of the flood effects if risk reduction measures are implemented. The approach is applied to a pilot study for the River Mulde in Saxony, Germany, heavily affected by the hazardous flood in 2002. A GIS database of economic, social, and environmental risk criteria was created. Two different multicriteria decision rules—a disjunctive and an additive weighting approach—are utilized for an overall flood risk assessment in the area. For implementation, a software tool (FloodCalc) was developed supporting both, the risk calculation of the single criteria as well as the multicriteria analysis.

Sheng, Jingfen, and John P. Wilson. 2009. Watershed urbanization and changing flood behavior across the Los Angeles metropolitan region. ***Natural Hazards*** **48 (1): 41-57.**
This article examines the effects of watershed urbanization on stream flood behavior in the Los Angeles metropolitan region. Stream gauge data, spatially distributed rainfall data, land use/land cover, and census population data were used to quantify change in flood behavior and urbanization in multiple watersheds. Increase in flood discharge started at the very early stage of the urbanization when the population density was relatively low but the rate of increase of flood discharge varied across watersheds depending on the distribution of the imperviousness surface and flood mitigation practices. This spatial variability in rainfall-runoff indices and the increasing flood risk across the metropolitan region has posed a challenge to conventional flood emergency management, which usually responds to flood damages rather than being concerned with the broader issues of land use, land cover, and planning. This study points out that alternative land use planning and flood management practices could mitigate urban flood hazard.

Veerbeek, W., and C. Zevenbergen. 2009. Deconstructing urban flood damages: Increasing the expressiveness of flood damage models combining a high level of detail with a broad attribute set. ***Journal of Flood Risk Management*** **2 (1): 45-57.**
Climate change increases uncertainty regarding the frequency and severity of flood events, posing new challenges for urban areas often located along major rivers. Current flood damage assessment methods often ignore the level of differentiation found in the urban fabric. Their level of detail is too coarse and limits possibilities of tailor-made solutions based on refined insights on the severity, distribution, and horizon of expected impacts. As part of the Urban Flood Management project for the city of Dordrecht, the Netherlands, a flood damage assessment model was developed using a substantially higher level of detail than used in current practice. The model incorporates methods of analysis linking the spatial distribution of flood damages, flood damage composition, age of the building stock, and a range of other attributes to gain a comprehensive view on the financial consequences of urban flooding. The output provides a foundation for integration of flood proofing schemes into urban development and redevelopment.

Gender & Vulnerable Populations

Anastario, Michael, Nadine Shehab, and Lynn Lawry. 2009. Increased gender-based violence among women internally displaced in Mississippi two years post-Hurricane Katrina. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 18-26.**
Although different types of gender-based violence (GBV) have been documented in disaster-affected populations, no studies have documented a quantitative increase in rates of GBV among populations living in protracted displacement after a disaster. The authors assessed the change in rates of GBV after Hurricane

Katrina among internally displaced people (IDPs) living in travel trailer parks in Mississippi. The study design included successive cross-sectional randomized surveys, conducted in 2006 and 2007, among IDPs in Mississippi using a structured questionnaire. The authors sampled 50 travel trailer parks in nine counties in Mississippi in 2006, and 69 parks in 20 counties in 2007. A total of 420 female respondents comprised the final sample. The authors measured respondent demographics, forms of GBV including sexual and physical violence further subtyped by perpetrator, suicidal ideation, suicide attempt, and Patient Health Questionnaire-assessed depression. Respondents had a mean age of 42.7 years. The crude rate of new cases of GBV among women increased from 4.6/100,000 per day to 16.3/100,000 per day in 2006, and remained elevated at 10.1/100,000 per day in 2007. The increase was primarily driven by the increase in intimate partner violence. GBV experience was significantly associated with increased risk for poor mental health outcomes. Overall, the rate of GBV, particularly intimate partner violence, increased within the year following Hurricane Katrina and did not return to baseline during the protracted phase of displacement. Disaster planning efforts should incorporate plans to decrease the incidence of GBV following a disaster, and to ensure adequate services to people with post-disaster GBV experience.

Angeletti, Michelle A. 2009. Breastfeeding support in emergencies: Policy implications for humanitarian relief agencies. *Journal of Emergency Management* 7 (1): 39-44.
While breastfeeding provides numerous benefits to infants and young children, these benefits are especially evident during and after emergencies. This article describes the benefits of breastfeeding in emergencies and provides guidelines that can be implemented by humanitarian relief agencies to protect, promote, and support breastfeeding.

Bhushan, Braj, and J. Sathya Kumar. 2009. Emotional distress and posttraumatic stress in children: The impact of direct versus indirect exposure. *Journal of Loss and Trauma* 14 (1): 35-45.
This study examined whether familiarity with the physical environment and verbal/pictorial exposure to a tsunami also induced posttraumatic stress symptoms in adolescents. The Impact of Event Scale (IES) and Pediatric Emotional Distress Scale (PEDS) were administered to 231 subjects (130 directly exposed and 101 indirectly exposed). The directly exposed group scored high on the IES and PEDS. A significant sex difference was observed on all three dimensions of the IES, and fearful and traumatic event-related dimensions of PEDS, with females at a higher risk compared to males. In the indirectly exposed group, no sex difference was observed for the IES (avoidance and total impact score) or the fearful, acting out, or traumatic experience related dimensions of the PEDS. Significant sex differences were observed in this group on the IES intrusion and PEDS

withdrawal scores, with males higher on intrusion and females higher on withdrawal.

Doocy, Shannon, Amy Daniels, and Daniel Aspilcueta. 2009. Mortality and injury following the 2007 Ica earthquake in Peru. *American Journal of Disaster Medicine* 4 (1): 15-22.
This paper quantifies earthquake injury and mortality from the 2007 Ica earthquake in Peru and assesses earthquake-related risk and vulnerability. The design was a population-based cluster survey of households in the region most affected by the quake. A stratified cluster survey design was used to allow for comparison between urban, peri-urban, and rural areas, where different outcomes were anticipated as a result of variation in building practices and access to post-earthquake assistance. A total of 42 clusters of 16 households were planned to allow for comparison between the location types and to ensure adequate spatial coverage. The four affected provinces are in southern Peru: Ica, Pisco, Chincha, and Canete. A total of 672 randomly selected households with a combined population of 3,608 individuals, of which 3,484 (97 percent) were reported as household members on the day of the earthquake. Mortality and injury rates in the four most affected provinces were estimated at 1.4 deaths per 1,000 exposed (95 CI: 0.5-3.3) and 29 injuries per 1,000 exposed (95 CI: 6-52). Older adults and members of households of lower socioeconomic status faced increased risk of injury. No significant differences in injury rates were observed between rural, urban, and peri-urban residence areas. Populations of lower socioeconomic status faced increased risk of injury. However, no differences in injury rates were observed between rural, urban, and peri-urban communities. Study findings suggest that earthquake preparedness and mitigation efforts should focus on population subgroups of lower socioeconomic in both rural and urban areas of earthquake-prone regions.

Ebert, Annemarie, Norman Kerle, and Alfred Stein. 2009. Urban social vulnerability assessment with physical proxies and spatial metrics derived from air- and spaceborne imagery and GIS data. *Natural Hazards* 48 (2): 275-294.
Risk management in urban planning is of increasing importance to mitigate the growing amount of damage and the increasing number of casualties caused by natural disasters. Risk assessment to support management requires knowledge about present and future hazards, elements at risk, and different types of vulnerability. This article deals with the assessment of social vulnerability (SV). In the past this has been neglected because of a lack of data and assessment difficulties. Existing approaches for SV assessment, primarily based on community-based methods or on census data, have limited efficiency and transferability. In this article a new method based on contextual analysis of image and GIS data is presented. An approach based on proxy variables that were derived from high-resolution optical and laser scanning data was applied, in combination with elevation information and existing hazard data. Object-oriented image analysis was applied for the definition and estimation of those variables, focusing on SV indicators with physical characteristics. A reference Social Vulnerability Index (SVI) was created from census data available for the study area on a neighborhood level and

tested for parts of Tegucigalpa, Honduras. For the evaluation of the proxy variables, a stepwise regression model to select the best explanatory variables for changes in the SVI was applied. Eight out of 47 variables explained almost 60 percent of the variance, whereby the slope position and the proportion of built-up area in a neighborhood were found to be the most valuable proxies. This work shows that contextual segmentation-based analysis of geospatial data can substantially aid in SV assessment and, when combined with field-based information, leads to optimization in terms of assessment frequency and cost.

Eisenman, David P., Qiong Zhou, Michael Ong, Steven Asch, Deborah Glik, and Amy Long. 2009. Variations in disaster preparedness by mental health, perceived general health, and disability status. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 33-40.**

Chronic medical problems, mental illness, and disability increase vulnerability to disasters. National efforts have focused on preparing people with disabilities. Studies find them to be increasingly prepared, but less is known about people with chronic mental and medical illnesses. The authors examined the relationship between health status (mental health, perceived general health, and disability) and disaster preparedness (home disaster supplies and family communication plan). A random digit-dial telephone survey of the Los Angeles County population was conducted from October 2004 to January 2005 in 6 languages. Separate multivariate regressions modeled determinants of disaster preparedness, adjusting for sociodemographic covariates then sociodemographic variables and health status variables. Only 40.7 percent of people who rated their health as fair/poor have disaster supplies compared with 53.1 percent of those who rate their health as excellent ($P < 0.001$). Only 34.8 percent of people who rated their health as fair/poor have an emergency plan compared with 44.8 percent of those who rate their health as excellent ($P < 0.01$). Only 29.5 percent of people who have a serious mental illness have disaster supplies compared with 49.2 percent of those who do not have a serious mental illness ($P < 0.001$). People with fair/poor health remained less likely to have disaster supplies (adjusted odds ratio [AOR] 0.69, 95 percent confidence interval [CI] 0.500.96) and less likely to have an emergency plan (AOR 0.68, 95 percent CI 0.510.92) compared with those who rate their health as excellent, after adjusting for the sociodemographic covariates. People with serious mental illness remained less likely to have disaster supplies after adjusting for the sociodemographic covariates (AOR 0.67, 95 percent CI 0.480.93). Disability status was not associated with lower rates of disaster supplies or emergency communication plans in bivariate or multivariate analyses. Finally, adjusting for the sociodemographic and other health variables, people with fair/poor health remained less likely to have an emergency plan (AOR 0.66, 95 percent CI 0.480.92) and people with serious mental illness remained less likely to have disaster supplies (AOR 0.67, 95 percent CI 0.470.95). People who report fair/poor general health and probable serious mental illness are less likely to report household disaster preparedness and an emergency communication plan. The results could add to our understanding of why people with preexisting health problems suffer disproportionately from disasters. Public health may consider collaborating with community partners and health services providers to improve preparedness among people with chronic illness and people who are mentally ill.

Ferrer, Rizaldy R., Marizen Ramirez, Kori Sauser, Ellen Iverson, and Jeffrey S. Upperman. 2009. Emergency drills and exercises in healthcare organizations: Assessment of pediatric population involvement using after-action reports. ***American Journal of Disaster Medicine*** **4 (1): 23-32.**

The evaluation of pediatric disaster preparation is often lacking, even though the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) requires healthcare organizations to demonstrate disaster preparedness through the use of disaster exercises. This investigation identified, described, and assessed the involvement of pediatric victims in healthcare organization disaster drills using data from the after-action reports generated by healthcare organizations per JCAHO regulations. Forty-nine reports were voluntarily supplied. The authors analyzed the data using quantitative and qualitative approaches. Only nine reports suggested pediatric involvement. Hospitals with large bed capacity ($M = 465.6$) tended to include children in exercises more often compared with smaller facilities ($M = 350.8$). Qualitative content analysis revealed a lack of parent-child identification and family reunification systems, ineffective communication strategies, lack of pediatric resources and specific training, and unfamiliarity with altering standards of pediatric care during a disaster. Although many organizations are performing disaster exercises, most do not include pediatric concerns. More work is needed to understand the basis of this emergency preparedness gap. Overall, pediatric emergency planning should be a high priority for this vulnerable population.

Fontaine, Matthew M., and Anne C. Steinemann. 2009. Assessing vulnerability to natural hazards: Impact-based method and application to drought in Washington State. ***Natural Hazards Review*** **10 (1): 11-18.**

This article presents a vulnerability assessment technique using measures of exposure, sensitivity, and adaptive capacity. Historically, vulnerability assessments focused on analyzing the hazard without considering causes or mitigation. The vulnerability assessment method (VAM), presented here, acquires data and information from affected stakeholders to assess not only the hazard, but also the causes of vulnerability, potential for adaptation, previous impacts, and ways to mitigate future impacts. Researchers applied the VAM to a case study of Washington State that assessed drought vulnerability across 34 subsectors. Results indicate the highest vulnerability for dry land farmers, farmers with junior water rights, fisheries, ski area operators, berry farmers, and the green industry. Through validation exercises, they demonstrate the VAM's internal consistency and external applicability. Contributions of the VAM include incorporation of stakeholder data, integrated and quan-

titative assessments of vulnerability components, and applicability to other regions, scales, and types of hazards.

Gerber, Elaine. 2009. Describing tragedy: The information access needs of blind people in emergency-related circumstances. *Human Organization* 68 (1): 73-81.
Audio description is a technique used for "translating" visual material to aural readers/blind people. In this article, exploratory research on audio description (AD) is presented, which raises important questions in the field of applied anthropology and emergency planning: How does one translate visual material for a non-seeing audience? From the point of view of blind consumers, what constitutes "good" description? What specific information access needs do they have in event of emergencies? Selected results are presented from three telephone focus groups on AD, conducted with 39 blind or visually impaired people nationwide in the United States during September and October 2005. This paper addresses emergency planning, audio description, and the need for more accurate information access for blind people during public warning broadcasts and in delivering the news. Further, it examines existing guidelines for the inclusion of blind people in the provision of emergency information, concluding that successful emergency preparedness must include first-hand expertise of disabled people themselves.

Ginige, Kanchana, Dilanthi Amaratunga, and Richard Haigh. 2009. Mainstreaming gender in disaster reduction: Why and how? *Disaster Prevention and Management* 18 (1): 23-34.
This paper highlights the importance of gender mainstreaming into disaster reduction decision making as a way of reducing the disaster vulnerabilities of women, a group highly vulnerable to disasters. It builds a discussion around disaster reduction, the importance of gender mainstreaming in disaster reduction, and the ways of mainstreaming gender based on a literature review. It reviews academic literature as well as papers and reports produced by the United Nations International Strategy for Disaster Reduction (UN/ISDR) and other institutions. The paper emphasizes the need for enhancing gender balance in disaster reduction decision making in order to understand the possible effects of policies and measures developed for disaster reduction on gender roles. It paves the way forward to identify how gender mainstreaming could be achieved in the context of construction since construction has a significant relationship with development that could create or reduce disaster risk.

Goenjian, Amen K., David Walling, Alan M. Steinberg, Alexandra Roussos, Haig A. Goenjian, and Robert S. Pynoos. 2009. Depression and PTSD symptoms among bereaved adolescents 6½ years after the 1988 Spitak earthquake. *Journal of Affective Disorders* 112 (1-3): 81-84.
This article compares depression and post-traumatic stress syndrome symptoms of parentally bereaved adolescents and a comparison group after a catastrophic natural disaster. Six and a half years after the Spitak earthquake, 48 parentally bereaved adolescents and a comparison group of 44 subjects with no parental loss were evaluated using the Depression Self-Rating Scale (DSRS) and Child Posttraumatic Stress Disorder Reaction Index (CPTSD-RI). Orphans scored significantly higher on depression than those who lost a father, who in turn scored significantly higher than those who lost a mother. Depression scores for orphans fell above the cutoff for clinical depression, while those who lost a father scored slightly below. PTSD scores within each group fell in the moderate range of severity, with girls scoring higher than boys. As self-report instruments were used, responses may have been over- or under-reported. Participants belonged to the same ethnic group and therefore the results may not be generalizable to other populations. Loss of both parents and, to a lesser degree, loss of a father is a significant risk factor for depression, but not for PTSD. This study extends prior findings documenting post-disaster chronicity of depression and PTSD among bereaved adolescents, and underscores the need for post-disaster mental health and social programs, especially for those who suffer the loss of both parents.

Hirsch, Arnold R., and A. Lee Levert. 2009. The Katrina conspiracies: The problem of trust in rebuilding an American city. *Journal of Urban History* 35 (2): 207-219.
The desolation of New Orleans by Hurricane Katrina necessitated the evacuation, repopulation, and reconstruction of the city. Historic social, economic, and political divisions conditioned that process, both reflecting and exacerbating racial tensions. The lack of trust between blacks and whites generated rumors and, for many, explanations for the slow response to cries for relief, the attempts to restrict black mobility in the immediate aftermath of the storm, and fears of exclusion or other-race domination in the post-Katrina political era. Contemporary opportunists and exploiters of such racial divisions lent their weight to the support of traditional racial reactions. The strategy, tactics, and outcomes of the first post-Katrina elections thus revealed the deep influence of pre-Katrina values and behavior in the rebuilding process. Under such conditions, that process remains halting, mired in racial and political conflict, and seemingly unable to make a break with a racially burdened past.

Ikeda, Keiko. 2009. How women's concerns are shaped in community-based disaster risk management in Bangladesh. *Contemporary South Asia* 17 (1): 65-78.
This article elaborates on how concerns regarding gender in community-based disaster risk management are shaped through interaction between local agents of development and communities in Bangladesh. Since women and men have different experiences in disaster, gender concerns should be fully addressed by the community and integrated into the action they take up to reduce disaster risks. The term "local agents of development" refers to individuals engaged in implementation of development policy in their own community. Recent trends in community-based disaster risk management policy seek what is called a "whole community approach," engaging various stakeholders such as tra-

ditional village elite, "local civil society," and leaders of community-based organizations—mostly poor villagers supported by non-governmental organizations. Within the context of the historical evolution of community development approaches in Bangladesh, this is quite new in terms of bringing together traditional leaders and poor target groups, including women's groups. By drawing from the experience of women and focusing on the functioning of local agents of development during the flood of 2004, the author assesses the gaps between the primary concerns of women and those taken up in the risk-reduction action, to see whether, why, and when they have widened or been bridged.

Kanter, Robert K., John S. Andrake, Nancy M. Boeing, James Callahan, Arthur Cooper, Christine A. Lopez-Dwyer, James P. Marcin, Folafouuwa O. Odetola, Anne E. Ryan, Thomas E. Terndrup, and Joseph R. Tobin. 2009. Developing consensus on appropriate standards of disaster care for children. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 27-32.**

Neither professional consensus nor evidence exists to guide the choice of essential hospital disaster interventions. This study demonstrates a method for developing consensus on hospital disaster interventions that should be regarded as essential, quantitatively balancing needs and resources. A panel of pediatric acute care practitioners developed consensus using a modified Delphi process. Interventions were chosen such that workload per staff member would not exceed the previously validated maximum according to the Therapeutic Intervention Scoring System. Based on published models, it was assumed that the usual numbers of staff would care for a disaster surge of four times the usual number of intensive care and non-intensive care hospital patients. Using a single set of assumptions on constrained resources and overwhelming needs, the panel ranked and agreed on essential interventions. A number of standard interventions would exceed crisis workload constraints, including detailed recording of vital signs and fluid balance, administration of vasoactive agents, invasive monitoring of pressures (central venous, intraarterial, and intracranial), dialysis, and tube feedings. The quantitative methodology and consensus development process described in the present report may have utility in future planning. Groups with appropriate expertise must develop action plans according to authority within each jurisdiction, addressing likely disaster scenarios, according to the needs in each medical service region, using available regional resources, and accounting for the capabilities of each institution.

Kasapoglu, Aytul, Feryal Turan, and Ali Donmez. 2009. Impacts of disasters: Comparisons of several worries in Turkey. ***Stress and Health*** **25 (1): 63-70.**

This paper defines respondents' levels of worries to find out the main predictors of each worry factor by comparing the results of earthquake (2001) and bird flu (2006) studies carried out in Turkey. Assuming that the critical power-conflict perspective was appropriate; several types of worries, namely, traffic accidents, natural disasters, unemployment, health and sickness, nuclear plants, war and terrorism, and environmental problems defined by Kamano have been analyzed using parametric and non-parametric statistical significance tests. The results revealed that earthquake hazards affected respondents' level of worries more than bird flu disease, mainly because of the enormous economic and human losses of the 1999 earthquake. It was also found that the main predictors were not the same for both studies: the education variable was more effective on the level of worries of earthquake survivors, and gender was more influential for the bird flu study.

Lein, Haakon. 2009. The poorest and most vulnerable? On hazards, livelihoods and labeling of riverine communities in Bangladesh. ***Singapore Journal of Tropical Geography*** **30 (1): 98-113.**

Within the field of hazard research, vulnerability studies have been central to inducing a shift in the perspective on disasters as being primarily inflicted by geophysical events to that of apprehending disasters as destructive outcomes of particular social as well as hazardous environmental conditions. However, the inherent tendency within vulnerability studies to classify certain areas or people as "vulnerable" may in some cases also serve to reinforce popular or ingrained prejudices, negative stereotypes, dubious explanations of living conditions, and the fate of specific communities that become so labeled. The riverbanks and islands in river courses of Bangladesh have long been portrayed as home to the "poorest" and most vulnerable communities, the widespread assumption being that people would only live in such riverine environments because they have no other options. Drawing on an examination of existing literature on char settlements in Bangladesh and data from a field site in the Jamuna River, this paper argues that the prevailing perceptions and labeling of char dwellers as "vulnerable" people is based on a far too simplistic understanding of both rural migration patterns and the livelihoods obtained in these riverine areas.

Lommen, Mirian J.J., Angelique Sanders, Nicole Buck, and Arnoud` Arntz. 2009. Psychosocial predictors of chronic Post-Traumatic Stress Disorder in Sri Lankan tsunami survivors. ***Behavior Research and Therapy*** **47 (1): 60-65.**

This study aimed to determine whether psychological factors associated with Post-Traumatic Stress Disorder (PTSD) identified in Western samples generalize to low Social-Economical-Status (SES) populations in an underdeveloped Asian country. The study included 113 survivors of the 2004 tsunami on the south coast of Sri Lanka, recruited from four preschools and 10 villages for displaced persons. With logistic regressions the relations between interview-based PTSD diagnosis and psychological factors were assessed, controlling for putative confounders. Fifteen months post-trauma the prevalence of PTSD was 52.2 percent. Multivariate analyses indicated that negative interpretation of tsunami memories was significantly ($P < 0.005$) related to PTSD. Of the putative confounders, gender and (non-replaced) lost work equipment were related to current PTSD ($P < 0.05$). The results indicate that the relation between negative interpretation of trauma memories and PTSD is quite universal, suggesting that interventions focusing on this

factor may be important in treatment of tsunami survivors who are suffering from chronic PTSD.

Maantay, Juliana, and Andrew Maroko. 2009. Mapping urban risk: Flood hazards, race, and environmental justice in New York. ***Applied Geography*** **29 (1): 111-124.**
This paper demonstrates the importance of disaggregating population data aggregated by census tracts or other units, for more realistic population distribution and location. A newly developed mapping method, the Cadastral-based Expert Dasymetric System (CEDS), calculates population in hyper-heterogeneous urban areas better than traditional mapping techniques. A case study estimating population potentially impacted by flood hazard in New York City compares the impacted population determined by CEDS with that derived by centroid-containment method and filtered areal-weighting interpolation. Compared to CEDS, 37 percent and 72 percent fewer people are estimated to be at risk from floods citywide, using conventional areal weighting of census data, and centroid-containment selection, respectively. Undercounting of impacted population could have serious implications for emergency management and disaster planning. Ethnic and racial populations are also spatially disaggregated to determine any environmental justice impacts with flood risk. Minorities are disproportionately undercounted using traditional methods. Underestimating more vulnerable subpopulations impairs preparedness and relief efforts.

Nakamura, Karen. 2009. Disability, destitution, and disaster: Surviving the 1995 Great Hanshin Earthquake in Japan. ***Human Organization*** **68 (1): 82-88.**
On the morning of January 17, 1995, a magnitude 7.3 earthquake struck the port city of Kobe, Japan. 6,400 people died and over $80 billion in property damage occurred. Among those rendered homeless was a small group of people with severe disabilities. Over the next decade, this group leveraged discourses surrounding civil society, disability, poverty, and the role of government in natural disasters, to become one of the most powerful and vocal proponents of disability rights in Japan. This article discusses what lessons we can learn to make disability advocacy a leading, rather than trailing, element of social policy.

Nathan, Fabien. 2008. Risk perception, risk management and vulnerability to landslides in the hill slopes in the city of La Paz, Bolivia: A preliminary statement. ***Disasters*** **32 (3): 337-357.**
This article is drawn from preliminary findings of the author's PhD. Most of the results are still being analyzed and thus those discussed here are not definitive and are subject to revision. Conclusions have been drawn from almost two years fieldwork in the western hill slope of La Paz, using various techniques for data collection: constant participant observation with the inhabitants and their neighborhood representatives; in-depth interviews with more than 30 families at risk; informal interviews with other people at risk and with disaster victims; semi-directed interviews with dozens of 'old inhabitants' of the neighborhoods; in-depth interviews with dozens of "neighborhood presidents" and with many local authorities related to risk management; and analysis of documentation, maps, pictures, photographs, video collections, and other visual material. The in-depth interviews with people living with risk contained more than 120 questions; those related to risk, emergencies, and hazards were purposefully open-ended to see whether the theme appeared by itself in the interviewee's discourse and concerns. In this respect, the interview guide took into account advances in sociology, anthropology, and applied human security studies, focusing on what really mattered for the research subjects. This is a hybrid method combining the advantages of questionnaires, semistructured interviews, and life stories. It is adaptive and flexible but also allows for future statistical analysis.

Nelson, Valerie, and Tanya Stathers. 2009. Resilience, power, culture, and climate: A case study from semi-arid Tanzania, and new research directions. ***Gender & Development*** **17 (1): 81-94.**
Rapid changes to the climate are predicted over the next few years, presenting challenges for women's empowerment and gender equality on a completely new scale. There is little evidence or research to provide a reliable basis for gender-sensitive approaches to agricultural adaptation to climate change. This article explores the gender dimensions of climate change, in relation to participation in decision-making, divisions of labor, access to resources, and knowledge systems. It draws on insights from recent research on agricultural adaptation to climate change in Tanzania. The article then explains why future gender-sensitive climate-adaptation efforts should draw upon insights from "resilience thinking," "political ecology," and environmental anthropology as a way of embedding analysis of power struggles and cultural norms in the context of the overall socio-ecological system.

Othelia Lee, Eun-Kyoung, Ce Shen, and Thanh V. Tran. 2009. Coping with Hurricane Katrina: Psychological distress and resilience among African American evacuees. ***Journal of Black Psychology*** **35 (1): 5-23.**
Hurricane Katrina was one of the most devastating natural disasters in U.S. history. Although this natural disaster affected all racial groups, low-income African Americans experienced disproportionate suffering. This study examines factors related to psychological resilience in the Hurricane Katrina a 363-evacuee sample drawn from the Kaiser Washington Post Harvard Poll. The structural equation model used explains 34 percent of the total variance of Katrina victims' resilience was measured by their perceived sense of recovery. Findings suggest those evacuees who reported psychological distress as a reaction to the disaster were less likely to report they would recover fully. All three Hurricane Katrina experience-related variables—being insured, home destruction, and human loss—significantly affect psychological distress, with human loss being strongest. Implications for practice and research are discussed.

Pfefferbaum, Betty, and Carol S. North. 2008. Research with children exposed to disasters. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-***

Disaster Mental Health Needs Assessment Surveys **17 (S2): S49-S56.**

A number of logistical issues complicate child disaster research. Like adult studies, much child research has used a single cross-sectional assessment of nonrepresentative samples, fails to consider pre-disaster contribution to post-disaster problems, and leaps to unwarranted causal conclusions from results that provide mere associations. Despite concern about the accuracy of parental reports and concern about children's understanding of terms, most child studies use a single source of information—either the children themselves or their parents. As the field matures, greater attention to the sophistication of research methods and design will increase our understanding of children in the context of disasters.

Reardon, Kenneth M., Marcel Ionescu-Heroiu, and Andrew J. Rumbach. 2008. Equity planning in post-Hurricane Katrina New Orleans: Lessons from the Ninth Ward. ***Cityscape: A Journal of Policy Development and Research*** **10 (3): 57-76.**

This article describes how grassroots activists and community leaders representing poor and working class residents of New Orleans, together with planning students and faculty from three research universities, overcame racial, class, and cultural barriers to collaboration to create and promote a comprehensive Hurricane Katrina recovery plan for the neighborhoods that make up the city's Ninth Ward.

Rosborough, Stephanie, Jennifer L. Chan, and Parveen Parmar. 2009. Responding to gender-based violence in disasters: Grappling with research methods to clear the way for planning. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 8-10.**

Ruwanpura, Kanchana N. 2008. Temporality of disasters: The politics of women's livelihoods 'after' the 2004 tsunami in Sri Lanka. ***Singapore Journal of Tropical Georgraphy*** **29 (3): 325-340.**

The devastation caused by the 2004 Indian Ocean tsunami in Sri Lanka is represented as a "natural disaster." Yet the tsunami did not occur in a sociopolitical and historical vacuum. How people responded to the tsunami, the challenges of and attitudes to relocation and post-tsunami livelihoods were shaped by uneven development, social exclusion, and ethnonationalist war. All these responses are embedded in structures of gender, caste, class, and ethnicity. The tsunami brought to the forefront preexisting inequalities, showing up complexities in the temporality of disasters. Drawn from fieldwork in two coastal areas in the southern and eastern provinces, this paper shows how gendered structures within the local political economy influenced the ways that institutional actors as well as the displaced communities and women initially devised livelihood strategies. These reactions show how place matters as much as preexisting gendered political economy conditions and reveal the complex ways in which women continue to mediate and negotiate everyday responses in the aftermath of a "natural" disaster.

Soeteman, Rik J.H., C. Joris Yzermans, M.M. Spreeuwenberg, Tina Dorn, Jan J. Kerssens, Wil J.H.M. van de Bosch, and Jouke van der Zee. 2009. Does disaster affect immigrant victims more than non-immigrant victims in Dutch general practice: A matched cohort study. ***Journal of Public Health*** **17 (1): 27-32.**

In the literature, immigrant victims appear to be more vulnerable to health effects of a disaster than indigenous victims. Most of these studies were performed without pre-disaster measurement and without using a control group. The aim of this study is to monitor differences between two groups of victims—Turkish immigrants and indigenous Dutch, in utilization and morbidity as presented in general practice after a human-caused disaster. A matched cohort study was performed with pre-disaster (one year) and post-disaster (four years) measurements of patients from 30 general practices in Enschede. Turkish victims (N=303) and Dutch victims (N=606), matched on age, gender and socioeconomic status, were included. Main outcome measures were psychological problems and physical symptoms as recorded by the general practitioner, using the International Classification of Primary Care. The Turkish victims showed higher utilization than the Dutch victims prior to the disaster. In the first post-disaster year, both groups of victims showed an increase in utilization, but the increases did not differ significantly. The Turkish group showed no significantly greater increase than the Dutch group in the five most prevalent clusters of health problems (psychological, respiratory, skin, musculoskeletal, and digestive). The Turkish victims in general practice were as vulnerable as the Dutch victims for the effects on their health of this man-made disaster. Differences between Turkish and native Dutch victims of this man-made disaster can largely be explained by the differences that existed already before the disaster.

Terranova, Andrew M., Paul Boxer, and Amanda Sheffield Morris. 2009. Changes in children's peer interactions following a natural disaster: How pre-disaster bullying and victimization rates changed following Hurricane Katrina. ***Psychology in the Schools*** **46 (4): 333-347**.

Youth exposed to disasters experience stress and adjustment difficulties, which likely influence their interactions with peers. In this study, the authors examined changes in bullying and peer victimization in two cohorts of children. Youth from an area affected by Hurricane Katrina were assessed pre and post-disaster (n = 96, mean [M] = 10.9 years old, 53 percent female), and a comparison group from a nearby area was assessed over the same time interval one year prior (n = 120, M = 10.2 years old, 52 percent female). Within the hurricane group, relations between symptoms of post-traumatic stress disorder with bullying and victimization also were examined. Following the hurricane, the hurricane group reported increased relational and overt bullying relative to the nonhurricane group, and PTSD symptoms pre-

dicted increased victimization. Thus, school personnel should be vigilant and prepared to respond to increased bullying following disasters and for increased victimization in youth experiencing PTSD symptoms.

Zoraster, Richard M. 2009. "Social Worth" will not affect allocation of scarce resources in a pandemic or disaster: Political correctness, sophistry, or reality? ***American Journal of Disaster Medicine*** **4 (1): 5-7.**

Homeland Security & Terrorism

Bedford, Jennifer, and James Kendra. 2009. Security as subversion: Undermining access, agency, and voice through the discourse of security. ***Journal of Emergency Management*** **7 (1): 53-63.**
This article describes a case in which local emergency planning was thwarted by indifference and concern about security. It argues that excessive security concerns can impede the cooperation and information sharing that is essential to good planning, suggesting that concerns about less likely terrorist attacks undercut preparation for more likely emergencies arising from natural or technological sources.

Goffman, Thomas E. 2009. Bioterrorism versus radiological terrorism: Notes from a bio/nuclear epidemiologist. ***American Journal of Disaster Medicine*** **4 (1): 9-14.**
The antiterrorism and disaster planning communities often speak of the high potential for bioterrorism and possible potential for radioterrorism, specifically the explosion of a fission device on U.S. soil. Information gained from an epidemiologist's work in the national and international scene, which inevitably involves intelligence regarding the cultures and subcultures being studied, suggest that bioterrorism is far less likely to be a major threat, that it has been over-emphasized at the state level due to warnings from the Department of Homeland Security, and that Homeland Security itself appears biased toward bioterrorism with very little available rational basis.

Goffman, Thomas E. 2009. The current state of affairs for disaster planning for a nuclear terrorist attack. ***American Journal of Disaster Medicine*** **4 (1): 59-64.**
The author presents current thinking on the effects of an atomic bomb blast from a medical point of view. He argues current U.S. federal plans for a nuclear disaster are crude, insufficient, disarticulated, and rely on martial law as a means of crowd control. The physics of a fusion reaction bomb are discussed along with the plans of other countries. Apparently "secret" American plans show poor understanding of the physics of nuclear bombs along with poor insight into what will be needed to help the maximum number of citizens. An alternative plan involving computer modeling and educating the public to the effects of a fission explosion is presented. The key issue of statewide planning is discussed, since the federal government has dumped medical problems on "the local level."

Gotham, Kevin Fox, and Miriam Greenberg. 2008. From 9/11 to 8/29: Post-disaster recovery and rebuilding in New York and New Orleans. ***Social Forces*** **87 (2): 1039-1062.**
This article examines the process of post-disaster recovery and rebuilding in New York City since 9/11 and in New Orleans since the Hurricane Katrina disaster. As destabilizing events, 9/11 and Katria forced a rethinking of the major categories, concepts, and theories that long dominated disaster research. The authors analyze the form, trajectory, and problems of reconstruction in the two cities with special emphasis on the implementation of the Community Development Block Grant Program, the Liberty Zone and the Gulf Opportunity Zone, and tax-exempt private activity bonds to finance and promote reinvestment. Drawing on a variety of data sources, they show that New York and New Orleans have become important laboratories for entrepreneurial city and state governments seeking to use post-disaster rebuilding as an opportunity to push through far-reaching neoliberal policy reforms. The emphasis on using market-centered approaches for urban recovery and rebuilding in New York and New Orleans should be seen not as coherent or sustainable responses to urban disaster but rather as deeply contradictory restructuring strategies that are intensifying the problems they seek to remedy.

Krewski, Daniel, Louise Lemyre, Michelle C. Turner, Jennifer E.C. Lee, Christine Dallaire, Louise Bouchard, Kevin Brand, and Pierre Mercier. 2009. Public perception of population health risks in Canada: Health hazards and health outcomes. ***International Journal of Risk Assessment and Management*** **11 (3/4): 299-318.**
The focus of this article is a descriptive account of the perceptions of five health hazards (motor vehicles, climate change, recreational physical activity, cellular phones, and terrorism) and five health outcomes (cancer, long-term disabilities, asthma, heart disease, and depression) from a recent survey of 1,503 Canadians. To shed light on factors that influence risk perception in Canada, the extent to which these exemplars are perceived as high in risk and controllability, as well as the extent to which knowledge and uncertainty surrounding them is high, was examined. The degree to which these exemplars are deemed acceptable and generate worry among Canadians was also examined. Variation was observed in the extent to which different health hazards and outcomes are perceived on the various dimensions. Perceptions of health hazards and outcomes also vary significantly by gender, age, and education. Findings are compared to existing research on risk perception.

Laraby, Patrick R., Margaret Bourdeaux, S. Ward Casscells, David J. Smith, and Lynn Lawry. 2009. Humanitarian assistance and disaster relief: Changing the face of defense. ***American Journal of Disaster Medicine*** **4 (1): 33-40.**
The U.S. Department of Defense (DOD) is evolving to meet new security challenges in the twenty-first century. Today's challenges result from growing political, environmental, and economic instability in important areas of the globe that threaten national and global security. Immediate outreach to foreign nations in times of violent instability or natural disaster fosters security and stability both for the affected country and for the United States. Foreign humanitarian assistance (FHA) is a rap-

idly evolving military mission that addresses conflict prevention, conflict, post-conflict, and natural disasters. With DOD's extensive global medical resources, it is often uniquely qualified to play a critical role in relief and/or public health efforts. When and how the American military will act in FHA and disaster relief is a still-evolving doctrine with three issues deserving particular attention: aligning operations with host government leadership; preserving humanitarian space; and tailoring the military's unique resources to the specific political and medical situation at hand. The DOD's response to a large-scale earthquake in Peru suggests useful approaches to these three issues, provides a template for future FHA mission, and points to strategic decisions and operational capabilities that need further development to establish the FHA mission firmly within DOD's repertoire of security engagement activities.

Lowe Steffen, Seana, and Alice Fothergill. 2009. 9/11 volunteerism: A pathway to personal healing and community engagement. ***The Social Science Journal*** **46 (1): 29-46.**

This paper is a longitudinal analysis of the impacts of spontaneous volunteerism on those who responded to emergency needs immediately following the September 11, 2001 terrorist attacks on the World Trade Center in New York City. Our qualitative study investigates the long-term implications for the volunteers who participated in helping behaviors ranging from working on the bucket brigade to serving food to rescue workers to working as translators for victims' families. This project consists of two waves of data collection. The first set of in-depth interviews with 23 volunteers was conducted in the weeks following the attacks in the fall of 2001. In the second wave of interviews over three years later, the authors interviewed 20 volunteers, nearly half of whom were original respondents in the first wave. Through their analysis, they found that taking action facilitated meaningful therapeutic recovery from feelings of victimization following the event. In addition to the apparent long-term impact on personal healing, the opportunity to volunteer had lasting impacts on self-concept that translated to significant changes in life choices. The second wave of research also reveals that the experience of action impacted the volunteers' community sentiment by fostering new levels of identification with and affinity for members of their community. In addition, community response work in the aftermath of a disaster appeared to increase community engagement in non-disaster times.

Manley, Dawn K., and Dena M. Bravata. 2009. A decision framework for coordinating bioterrorism planning: Lessons from the BioNet program. ***American Journal of Disaster Medicine*** **4 (1): 49-57.**

Effective disaster preparedness requires coordination across multiple organizations. This article describes a detailed framework developed through the BioNet program to facilitate coordination of bioterrorism preparedness planning among military and civilian decision makers. The authors conducted a series of semi-structured interviews with civilian and military decision makers from public health, emergency management, hazardous material response, law enforcement, and military health in the San Diego area. Decision makers used a software tool that simulated a hypothetical anthrax attack, which allowed them to assess the effects of a variety of response actions (e.g., issuing warnings to the public, establishing prophylaxis distribution centers) on performance metrics. From these interviews, the authors characterized the information sources, technologies, plans, and communication channels that would be used for bioterrorism planning and responses. The authors used influence diagram notation to describe the key bioterrorism response decisions, the probabilistic factors affecting these decisions, and the response outcomes. Results: The authors present an overview of the response framework and provide a detailed assessment of two key phases of the decision-making process: (1) pre-event planning and investment; and (2) incident characterization and initial responsive measures. The framework enables planners to articulate current conditions; identify gaps in existing policies, technologies, information resources, and relationships with other response organizations; and explore the implications of potential system enhancements. Use of this framework could help decision makers execute a locally coordinated response by identifying the critical cues of a potential bioterrorism event, the information needed to make effective response decisions, and the potential effects of various decision alternatives.

Masterson, Lori, Christel Steffen, Michael Brin, Mary Frances Kordick, and Steve Christos. 2009. Willingness to respond: Of emergency department personnel and their predicted participation in mass casualty terrorist events. ***The Journal of Emergency Medicine*** **36 (1): 43-49.**

In May, 2003, the TOPOFF 2 national disaster drill demonstrated inadequate preparedness for mass casualty terrorist events and failed to address the willingness of Emergency Department (ED) personnel to assist with these events. The objective of this study was to examine ED personnel willingness to respond to various multiple casualty events. A prospective voluntary survey of ED personnel from multiple hospitals was randomly administered in the form of vignette-based questionnaires. The survey of 204 participants at eight hospitals in the Chicago area revealed that staff members were more willing to work additional hours for victims of an airplane crash (98.0 percent), than for a radioactive bomb (85.3 percent), or a biologic agent (54.0 percent). For the biologic agent only, men were significantly more likely to respond than women. Hospital management should anticipate significant reductions in workforce during biologic and radioactive disaster events. Employees' willingness to respond was not augmented by any incentives offered by hospitals, although enhanced financial remuneration and disability coverage showed the most potential to increase response.

Moss, Mitchell, Charles Schellhamer, and David A. Berman. 2009. The Stafford Act and priorities for reform. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-21.**

During the past fifty years, federal disaster policy in the United States has been shaped by an ongoing conflict between proponents who favor federal intervention following a disaster and those who believe disaster response should be the responsibility of state and local governments and charities. This article explores the existing federal disaster policy landscape within the United States with a focus on the Stafford Act, the cultural and political forces that produced it, and how the current system is ill equipped to aid in the response and recovery from major catastrophes. The Stafford Act defines how federal disasters are declared, determines the types of assistance to be provided by the federal government, and establishes cost sharing arrangements among federal, state, and local governments. The Federal Emergency Management Agency (FEMA) carries out the provisions of the Stafford Act and distributes much of the assistance provided by the Act. With the establishment of the U.S. Department of Homeland Security, the threat of domestic terrorism, and large-scale natural disasters like Hurricane Katrina, the limits of the Stafford Act and FEMA have been shown. The article looks at several areas where the shortcomings of the Stafford Act have emerged and propose directions for reform.

Rubin, G. James, Richard Amlot, Lisa Page, and Simon Wessely. 2008. Methodological challenges in assessing general population reactions in the immediate aftermath of a terrorist attack. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys*** **17 (S2): S29-S35.**

Assessing mental health needs following a disaster is important, particularly within high-risk groups like first responders or individuals directly caught up in the incident. Following events involving widespread destruction, ingenuity and hard work are required to study these issues. When considering responses among the general population following less devastating events such as a conventional terrorist attack, or following an event involving a chemical, biological, radiological, or nuclear agent, other variables may become more relevant for determining the population's overall psychosocial well-being. Trust, perceived risk, sense of safety, willingness to take prophylaxis and unnecessary attendance at medical facilities will all be important in determining the overall psychological, medical, economic, and political impact of such attacks. Assessing these variables can help government agencies and nongovernmental organizations adjust their communication and outreach efforts. To provide these data quickly, telephone surveys using short time windows for data collection or which use quota samples are often required. It is unclear whether slower, more conventional, and more expensive survey methods with better response rates would produce different results compared to these quicker and cheaper methods, and whether those differences would have a major impact on any resulting policy decisions. This empirical question would benefit from further study.

Wood, Karen M. 2009. Community health centers: The untapped resource for public health and medical preparedness. ***Homeland Security Affairs*** **5 (1): 1-39**

HSPD-21 was recently released to the public calling for a transformation in the national approach to public health and medical preparedness in the United States. The latest deliberations, as prioritized by this strategy, are to bolster the nation's ability to manage a public health crisis by stimulating improvements in the areas of biosurveillance, countermeasure distribution, mass casualty care, and community resilience. The objective is to create a much more tightly integrated systems approach toward public health and medical preparedness. Community Health Centers (CHCs), by philosophic orientation, geographic location, and as publicly-funded entities, are well-positioned to provide medical services, education, and other human services to prevent, prepare for, respond to, mitigate, and recover from the public health impact of a bioterrorist event or other biological disease outbreak. Aggressive investment in CHCs and their emergency management programs serves a dual purpose that will: (1) create greater social equity by reducing health disparities and make public health emergency management more accessible to special needs populations; and (2) support many of the objectives identified in the Public Health and Medical Preparedness Strategy.

Hurricanes & Coastal Hazards

Anastario, Michael, Nadine Shehab, and Lynn Lawry. 2009. Increased gender-based violence among women internally displaced in Mississippi two years post-Hurricane Katrina. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 18-26.**

Although different types of gender-based violence (GBV) have been documented in disaster-affected populations, no studies have documented a quantitative increase in rates of GBV among populations living in protracted displacement after a disaster. The authors assessed the change in rates of GBV after Hurricane Katrina among internally displaced people (IDPs) living in travel trailer parks in Mississippi. The study design included successive cross-sectional randomized surveys, conducted in 2006 and 2007, among IDPs in Mississippi using a structured questionnaire. The authors sampled 50 travel trailer parks in nine counties in Mississippi in 2006, and 69 parks in 20 counties in 2007. A total of 420 female respondents comprised the final sample. The authors measured respondent demographics, forms of GBV including sexual and physical violence further subtyped by perpetrator, suicidal ideation, suicide attempt, and Patient Health Questionnaire-assessed depression. Respondents had a mean age of 42.7 years. The crude rate of new cases of GBV among women increased from 4.6/100,000 per day to 16.3/100,000 per day in 2006, and remained elevated at 10.1/100,000 per day in 2007. The increase was primarily driven by the increase in intimate partner violence. GBV experience was significantly associated with increased risk for poor mental health

outcomes. Overall, the rate of GBV, particularly intimate partner violence, increased within the year following Hurricane Katrina and did not return to baseline during the protracted phase of displacement. Disaster planning efforts should incorporate plans to decrease the incidence of GBV following a disaster, and to ensure adequate services to people with post-disaster GBV experience.

Berenbrock, C., R.R. Mason, and S.F. Blanchard. 2009. Mapping Hurricane Rita inland storm tide. ***Journal of Flood Risk Management*** **2 (1): 76-82.**
Flood inundation data are most useful for decision makers when presented in the context of maps of affected communities and areas. But because the data are scarce and rarely cover the full extent of flooding, interpolation and extrapolation of the information are needed. Many geographic information systems provide various interpolation tools, but these tools often ignore the effects of the topographic and hydraulic features that influence flooding. A barrier mapping method was developed to improve maps of storm tide produced by Hurricane Rita. Maps were developed for the maximum storm tide and at three hour intervals from midnight (00:00 hours) through noon (12:00 hours) on September 24, 2005. The improved maps depict storm tide elevations and the extent of flooding. The extent of storm tide inundation from the improved maximum storm tide map was compared with the extent of flood inundation from a map prepared by the Federal Emergency Management Agency (FEMA). The boundaries from these two maps generally compared quite well especially along the Calcasieu River. Also a cross-section profile that parallels the Louisiana coast was developed from the maximum storm tide map and included FEMA high-water marks.

Broz, Dita, Elise C. Levin, Amy P. Mucha, Darlene Pelzel, William Wong, Victoria Persky, and Ronald C. Hershow. 2009. Lessons learned from Chicago's emergency response to mass evacuations caused by Hurricane Katrina. ***American Journal of Public Health*** **99 (8): 1-9.**
This article analyzes the response of the Chicago Department of Public Health with respect to its effectiveness in providing health care to Hurricane Katrina evacuees arriving in the city. Between September 12 and October 21, 2005, researchers conducted a real-time qualitative assessment of a medical unit in Chicago's Hurricane Victim Welcome and Relief Center. A semistructured guide was used to interview 33 emergency responders to identify key operational successes and failures. The medical unit functioned at a relatively high level, primarily as a result of the flexibility, creativity, and dedication of its staff and the presence of strong leadership. Chronic health care services and prescription refills were the most commonly mentioned services provided, and collaboration with a national pharmacy proved instrumental in reconstructing medication histories. The lack of a comprehensive and well-communicated emergency response plan resulted in several preventable inefficiencies. Findings highlight the need for improved planning for care of evacuee populations after a major emergency event and the importance of ensuring continuity of care for the most vulnerable. The article provides an emergency response preparedness checklist for local public health departments.

Brunsma, David, and J. Steven Picou. 2008. Disasters in the twenty-first century: Modern destruction and future instruction. ***Social Forces*** **87 (2): 983-991.**

Changnon, Stanley A. 2009. Characteristics of severe Atlantic hurricanes in the United States: 1949–2006. ***Natural Hazards*** **48 (3): 329-337.**
Property insurance data available for 1949 to 2006 were assessed to get definitive measures of hurricane losses in the United States. Catastrophes—events causing more than $1 million in losses—were most frequent in the southeast and south climate regions. Losses in these two regions totaled $127 billion, 85 percent of the nation's total losses. During the study period, there were 79 hurricane catastrophes, causing $150.6 billion in losses and averaging $2.6 billion per year. All aspects of these hurricanes showed increases in post-1990 years. Sizes of loss areas averaged one state between 1949 and 1967, but grew to three states between 1990 and 2006. Seven of the 10 most damaging hurricanes came in 2004 (four) and 2005 (three). The number of hurricanes also peaked between 1984 and 2006, increasing from an annual average of 1.2 from 1949 to 1983 to 2.1 per year. Losses were $49.3 billion from 1991 to 2006, 32 percent of the 58-year total. Various reasons have been offered for such recent increases in hurricane losses including more hurricanes, more intense tropical storms, increased societal vulnerability in storm-prone areas, and a change in climate due to global warming, although this is debatable.

Chowdhury, Arindam Gan, F. Emil Simiu, and Stephen P. Leatherman. 2009. Destructive testing under simulated hurricane effects to promote hazard mitigation. ***Natural Hazards Review*** **10 (1): 1-10.**
The human and financial toll of hurricanes on the Eastern and Gulf Coast communities in the United States has been immense. The International Hurricane Research Center at Florida International University focuses on a first-of-its-kind, full-scale destructive testing method that could lead to a better understanding of interaction between hurricanes and structures and develop effective mitigation measures. This hurricane engineering research will improve building resiliency through full-scale destructive testing and raise public awareness of the need for improved building safety and how to achieve it. This paper describes the full-scale destructive testing concept, details application in pilot tests, illustrates the scientific approach underlying the current testing, and discusses plans to develop techniques to mitigate hurricane destruction. This research is necessary for available and affordable insurance, which is needed to sustain the economy of the U.S. coastal states.

Colten, Craig E., and Amy R. Sumpter. 2009. Social memory and resilience in New Orleans. *Natural Hazards* 48 (3): 355-364.

A key concept in resilience studies is that human societies can learn from hazard events, using their accumulated social memory to better contend with future catastrophes. This article explores the deliberate referral to historical records complied after Hurricane Betsy in 1965 and how they were used to prepare for tropical storms at the time of Hurricane Katrina in 2005. Despite proclamations that Louisiana would not repeat its mistakes, hazards planners seriously neglected the historical record.

Cruz, Ana Maria, and E. Krausman. 2009. Hazardous-materials releases from offshore oil and gas facilities and emergency response following Hurricanes Katrina and Rita. *Journal of Loss Prevention in the Process Industries* 22 (1): 59-65.

Hurricanes Katrina and Rita triggered numerous hazardous materials releases from industrial and storage facilities on shore, as well as from offshore oil and gas facilities in the Gulf of Mexico. In this paper, we identify and analyze over 600 hazardous materials releases triggered by Hurricanes Katrina and Rita from offshore platforms and pipelines. The results of the study could assist offshore industry owners/operators, government officials, and policy makers by providing lessons learned and recommendations for better disaster planning for major storms and flood events.

Cuddeback, Marsha R., and Frank M. Bosworth. 2008. Rebuilding community block by block. *Cityscape: A Journal of Policy Development and Research* 10 (3): 77-100.

In 2003, the Louisiana State University (LSU) Office of Community Design and Development was awarded a U.S. Department of Housing and Urban Development grant to investigate new prototypes for sustainable affordable housing. Following Hurricane Katrina, the grant focus shifted to developing a home-building training program for New Orleans residents, which resulted in constructing the first new post-Hurricane Katrina houses on the north side of the Lower 9th Ward. The work was completed by a team of previously unskilled workers and 13 fourth-year undergraduate architecture students. This enterprise is discussed in the context of community participation, service learning, and the capital market for affordable housing in New Orleans at the time of the project. The demonstration project has not secured funding for continuation at this time but was considered successful. The authors suggest six actions for replicating the program.

Evans-Cowley, Jennifer S., and Meghan Zimmerman Gough. 2008. Citizen engagement in post-Hurricane Katrina planning in Harrison County, Mississippi. *Cityscape: A Journal of Policy Development and Research* 10 (3): 21-38.

This article describes an empowerment planning process that brought residents, public officials, and university students together in Harrison County, Mississippi, following the devastation that Hurricane Katrina brought to the community in August 2005. The participants developed solutions to several critical problems involved in rebuilding efforts. The article addresses methods of engaging community members in a participatory planning process, structures for supporting student learning for future efforts, and the challenges of overcoming local residents' perceptions of outsiders' participation in their process. The article concludes by proposing measures for evaluating the merit of a planning process.

Gotham, Kevin Fox, and Miriam Greenberg. 2008. From 9/11 to 8/29: Post-disaster recovery and rebuilding in New York and New Orleans. *Social Forces* 87 (2): 1039-1062.

This article examines the process of post-disaster recovery and rebuilding in New York City since 9/11 and in New Orleans since the Hurricane Katrina disaster. As destabilizing events, 9/11 and Katria forced a rethinking of the major categories, concepts, and theories that long dominated disaster research. The authors analyze the form, trajectory, and problems of reconstruction in the two cities with special emphasis on the implementation of the Community Development Block Grant Program, the Liberty Zone and the Gulf Opportunity Zone, and tax-exempt private activity bonds to finance and promote reinvestment. Drawing on a variety of data sources, they show that New York and New Orleans have become important laboratories for entrepreneurial city and state governments seeking to use post-disaster rebuilding as an opportunity to push through far-reaching neoliberal policy reforms. The emphasis on using market-centered approaches for urban recovery and rebuilding in New York and New Orleans should be seen not as coherent or sustainable responses to urban disaster but rather as deeply contradictory restructuring strategies that are intensifying the problems they seek to remedy.

Grace, Martin F., and Robert W. Klein. 2009. The perfect storm: Hurricanes, insurance and regulation. *Risk Management and Insurance Review* 12 (1): 81-124.

The intense hurricane seasons of 2004 and 2005 caused considerable instability in property insurance markets in coastal states with the greatest problems occurring in Florida and the Southeast. Insurers have substantially raised rates and decreased their exposures. While no severe hurricanes struck the United States in 2006 and 2007, market pressures remain strong given the high risk still facing coastal states. These developments generate considerable concern and controversy among various stakeholder groups. Government responses have varied. In Florida, political pressures prompted a wave of legislation and regulations to expand government underwriting and subsidization of hurricane risk and constrain insurers' rates and market adjustments. Other states' actions seem more moderate. In this context, it is important to understand how property insurance markets have been changing and governments have been responding to increased catastrophe risk. This article examines important market developments and evaluates associated government policies. The article comments on how regulation is affecting the equilibration of insurance markets and offer opinions on policies that are helpful

and harmful.

Hamilton, Douglas R., Thomas F. Gavagan, Kieran T. Smart, Lori A. Upton, Nancy F. Weller, Umalr A. Shah, Avirm Fishkind, David Persse, Paul Shank, and Kenneth Mattox. 2008. Houston's medical disaster response to Hurricane Katrina: Part 1: The initial medical response from Trauma Service Area Q. ***Annals of Emergency Medicine*** **(ePub).**
After Hurricane Katrina hit the Gulf Coast on August 29, 2005, thousands of ill and injured evacuees were transported to Houston, TX. Houston's regional disaster plan was quickly implemented, leading to the activation of the Regional Hospital Preparedness Council's Catastrophic Medical Operations Center and the rapid construction of a 65-examination-room medical facility within the Reliant Center. A plan for triage of arriving evacuees was quickly developed and the Astrodome/Reliant Center Complex megashelter was created. This article discusses major elements of the regional disaster response, including regional coordination, triage and emergency medical service transfers into the region's medical centers, medical care in population shelters, and community health challenges.

Hamilton, Douglas R., Thomas F. Gavagan, Kieran T. Smart, Lori A. Upton, Nancy F. Weller, Umalr A. Shah, Avirm Fishkind, David Persse, Paul Shank, and Kenneth Mattox. 2008. Houston's medical disaster response to Hurricane Katrina: Part II: Transitioning from emergency evacuee care to community health care. ***Annals of Emergency Medicine*** **(ePub).**
After Hurricane Katrina hit the Gulf Coast on August 29, 2005, thousands of ill and injured evacuees were transported to Houston, TX. Houston's regional disaster plan was quickly implemented, leading to the activation of the Regional Hospital Preparedness Council's Catastrophic Medical Operations Center and the rapid construction of a 65-examination-room medical facility within the Reliant Center. A plan for triage of arriving evacuees was quickly developed and the Astrodome/Reliant Center Complex mega-shelter was created. Herein, we discuss major elements of the regional disaster response, including regional coordination, triage and emergency medical service transfers into the region's medical centers, medical care in population shelters, and community health challenges.

Hirsch, Arnold R., and A. Lee Levert. 2009. The Katrina conspiracies: The problem of trust in rebuilding an American city. ***Journal of Urban History*** **35 (2): 207-219.**
The desolation of New Orleans by Hurricane Katrina necessitated the evacuation, repopulation, and reconstruction of the city. Historic social, economic, and political divisions conditioned that process, both reflecting and exacerbating racial tensions. The lack of trust between blacks and whites generated rumors and, for many, explanations for the slow response to cries for relief, the attempts to restrict black mobility in the immediate aftermath of the storm, and fears of exclusion or other-race domination in the post-Katrina political era. Contemporary opportunists and exploiters of such racial divisions lent their weight to the support of traditional racial reactions. The strategy, tactics, and outcomes of the first post-Katrina elections thus revealed the deep influence of pre-Katrina values and behavior in the rebuilding process. Under such conditions, that process remains halting, mired in racial and political conflict, and seemingly unable to make a break with a racially burdened past.

Islam, Tanveerul, and Richard E. Peterson. 2009. Climatology of landfalling tropical cyclones in Bangladesh 1877-2003. ***Natural Hazards*** **48 (1): 115-135.**
Bangladesh is highly susceptible to tropical cyclones. Unfortunately, there is a dearth of climatological studies on the tropical cyclones there. The Global Tropical Cyclone Climatic Atlas (GTCCA) lists historical storm track information for all the seven tropical cyclone ocean basins including the North Indian Ocean. Using GIS, tropical cyclones that made landfall in Bangladesh between 1877 and 2003 are identified and examined from the climatological perspective. For the convenience of study, the coast of Bangladesh is divided into five segments and comparisons are made among the coastal segments in terms of cyclone landfall and vulnerability. There is a large variability in the year-to-year occurrence of landfalling tropical cyclones in Bangladesh. Most of the tropical cyclones (70 percent) hit in the months of May-June and October-November. They generally show the well-known pattern of pre- and post-monsoon cyclone seasons in that region.

Kapucu, Naim, Maria-Elena Augustin, and Vener Garayev. 2009. Interstate partnerships in emergency management: Emergency management assistance compact in response to catastrophic disasters. ***Public Administration Review*** **69 (2): 297-313.**
The Emergency Management Assistance Compact (EMAC) is a mutual aid agreement and partnership allowing states to assist one another in responding to natural and man-made disasters, often in advance of federal disaster assistance. This article examines EMAC's response to Hurricanes Katrina and Rita in order to address the significant need for analysis of emergency management at the state level. A content analysis of news reports, government documents, and reports from a number of institutions was performed to determine the volume and direction of EMAC's performance and its transactions during the response operations. The authors find a lack of EMAC training among responders, potentially reducing communication and coordination and the efficiency and effectiveness of response operations. A network analysis assessed the relationships among the responding organizations to coordinate their emergency response operations.

Kessler, Ronald C., and Hans-Ulrich Wittchen. 2008. Post-disaster mental health needs assessment surveys: The challenge of improved future research.

International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys **17 (S2): S1-S5.**
Disasters are very common occurrences, becoming increasingly prevalent throughout the world. The number of natural disasters either affecting more than 100 people or resulting in a call for international assistance, increased from roughly 100 per year worldwide in the late 1960s, to over 500 per year in the past decade. Population growth, environmental degradation, and global warming all play parts in accounting for these increases. There is also the possibility of a pandemic. This paper covers a topic of growing worldwide importance: mental health needs assessment in the wake of large-scale disasters. Although natural and human-made disasters are known to have substantial effects on the mental health of the people who experience them, research shows that the prevalence of post-disaster psychopathology varies enormously from one disaster to another in ways that are difficult to predict merely by knowing the objective circumstances of the disaster. Mental health needs assessment surveys are consequently carried out after many large-scale natural and human-made disasters to provide information for service planners on the nature and magnitude of need for services. These surveys vary greatly, though, in the rigor with which they assess disaster-related stressors and post-disaster mental illness. Synthesis of findings across surveys is hampered by these inconsistencies. The typically limited focus of these surveys with regard to the inclusion of risk factors, follow-up assessments, and evaluations of treatment, also limit insights concerning post-disaster mental illness and treatment response. The papers in this issue discuss methodological issues in the design and implementation of post-disaster mental health needs assessment surveys aimed at improving on the quality of previous such surveys. The many recommendations in these papers will help to foster improvements in the next generation of post-disaster mental health surveys.

Landy, Marc. 2008. Mega-disasters and federalism. ***Public Administration Review*** **68: S186-S198.**
Measured in dollar terms, Hurricane Katrina was the worst natural disaster in American history. Megadisaster response recovery and mitigation put federalism to an especially difficult test because they require speed, efficiency, decisiveness, and effective coordination. This essay focuses on the response to and recovery from Katrina in order to probe the implications of mega-disasters for federalism. It understands federalism as being composed off our dimensions: the three levels of government, and the civic realm. It tests key defenses of federalism against civic and government performance during Katrina. It offers examples of successes and failures involving all four dimensions and provides specific recommendations for improving megadisaster mitigation, response, and recovery while maintaining an appropriate constitutional balance among the three lev

els of government, and between the civilian government and the military.

Li, Geraldine M. 2009. Tropical cyclone risk perceptions in Darwin, Australia: A comparison of different residential groups. ***Natural Hazards*** **48 (3): 365-382.**
Different individuals and groups perceive risk differently. This can significantly affect risk management and mitigation practices and requirements. This paper presents findings from a study of tropical cyclone risk perceptions in the city of Darwin in the Northern Territory of Australia. Primary in-depth interview data and other secondary data are analyzed, focusing in particular on wind damage, storm surge, and life safety risk perceptions of residents since Cyclone Tracy—which struck in 1974—and perceptions of future climate change as it relates to tropical cyclone risk. The analysis reveals that a number of perceptions prevail. In particular, the study reveals a wide difference of perceptions between short-term residents (Group 1) and long-term and expert residents (Group 2) in relation to wind damage, storm surge and life safety risk. It also reveals a large division between laypersons (Group 3) and expert residents' (Group 4) perceptions of climate change risk as it relates to tropical cyclone risk. The author recommends that flexible, multiple and integrative management and mitigation approaches are required to deal with such different perceptions and divisions in the resident population.

Li, Yue, and Bruce R. Ellingwood. 2009. Framework for multihazard risk assessment and mitigation for wood-frame residential construction. ***Journal of Structural Engineering*** **135 (2): 159-168.**
Wood-frame residential construction represents a major investment in the United States which, when exposed to hurricanes, earthquakes, and other natural hazards, may sustain substantial damage. Although in many parts of the country one natural hazard dominates, in certain areas multiple hazards may pose a significant threat to buildings. Building design and construction practices should address the overall risk to residential construction from multiple hazards to achieve design strategies and risk levels that are consistent with occupant expectations and social objectives. This paper presents a framework for multihazard risk assessment using hurricane and earthquake hazards as an example. Structural reliability-based methods that describe natural hazard and structural system response probabilistically are essential for quantifying expected losses from natural disasters and for developing appropriate strategies to manage risk. The framework permits the main sources of uncertainty that affect building performance to be identified, and provides insight on strategies for effective multihazard mitigation efforts.

Moreno, Alvaro, and Susanne Becken. 2009. A climate change vulnerability assessment methodology for coastal tourism. ***Journal of Sustainable Tourism*** **(ePub).**
Coastal and marine environments are among the most popular areas for outdoor recreation and tourism. Coastal areas have also been identified as the most vulnerable to climate change, for example as a result of extreme events and sea-level rise. It will be increasingly important for coastal tourism destination managers to understand their vulnerability to climatic changes and

to devise appropriate adaptation. This paper presents a five-step vulnerability assessment methodology for tourism in coastal areas. The five steps include (1) system analysis, (2) identification of activity and hazard sub-systems, (3) vulnerability assessments for the different sub-systems at risk, (4) integration for the destination as a whole and scenario analysis and (5) communication. The framework is illustrated by an example of how it might be applied to Fiji. The paper concludes that a consistent methodology, like the one proposed, will facilitate vulnerability assessments in a range of coastal destinations, allow comparison to be made of vulnerabilities across different situations, provide a basis for more research into specific adaptation measures and assist destinations to develop a more sustainable tourism industry.

Moss, Mitchell, Charles Schellhamer, and David A. Berman. 2009. The Stafford Act and priorities for reform. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-21.**
During the past fifty years, federal disaster policy in the United States has been shaped by an ongoing conflict between proponents who favor federal intervention following a disaster and those who believe disaster response should be the responsibility of state and local governments and charities. This article explores the existing federal disaster policy landscape within the United States with a focus on the Stafford Act, the cultural and political forces that produced it, and how the current system is ill equipped to aid in the response and recovery from major catastrophes. The Stafford Act defines how federal disasters are declared, determines the types of assistance to be provided by the federal government, and establishes cost sharing arrangements among federal, state, and local governments. The Federal Emergency Management Agency (FEMA) carries out the provisions of the Stafford Act and distributes much of the assistance provided by the Act. With the establishment of the U.S. Department of Homeland Security, the threat of domestic terrorism, and large-scale natural disasters like Hurricane Katrina, the limits of the Stafford Act and FEMA have been shown. The article looks at several areas where the shortcomings of the Stafford Act have emerged and propose directions for reform.

Othelia Lee, Eun-Kyoung, Ce Shen, and Thanh V. Tran. 2009. Coping with Hurricane Katrina: Psychological distress and resilience among African American evacuees. ***Journal of Black Psychology*** **35 (1): 5-23.**
Hurricane Katrina was one of the most devastating natural disasters in U.S. history. Although this natural disaster affected all racial groups, low-income African Americans experienced disproportionate suffering. This study examines factors related to psychological resilience in the Hurricane Katrina a 363-evacuee sample drawn from the Kaiser Washington Post Harvard Poll. The structural equation model used explains 34 percent of the total variance of Katrina victims' resilience was measured by their perceived sense of recovery. Findings suggest those evacuees who reported psychological distress as a reaction to the disaster were less likely to report they would recover fully. All three Hurricane Katrina experience-related variables—being insured, home destruction, and human loss—significantly affect psychological distress, with human loss being strongest. Implications for practice and research are discussed.

Quale, John, and Kristina L. Iverson. 2008. A sustainable housing response to Hurricane Katrina. ***Cityscape: A Journal of Policy Development and Research*** **10 (3): 101-112.**
This article describes the collaborative experience of the ecoMOD project at the University of Virginia (UVA) and Habitat for Humanity International as they developed a prototypical ecological, prefabricated, and affordable home for a family along the Gulf Coast of Mississippi after Hurricane Katrina made landfall in August of 2005. Since 2004, ecoMOD has created five affordable housing units, four of them in Charlottesville, Virginia. The project is a partnership of the UVA School of Architecture and the School of Engineering and Applied Science. The project's aim is to create well-designed, high-quality homes that minimize living costs and environmental impact.

Reardon, Kenneth M., Marcel Ionescu-Heroiu, and Andrew J. Rumbach. 2008. Equity planning in post-Hurricane Katrina New Orleans: Lessons from the Ninth Ward. ***Cityscape: A Journal of Policy Development and Research*** **10 (3): 57-76.**
This article describes how grassroots activists and community leaders representing poor and working class residents of New Orleans, together with planning students and faculty from three research universities, overcame racial, class, and cultural barriers to collaboration to create and promote a comprehensive Hurricane Katrina recovery plan for the neighborhoods that make up the city's Ninth Ward.

Rumpf, Jonas, Helga Weindl, Peter Hoppe, Ernst Rauch, and Volker Schmidt. 2009. Tropical cyclone hazard assessment using model-based track simulation. ***Natural Hazards*** **48 (3): 383-398.**
A method is introduced for assessing the probabilities and intensities of tropical cyclones at landfall and applied to data from the North Atlantic. First, a recently developed model for the basin-wide Monte Carlo simulation of tropical cyclone tracks is enhanced and transferred to the North Atlantic basin. Subsequently, a large number of synthetic tracks is generated by means of an implementation of this model. This synthetic data is far more comprehensive than the available historical data, while exhibiting the same basic characteristics. It, thus, creates a more sound basis for assessing landfall probabilities than previously available, especially in areas with a low historical landfall frequency.

Schwartz, Jeffrey A. 2009. Planning for the last disaster: Correctional facilities and emergency preparedness. ***Journal of Emergency Management*** **7 (1): 75-79.**
This study uses hurricanes Katrina and Rita to illus-

trate the phenomenon of "planning for the last disaster," in which public agencies become so transfixed by a profound crisis or disaster that they begin to prepare for another occurrence of the same event. In doing so, they abandon or ignore their ongoing and more generic emergency planning and deny the obvious, that the next emergency or disaster has a high probability of being a very different situation. The same counterproductive results can be obtained if an organization is swept up in media hype and public concern about an "emergency du jour," such as Y2K or pandemic flu. Although this article examines these issues in correctional organizations, the same principles apply to almost all public agencies.

Smith, Stanley K., and Chris McCarty. 2009. Fleeing the storm(s): An examination of evacuation behavior during Florida's 2004 hurricane. ***Demography*** **46 (1): 127-145.**

The 2004 hurricane season was the worst in Florida's history, with four hurricanes causing at least 47 deaths and some $45 billion in damages. To collect information on the demographic impact of those hurricanes, this study surveyed households throughout the state and in the local areas that sustained the greatest damage. It is estimated that one-quarter of Florida's population evacuated prior to at least one hurricane. In some areas, well over one-half of the residents evacuated at least once, and many evacuated several times. Most evacuees stayed with family or friends and were away from home for only a few days. Through logistic regression analysis, the study found that the strength of the hurricane and the vulnerability of the housing unit had the greatest impact on evacuation behavior; additionally, several demographic variables had significant effects on the probability of evacuating and the choice of evacuation lodging (family/friends, public shelters, or hotels/motels). With continued population growth in coastal areas and the apparent increase in hurricane activity caused by global warming, threats posed by hurricanes are rising and this study will help government officials plan more effectively for future hurricane evacuations.

Terranova, Andrew M., Paul Boxer, and Amanda Sheffield Morris. 2009. Changes in children's peer interactions following a natural disaster: How predisaster bullying and victimization rates changed following Hurricane Katrina. ***Psychology in the Schools*** **46 (4): 333-347.**

Youth exposed to disasters experience stress and adjustment difficulties, which likely influence their interactions with peers. In this study, the authors examined changes in bullying and peer victimization in two cohorts of children. Youth from an area affected by Hurricane Katrina were assessed pre and post-disaster (n = 96, mean [M] = 10.9 years old, 53 percent female), and a comparison group from a nearby area was assessed over the same time interval one year prior (n = 120, M = 10.2 years old, 52 percent female). Within the hurricane group, relations between symptoms of post-traumatic stress disorder with bullying and victimization also were examined. Following the hurricane, the hurricane group reported increased relational and overt bullying relative to the non-hurricane group, and PTSD symptoms predicted increased victimization. Thus, school personnel should be vigilant and prepared to respond to increased bullying following disasters and for increased victimization in youth experiencing PTSD symptoms.

Zandbergen, Paul A. 2009. Exposure of U.S. counties to Atlantic tropical storms and hurricanes, 1851-2003. ***Natural Hazards*** **48 (1): 83-99.**

Exposure of counties in the continental United States to tropical storm and hurricane conditions was determined using the historic record of storm tracks for the period 1851-2003. Two approaches were used to determine exposure: (1) cumulative number of hits, with a hit occurring when the storm's path crosses a county and (2) cumulative exposure factor, which describes how much of the county has been exposed to tropical storm, hurricane, and intense hurricane-force winds. In both approaches the top 10 counties in terms of cumulative exposure are in coastal Florida, North Carolina, and Louisiana. An explanatory model was developed to describe the patterns in the documented exposure, which included distance to coast, latitude, longitude, size, and shape of the counties. Multivariate linear regression confirmed that much of the spatial variability in exposure to storm conditions can be explained with these simple parameters.

Information & Spatial Technology

Aziz, Zeeshan, Feniosky Pena-Mora, Albert Chen, and Timothy Lantz. 2009. Supporting urban emergency response and recovery using RFID-based building assessment. ***Disaster Prevention and Management*** **18 (1): 35-48.**

This paper focuses on improving mobile computing support during a disaster response and recovery operation to aid in the assessment of building damage, as well as making assessments available for to ensure a safe, efficient and effective disaster response process. The research method involved the use of scenario-based, user needs analysis for studying end-user needs and requirements. The Rational Unified Process for software design and implementation was also used. An IT-supported collaboration platform was developed to enable first responders to communicate using hand-held devices and laptops, as well as to share critical building evaluation information using a ad hoc mobile network. A trial of the system was conducted at Illinois Fire Services Institute. Mobile devices with Radio Frequency Identification (RFID) and tags can be used for posting, gathering, storing, and sharing assessments with fewer errors, which leads to improved emergency response effectiveness. The key research contribution includes analysis of the first responder information needs, development of a collaborative framework for urban preparedness and emergency response, demonstration using realistic disaster scenarios, and implementation and validation of the prototype system.

Bass, Ellen J., Leigh Baumgart, Kevin Kloesel, Kathleen Dougherty, Havidan Rodriguez, Walter Diaz, William Donner, Jenniffer Santos, and Michael Zink. 2009. Incorporating emergency management needs in the

development of weather radar networks. ***Journal of Emergency Management*** **7 (1): 45-52.**
The Center for Collaborative Adaptive Sensing of the Atmosphere (CASA) is developing networks of low-power, low-cost radars that adaptively collect, process, and visualize high-resolution data in the lowest portion of the atmosphere. CASA researchers are working with emergency managers, ensuring the network concept is designed with their needs in mind. Interviews, surveys, product usage log analysis, and simulated scenarios are used to solicit input. Results indicate the need for products for both high- and low-bandwidth, velocity products that are more easily interpreted, and enhanced training. CASA researchers are developing interventions to address these needs.

Berenbrock, C., R.R. Mason, and S.F. Blanchard. 2009. Mapping Hurricane Rita inland storm tide. ***Journal of Flood Risk Management*** **2 (1): 76-82.**
Flood inundation data are most useful for decision makers when presented in the context of maps of affected communities and areas. But because the data are scarce and rarely cover the full extent of flooding, interpolation and extrapolation of the information are needed. Many geographic information systems provide various interpolation tools, but these tools often ignore the effects of the topographic and hydraulic features that influence flooding. A barrier mapping method was developed to improve maps of storm tide produced by Hurricane Rita. Maps were developed for the maximum storm tide and at three hour intervals from midnight (00:00 hours) through noon (12:00 hours) on September 24, 2005. The improved maps depict storm tide elevations and the extent of flooding. The extent of storm tide inundation from the improved maximum storm tide map was compared with the extent of flood inundation from a map prepared by the Federal Emergency Management Agency (FEMA). The boundaries from these two maps generally compared quite well especially along the Calcasieu River. Also a cross-section profile that parallels the Louisiana coast was developed from the maximum storm tide map and included FEMA high-water marks.

Currion, Paul. 2009. Only connect: Problem sciences, information systems and humanitarian reform. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 29-40.**
The introduction of information systems and the humanitarian reform process have a tremendous impact on how humanitarian assistance is delivered, yet the two processes are weakly connected. As a result, the humanitarian community fails to realize the potential of information technology in supporting key reform aspects and doesn't recognize technology is likely to render many reform discussions moot. The balance of knowledge is shifting toward those affected by disaster, implying that technology will increasingly empower them to cope more effectively with disaster impact. Traditional actors in the humanitarian community must incorporate this reality into its processes or risk being overtaken by newer and more agile institutions that might not be concerned with humanitarian principles.

Ebert, Annemarie, Norman Kerle, and Alfred Stein. 2009. Urban social vulnerability assessment with physical proxies and spatial metrics derived from air- and spaceborne imagery and GIS data. ***Natural Hazards*** **48 (2): 275-294.**
Risk management in urban planning is of increasing importance to mitigate the growing amount of damage and the increasing number of casualties caused by natural disasters. Risk assessment to support management requires knowledge about present and future hazards, elements at risk, and different types of vulnerability. This article deals with the assessment of social vulnerability (SV). In the past this has been neglected because of a lack of data and assessment difficulties. Existing approaches for SV assessment, primarily based on community-based methods or on census data, have limited efficiency and transferability. In this article a new method based on contextual analysis of image and GIS data is presented. An approach based on proxy variables that were derived from high-resolution optical and laser scanning data was applied, in combination with elevation information and existing hazard data. Object-oriented image analysis was applied for the definition and estimation of those variables, focusing on SV indicators with physical characteristics. A reference Social Vulnerability Index (SVI) was created from census data available for the study area on a neighborhood level and tested for parts of Tegucigalpa, Honduras. For the evaluation of the proxy variables, a stepwise regression model to select the best explanatory variables for changes in the SVI was applied. Eight out of 47 variables explained almost 60 percent of the variance, whereby the slope position and the proportion of built-up area in a neighborhood were found to be the most valuable proxies. This work shows that contextual segmentation-based analysis of geospatial data can substantially aid in SV assessment and, when combined with field-based information, leads to optimization in terms of assessment frequency and cost.

French, Simon, Clare Bayley, and Nan Zhang. 2009. Web-based group decision support for crisis management. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 41-53.**
The early designs for crisis management decision support systems used data-based or model-based methodologies and architectures. This article argues that the complexity of crisis management situations means that a greater emphasis on collaboration is needed. Moreover, modern interactive Web 2.0 technologies allow group decision support to be offered to geographically dispersed teams. Given that crisis management often requires teams to be drawn together from a number of organizations sited at different locations, the article reflects upon the potential of these technologies to support the early stages of crisis management without the need to draw the team together at a common location. It also reports on a small scale experiment using GroupSystems ThinkTank to manage an emerging food safety event. Such systems have potential and deserve more careful evaluation.

Lein, James K., and Nicole I. Stump. 2009. Assessing wildfire potential within the wildland-urban interface: A southeastern Ohio example. ***Applied Geography*** **29 (1): 21-34.**

Spreading cities and suburbs remain a common phenomenon throughout the United States. Urban spread, and the desire to move beyond the subdivision for a more natural setting in the country, creates both opportunities and challenges for natural resource managers. Perhaps no challenge is as great as those related to wildfire risk within the lands describing the urban-wildland interface. The need to gain a better understanding of the wildland-urban interface is critical to policy makers charged with risk reduction responsibilities. This paper develops a methodology that characterizes the spatial distribution of wildfire risk potential in southeastern Ohio, using a geospatial technology solution to model critical hazard and risk variables associated with wildfire. The results demonstrate that the association of wildfire with hazard and risk variables can be exploited to improve wildfire potential mapping and a validation assessment of the geographic information systems (GIS)-based prescriptive model displays a strong agreement with the pattern of historic wildfire for the region.

Lu, George Y., Long S. Chiu, and David W. Wong. 2008. Vulnerability assessment of rainfall-induced debris flows in Taiwan. ***Natural Hazards*** **43 (2): 223-244.**

A GIS-based decision support system, which incorporates local topographic and rainfall effects on debris flow vulnerability is developed. Rainfall at a scale compatible with the digital elevation model resolution is obtained using a neural network with a wind-induced topographic effect and rainfall derived from satellite rain estimates and an adaptive inverse distance weight method (WTNN). The technique is tested using data collected during the passage of typhoon Tori-Ji on July, 2001 over central Taiwan. Numerous debris flows triggered by the typhoon were used as control for the study. The results show that the WTNN technique outperforms other interpolation techniques including adaptive inversed distance weight (AIDW), simple kriging (SK), co-kriging, and multiple linear regression using gauge, and topographic parameters. Multiple remotely-sensed, fuzzy-based debris-flow susceptibility parameters are used to describe the characteristics of watersheds. Non-linear, multi-variant regressions using the WTNN derived rainfall and topography factors are derived using self-organizing maps (SOM) for the debris flow vulnerability assessment. An index of vulnerability representing the degrees of hazard is implemented in a GIS-based decision support system by which a decision maker can assess debris flow vulnerability.

Maantay, Juliana, and Andrew Maroko. 2009. Mapping urban risk: Flood hazards, race, and environmental justice in New York. ***Applied Geography*** **29 (1): 111-124.**

This paper demonstrates the importance of disaggregating population data aggregated by census tracts or other units, for more realistic population distribution and location. A newly developed mapping method, the Cadastral-based Expert Dasymetric System (CEDS), calculates population in hyper-heterogeneous urban areas better than traditional mapping techniques. A case study estimating population potentially impacted by flood hazard in New York City compares the impacted population determined by CEDS with that derived by centroid-containment method and filtered areal-weighting interpolation. Compared to CEDS, 37 percent and 72 percent fewer people are estimated to be at risk from floods citywide, using conventional areal weighting of census data, and centroid-containment selection, respectively. Undercounting of impacted population could have serious implications for emergency management and disaster planning. Ethnic and racial populations are also spatially disaggregated to determine any environmental justice impacts with flood risk. Minorities are disproportionately undercounted using traditional methods. Underestimating more vulnerable subpopulations impairs preparedness and relief efforts.

McGuirl, J., N. Sarter, and D. Woods. 2009. Effects of real-time imaging on decision-making in a simulated incident command task. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 54-69.**

Eight incident commanders (ICs) took part in a simulation exercise to determine the impact of real-time imaging feedback on situation assessment and decision making in an uncertain and high tempo environment. The imaging feedback simulated the video feed from an unmanned aerial vehicle (UAV) that allows incident command centers to monitor developments at the crisis site. Nearly all of the ICs failed to detect important changes in the situation that were not captured in the imaging but that were available via other, more traditional data sources. It appears that the ICs placed an inappropriately high level of trust in the imaging data, resulting in a narrowing of their data search activities and limited cross-checking between the data sources being used. This research helps anticipate and guard against undesirable effects of introducing similar technologies on training and operational procedures in a variety of domains.

Nirupama, N. 2009. Analysis of the global tsunami data for vulnerability and risk assessment. ***Natural Hazards*** **48 (1): 11-16.**

Past tsunami observations are necessary for the assessment of tsunami risk and vulnerability. The U.S. National Geophysical Data Center has prepared the world's most comprehensive tsunami databases, with Web site listings for oceans, as well as the Caribbean, Mediterranean, Black Sea, Red Sea, and the Gulf of Mexico. The dataset goes back as far as the first century A.D. and lists events on a confidence rating scale of 0-4—zero being an erroneous entry and four being a definite tsunami. Based on these different geographical datasets, this study created a comprehensive global dataset that included only tsunamis with confidence ratings of 3-4, meaning either probable or definite. There geographic distinction in this database, nor is there distiction based on a tsunami's coastal impact strength. The simple and straightforward statistical analysis suggests almost complete randomness. With a few minor exceptions, no patterns useful for future tsunami predictions

emerged.

Osuchowski, Monica. 2009. Bringing information management practices to natural disaster risk reduction. ***The Australian Journal of Emergency Management*** **24 (1): 53-59.**

The important role of information management in improving baseline data for natural hazards has been demonstrated through a collaborative pilot project between Geoscience Australia, Mineral Resources Tasmania and the University of Wollongong. The result is a "virtual" landslide database that makes full use of diverse data across three levels of government and has enabled landslide data to be collated and accessed from a single source. Such a system establishes the foundation for a very powerful and coordinated information resource in Australia and provides a suitable basis for greater investment in data collection. This paper highlights the capacity to extend the methodology across all hazards and describes one solution in facilitating a sound knowledge base on natural disasters and disaster risk reduction.

Sherrah, Meryl. 2009. A fresh approach to development assessment in Bushfire Protection Areas. ***The Australian Journal of Emergency Management*** **24 (1): 11-16.**

In late 2006 and 2007, changes were made to the planning and building requirements for new dwellings to be built in certain identified bushfire risk areas of South Australia. The changes affected 39 councils located throughout SA, including Eyre Peninsula, Yorke Peninsula, Kangaroo Island, the South-East, the Riverland, Murray Bridge, mid-North, Mt. Lofty Ranges and parts of the metropolitan Adelaide region. Under the changes, parts of these councils have now been designated as Bushfire Protection Areas. Each of these areas has been thoroughly assessed and categorized into one of three bushfire risk levels—high bushfire risk, medium bushfire risk, or general bushfire risk. There are also areas which are "excluded." Different planning and building requirements now apply depending on the designated level of bushfire risk. The Department of Planning and Local Government has prepared an online search tool to assist people in identifying whether a particular property in the 39 councils is in a Bushfire Protection Area and the property's assigned bushfire risk. A web mapping application to assist in development assessment in Bushfire Protection Areas has also been produced for Country Fire Service and council staff involved in development assessment. The development of the online search tool and the web mapping application was funded under the Natural Disaster Mitigation Program and has received Australian and State Government financial support.

Insurance & Economic Impact

Changnon, Stanley A. 2009. Characteristics of severe Atlantic hurricanes in the United States: 1949–2006. ***Natural Hazards*** **48 (3): 329-337.**

Property insurance data available for 1949 to 2006 were assessed to get definitive measures of hurricane losses in the United States. Catastrophes—events causing more than $1 million in losses—were most frequent in the southeast and south climate regions. Losses in these two regions totaled $127 billion, 85 percent of the nation's total losses. During the study period, there were 79 hurricane catastrophes, causing $150.6 billion in losses and averaging $2.6 billion per year. All aspects of these hurricanes showed increases in post-1990 years. Sizes of loss areas averaged one state between 1949 and 1967, but grew to three states between 1990 and 2006. Seven of the 10 most damaging hurricanes came in 2004 (four) and 2005 (three). The number of hurricanes also peaked between 1984 and 2006, increasing from an annual average of 1.2 from 1949 to 1983 to 2.1 per year. Losses were $49.3 billion from 1991 to 2006, 32 percent of the 58-year total. Various reasons have been offered for such recent increases in hurricane losses including more hurricanes, more intense tropical storms, increased societal vulnerability in storm-prone areas, and a change in climate due to global warming, although this is debatable.

Chhibber, Ajay, and Rachid Laajaj. 2008. Disasters, climate change and economic development in Sub-Saharan Africa: Lessons and directions. ***Journal of African Economics*** **17 (2): 7-49.**

This paper explores the links among natural disasters, climate change, and economic development and attempts to outline a framework for their consideration. The paper summarizes the limited knowledge of long-term economic impacts of natural disasters. Linking disasters, resource management, conflicts, and other transmission channels is necessary to develop an appropriate response. The paper argues African governments, along with their development partners, need to develop a more robust disaster adaptation and response capability as part of development planning. The paper makes the case for more market-based financing mechanisms and for emphasizing forecasting research. It also argues for more work linking climate change and disasters and for looking at disaster resilience as a continuum to development strategy.

Chowdhury, Arindam Gan, F. Emil Simiu, and Stephen P. Leatherman. 2009. Destructive testing under simulated hurricane effects to promote hazard mitigation. ***Natural Hazards Review*** **10 (1): 1-10.**

The human and financial toll of hurricanes on the Eastern and Gulf Coast communities in the United States has been immense. The International Hurricane Research Center at Florida International University focuses on a first-of-its-kind, full-scale destructive testing method that could lead to a better understanding of interaction between hurricanes and structures and develop effective mitigation measures. This hurricane engineering research will improve building resiliency through full-scale destructive testing and raise public awareness of the

need for improved building safety and how to achieve it. This paper describes the full-scale destructive testing concept, details application in pilot tests, illustrates the scientific approach underlying the current testing, and discusses plans to develop techniques to mitigate hurricane destruction. This research is necessary for available and affordable insurance, which is needed to sustain the economy of the U.S. coastal states.

Doocy, Shannon, Amy Daniels, and Daniel Aspilcueta. 2009. Mortality and injury following the 2007 Ica earthquake in Peru. ***American Journal of Disaster Medicine*** **4 (1): 15-22.**

This paper quantifies earthquake injury and mortality from the 2007 Ica earthquake in Peru and assesses earthquake-related risk and vulnerability. The design was a population-based cluster survey of households in the region most affected by the quake. A stratified cluster survey design was used to allow for comparison between urban, peri-urban, and rural areas, where different outcomes were anticipated as a result of variation in building practices and access to post-earthquake assistance. A total of 42 clusters of 16 households were planned to allow for comparison between the location types and to ensure adequate spatial coverage. The four affected provinces are in southern Peru: Ica, Pisco, Chincha, and Canete. A total of 672 randomly selected households with a combined population of 3,608 individuals, of which 3,484 (97 percent) were reported as household members on the day of the earthquake. Mortality and injury rates in the four most affected provinces were estimated at 1.4 deaths per 1,000 exposed (95 CI: 0.5-3.3) and 29 injuries per 1,000 exposed (95 CI: 6-52). Older adults and members of households of lower socioeconomic status faced increased risk of injury. No significant differences in injury rates were observed between rural, urban, and peri-urban residence areas. Populations of lower socioeconomic status faced increased risk of injury. However, no differences in injury rates were observed between rural, urban, and peri-urban communities. Study findings suggest that earthquake preparedness and mitigation efforts should focus on population subgroups of lower socioeconomic in both rural and urban areas of earthquake-prone regions.

Eisenman, David P., Qiong Zhou, Michael Ong, Steven Asch, Deborah Glik, and Amy Long. 2009. Variations in disaster preparedness by mental health, perceived general health, and disability status. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 33-40.**

Chronic medical problems, mental illness, and disability increase vulnerability to disasters. National efforts have focused on preparing people with disabilities. Studies find them to be increasingly prepared, but less is known about people with chronic mental and medical illnesses. The authors examined the relationship between health status (mental health, perceived general health, and disability) and disaster preparedness (home disaster supplies and family communication plan). A random digit-dial telephone survey of the Los Angeles County population was conducted from October 2004 to January 2005 in 6 languages. Separate multivariate regressions modeled determinants of disaster preparedness, adjusting for sociodemographic covariates then sociodemographic variables and health status variables. Only 40.7 percent of people who rated their health as fair/poor have disaster supplies compared with 53.1 percent of those who rate their health as excellent ($P < 0.001$). Only 34.8 percent of people who rated their health as fair/poor have an emergency plan compared with 44.8 percent of those who rate their health as excellent ($P < 0.01$). Only 29.5 percent of people who have a serious mental illness have disaster supplies compared with 49.2 percent of those who do not have a serious mental illness ($P < 0.001$). People with fair/poor health remained less likely to have disaster supplies (adjusted odds ratio [AOR] 0.69, 95 percent confidence interval [CI] 0.500.96) and less likely to have an emergency plan (AOR 0.68, 95 percent CI 0.510.92) compared with those who rate their health as excellent, after adjusting for the sociodemographic covariates. People with serious mental illness remained less likely to have disaster supplies after adjusting for the sociodemographic covariates (AOR 0.67, 95 percent CI 0.480.93). Disability status was not associated with lower rates of disaster supplies or emergency communication plans in bivariate or multivariate analyses. Finally, adjusting for the sociodemographic and other health variables, people with fair/poor health remained less likely to have an emergency plan (AOR 0.66, 95 percent CI 0.480.92) and people with serious mental illness remained less likely to have disaster supplies (AOR 0.67, 95 percent CI 0.470.95). People who report fair/poor general health and probable serious mental illness are less likely to report household disaster preparedness and an emergency communication plan. The results could add to our understanding of why people with preexisting health problems suffer disproportionately from disasters. Public health may consider collaborating with community partners and health services providers to improve preparedness among people with chronic illness and people who are mentally ill.

Freudenburg, William R., Robert Gramling, Shirley Laska, and Kai T. Erikson. 2008. Organizing hazards, engineering disasters? Improving the recognition of political-economic factors in the creation of disasters. ***Social Forces*** **87 (2): 1015-1038.**

Disaster studies have made important progress in recognizing the unequally distributed consequences of disasters, but there has been less progress in analyzing social factors that help create "natural" disasters. Even well-known patterns of hazard creation tend to be interpreted generically—as representing "economic development" or "capitalism"—rather than through focusing on the more specific dynamics involved. This article illustrates this point with two recent and well-known cases of flooding—those in the upper Mississippi River Valley and in the Katrina-related devastation of New Orleans. In the former case, damage was caused in part by building the very kinds of higher and stronger flood walls that were shown to be inadequate in the latter. In the New Orleans case, a more important factor in the death and destruction was the excavation of a transportation canal. In both cases, and many more, the underlying causes of damage to humans as well as

to the environment has involved a three-part pattern, supported by the political system: spreading the costs; concentrating the economic benefits; and hiding the real risks. In very real senses, these have been floods of folly, created not just by extreme weather events, but by deadly and avoidable patterns of political-economic choices. Comparable patterns appear to deserve greater attention in other contexts, as well.

Grace, Martin F., and Robert W. Klein. 2009. The perfect storm: Hurricanes, insurance and regulation. ***Risk Management and Insurance Review*** **12 (1): 81-124.**
The intense hurricane seasons of 2004 and 2005 caused considerable instability in property insurance markets in coastal states with the greatest problems occurring in Florida and the Southeast. Insurers have substantially raised rates and decreased their exposures. While no severe hurricanes struck the United States in 2006 and 2007, market pressures remain strong given the high risk still facing coastal states. These developments generate considerable concern and controversy among various stakeholder groups. Government responses have varied. In Florida, political pressures prompted a wave of legislation and regulations to expand government underwriting and subsidization of hurricane risk and constrain insurers' rates and market adjustments. Other states' actions seem more moderate. In this context, it is important to understand how property insurance markets have been changing and governments have been responding to increased catastrophe risk. This article examines important market developments and evaluates associated government policies. The article comments on how regulation is affecting the equilibration of insurance markets and offer opinions on policies that are helpful and harmful.

Hallegatte, Stephane, and Patrice Dumas. 2009. Can natural disasters have positive consequences? Investigating the role of embodied technical change. ***Ecological Economics*** **8 (3): 777-786.**
It has been suggested that disasters might have positive economic consequences, through the accelerated replacement of capital. This possibility is referred to as the "productivity effect." This effect is investigated using a model with embodied technical change. In this framework, disasters can influence the production level but cannot influence the growth rate, in the same way than the saving ratio in a Solow-like model. Depending on reconstruction quality, indeed, accounting for embodied technical change can either decrease or increase disaster costs, but is never able to turn disasters into positive events. Moreover, a better but slower reconstruction amplifies the short-term consequences of disasters, but pays off over the long-term. Regardless, the productivity effect cannot prevent the existence of a bifurcation when disaster damages exceed the reconstruction capacity, potentially leading to poverty traps.

Hallegatte, Stephane, and Michael Ghil. 2008. Natural disasters impacting a macroeconomic model with endogenous dynamics. ***Ecological Economics*** **68 (1-2): 582-592.**
This article investigates the macroeconomic response to natural disasters by using an endogenous business cycle (EnBC) model in which cyclical behavior arises from the investment-profit instability. The authors' model exhibits a larger response to natural disasters during expansions than during recessions. This apparently paradoxical result can be traced to the disasters amplifying pre-existing disequilibria during expansions, while the existence of unused resources during recessions damps the exogenous shocks. It thus appears that high-growth periods are also highly vulnerable to supply-side shocks. In their EnBC model, the average production loss due to a set of disasters distributed at random in time is highly sensitive to the dynamical characteristics of the impacted economy. Larger economic flexibility allows for a more efficient and rapid response to supply-side shocks and reduces production losses. On the other hand, too high a flexibility can lead to vulnerability phases that cause average production losses to soar. These results raise questions about the assessment of climate change damages or natural disaster losses that are based purely on long-term growth models.

Hochrainer, Stefan, Reinhard Mechler, and Georg Pflug. 2008. Climate change and financial adaptation in Africa: Investigating the impact of climate change on the robustness of index-based microinsurance in Malawi. ***Mitigation and Adaptation Strategies for Global Change*** **14 (3): 231-250.**
This paper discusses the applicability of crop insurance for the case of Malawi. It explores the potential impact of climate change on the viability of the Malawi weather insurance program, using of scenarios of climate change-induced variations in rainfall patterns. By combining catastrophe insurance modeling with climate modeling, the methodology demonstrates the feasibility, albeit with large uncertainties, of estimating the effects of climate variability and climate change on the near- and long-term future of microinsurance schemes serving the poor. By providing a model-based estimate of insurance back-up capital necessary to avoid ruin under climate variability and climate change, along with the associated uncertainties and data limitations, this methodology can quantitatively demonstrate the need for financial assistance to protect micro-insurance pools against climate-induced insolvency. This is of major concern to donors, nongovernmental organizations and others supporting these innovative systems, those actually at-risk and insurers providing insurance. A quantitative estimate of the additional burden that climate change imposes on weather insurance for poor regions is of interest to organizations funding adaptation. Further, by linking catastrophe modeling to regionalized climate modeling, the analysis identifies key modeling inputs necessary as well as important constraints. The article ends with a discussion of the opportunities and limits to similar modeling and weather predictability for Sub-Saharan Africa beyond the case of Malawi.

Kron, W. 2009. Flood insurance: From clients to global financial markets. ***Journal of Flood Risk Management*** **2 (1): 68-75.**
Weather-related natural catastrophes are increasing worldwide in number and intensity, and losses have

reached new levels. This represents a challenge that must be faced by governments, the people concerned, and the financial sector, both nationally and globally. Flood insurance is rare in most countries, but the development of solutions to make flood risk more insurable has gained momentum. There is no ideal flood insurance scheme, as each situation is influenced by factors such as risk-adequate premium structure, adverse selection, and general risk awareness. Solutions tailored to the situation in each respective country must be found. While rich countries have to find ways to handle record losses of $100 billion and more, poor countries need micro-insurance to provide people with at least a minimum of financial security. The insurance industry has through the reinsurance sector established a system to pay local monetary losses globally. In the wake of extremely expensive catastrophes, a system involving the whole financial market has great potential.

Nakamura, Karen. 2009. Disability, destitution, and disaster: Surviving the 1995 Great Hanshin Earthquake in Japan. ***Human Organization*** **68 (1): 82-88.**
On the morning of January 17, 1995, a magnitude 7.3 earthquake struck the port city of Kobe, Japan. 6,400 people died and over $80 billion in property damage occurred. Among those rendered homeless was a small group of people with severe disabilities. Over the next decade, this group leveraged discourses surrounding civil society, disability, poverty, and the role of government in natural disasters, to become one of the most powerful and vocal proponents of disability rights in Japan. This article discusses what lessons can we learn to make disability advocacy a leading, rather than trailing, element of social policy.

O'Dempsey, Tim. 2009. Fair training: A new direction in humanitarian assistance. ***Progress in Development Studies*** **9 (1): 81-86.**
Major catastrophes appear to be inevitable given the growth of mega-cities in disaster hotspots, the predicted effects of global climate change, and the crucial relationship between natural disasters and complex political emergencies. Disaster prevention, preparedness, and contingency planning will be effective only if trained personnel are available to develop these plans and implement them in a timely manner. Workforce migration— driven by poverty, insecurity, and lack of opportunity—creates a vacuum of leadership and skills that increases the the remaining population's vulnerability even further. Sustainable solutions to the problems of disasters and development will only be achieved when poor people have local access to fair training.

Veerbeek, W., and C. Zevenbergen. 2009. Deconstructing urban flood damages: Increasing the expressiveness of flood damage models combining a high level of detail with a broad attribute set. ***Journal of Flood Risk Management*** **2 (1): 45-57.**
Climate change increases uncertainty regarding the frequency and severity of flood events, posing new challenges for urban areas often located along major rivers. Current flood damage assessment methods often ignore the level of differentiation found in the urban fabric. Their level of detail is too coarse and limits possibilities of tailor-made solutions based on refined insights on the severity, distribution, and horizon of expected impacts. As part of the Urban Flood Management project for the city of Dordrecht, the Netherlands, a flood damage assessment model was developed using a substantially higher level of detail than used in current practice. The model incorporates methods of analysis linking the spatial distribution of flood damages, flood damage composition, age of the building stock, and a range of other attributes to gain a comprehensive view on the financial consequences of urban flooding. The output provides a foundation for integration of flood proofing schemes into urban development and redevelopment.

Zou, Le-Le, and Yi-Ming Wei. 2009. Impact assessment using DEA of coastal hazards on social-economy in Southeast Asia. ***Natural Hazards*** **48 (2): 167-189.**
Southeast Asian countries suffer from severe coastal hazards each year. A large number of these countries are incurring consequential costs that impact their national economies. It is crucial, therefore, to analyze the impact of such hazards on their economic development and provide a solid basis for future development strategies. The purpose of this paper is to assess the relationship between the economic development and the losses from coastal disasters, and to identify both the impact of hazards on the development, as well as the function of such development on the resilience to hazards. The data envelopment analysis (DEA) method is employed to build the assessment models. Data from 1995 to 2005 from eight Southeast countries are analyzed using the DEA models. A set of "resilience index" of these countries are concluded from the results. It is found that the economic development does not contribute to the strengthening of national resilience to coastal hazards. Inappropriate development could even impair the resilience. Additionally, the resilience to coastal hazards is impacted by various factors such as the allocation of resources and external assistance. From the analysis, a clear image is gained of the interaction between economic development and coastal hazards, which provides a basis for future development strategies.

Landslides & Avalanches

Geertsema, M., J.W. Schwab, A. Blais-Stevens, and M.E. Sakals. 2009. Landslides impacting linear infrastructure in west central British Columbia. ***Natural Hazards*** **48 (1): 59-72.**
Destructive landslides are common in west central British Columbia. Landslides include debris flows and slides, earth flows and flowslides, rock falls, slides, and avalanches, and complex landslides involving both rock and soil. Pipelines, hydrotransmission lines, roads, and railways have all been impacted by these landslides, disrupting service to communities. This article provides examples of the destructive landslides, their impacts, and the climatic conditions associated with the failures. It also considers future landsliding potential for west central British Columbia under climate change scenarios.

Gorum, T., B. Gonencgil, C. Gokceoglu, and H.A. Nefeslioglu.

2008. Implementation of reconstructed geomorphologic units in landslide susceptibility mapping: The Melen Gorge (NW Turkey). ***Natural Hazards*** **46 (3): 323-351.**
Although there are a considerable number of publications in the international literature on lanslide susceptibility mapping, geomorphology as a conditioning factor is rarely used in these studies. The purpose of this paper is to implement the geomorphologic parameters derived by reconstructed topography in landslide susceptibility mapping. Terrain is generalized by the contours passed through the convex slopes of the valleys that were formed by fluvial erosion. Therefore slope conditions before landsliding can be obtained. The reconstructed morphometric and geomorphologic units are taken into account as a conditioning parameter when assessing landslide susceptibility. Two different data, one of which is obtained from the reconstructed DEM, have been employed to produce two landslide susceptibility maps. The binary logistic regression is used to develop landslide susceptibility maps for the Melen Gorge in the northwestern part of Turkey. Due to the high correct classification percentages and spatial effectiveness of the maps, the landslide susceptibility map comprised the reconstructed morphometric parameters exhibits a better performance than the other. Five different datasets are selected randomly to apply proper sampling strategy. As a consequence of the analyses, the best outcomes are obtained from the dataset of the reconstructed topographical parameters and geomorphologic units, and lithological variables that are implemented together. Correct classification percentage and root mean square error (RMSE) values of the validation dataset are calculated as 86.28 percent and 0.35, respectively. Prediction capacity of the different datasets reveals that the landslide susceptibility map obtained from the reconstructed parameters has a higher prediction capacity than the other. Moreover, the landslide susceptibility map obtained from the reconstructed parameters produces logical results.

Holler, Peter. 2007. Avalanche hazards and mitigation in Austria: A review. ***Natural Hazards*** **43 (1): 81-101.**
At all times, natural hazards like torrents or avalanches pose a threat to settlements and infrastructures in the Austrian Alps. Since 1950 more than 1,600 persons have been killed by avalanches in Austria, which is an average of about 30 fatalities per year. In particular, the winter periods 1950/1951 and 1953/1954 stand out, with more than 100 fatalities. Those events led to an increase of avalanche control programs in the following decades. While from the 1950s to the 1970s emphasis was placed on permanent measures (technical structures, afforestations, hazard zoning, and so on), additional programs such as avalanche warning and forecasting have supplemented avalanche control measures in reecent decades. Current research is focused on avalanche simulation, risk management, and the influence of the forest on avalanche formation. An important area of future research is to develop improved methods for avalanche forecasting and to intensify the investigation of the dynamics of avalanches.

Holler, Peter. 2009. Avalanche cycles in Austria: An analysis of the major events in the last 50 years. ***Natural Hazards*** **48 (3): 399-424.**
During the last 50 years, an average of 30 people per year were killed by avalanches in Austria. About one-third of all avalanche fatalities occurred as a result of so-called "catastrophic avalanches." These are spontaneously released avalanches that affect villages and cause damage to property—buildings, roads and other infrastructure. The biggest avalanche events in Austria were in 1950/1951 (135 fatalities), in 1953/954 (143 fatalities) and in February 1999, when 38 persons were killed in Galtür and Valzur. This article analyzes nine major avalanche cycles in the last 55 years. An avalanche cycle is defined as 50 recorded avalanches of at least size three in two days and/or 5 persons killed in villages within two days. The basis of this study is the well-documented records from Fliri (1998), who analyzed natural disasters in the western part of Austria and the Trentino, including floods, mudflows, earthquakes, and avalanches. The meteorological data were taken from two relevant observation sites in the northern part of the Austrian Alps, from two sites in an intermediate and continental region, respectively, and from one site in the southern part of the Austrian Alps. Atmospheric patterns were analyzed using weather charts for the relevant periods. Both the meteorological data and the weather charts were provided by the Central Institute for Meteorology and Geodynamics. It was found that there was a major cycle every six years on average. Two-thirds of all investigated cycles were characterized by a continuous increase of snow depth over a period of at least three days. In only three periods (1975, 1986, 1988), daily extreme values could be observed. More than 40 percent of all the cycles occurred in January. In two-thirds, a northwesterly oriented frontal zone was responsible for the formation of a major cycle. The remaining cycles were released by low-pressure areas over Central Europe and the Mediterranean Sea, respectively.

Jeber, Faisal, Husaini Omar, Shattri Mansor, Noordin Ahmad, and Mahdzir Mahmud. 2008. Satellite data potential for landslide studies in tropical regions. ***Disaster Prevention and Management*** **17 (4): 470-477.**
The purpose of this paper is to show that satellite data applicability for landslide studies is given concentration in tropical regions, which have two limitations: regular cloud cover and thick vegetation. Landslide studies have three categories: mapping, zonation, and monitoring. High spatial resolution images are convenient for mapping. Since the slope and slope materials are the dominant parameters for slide potential, a high resolution DEM produced from the above data with classification of multispectral data will be vital for zonation. Weather-free and penetration are advantages that make radar images essential for monitoring. A composition of satellite data with support of aerial photography, with its high spatial resolution, will give an excellent spatial database for these studies, showing that satellite remote sensing data are applicable for landslides studies in inaccessible mountainous tropical regions.

Lagmay, Alfredo Mahar A., Arlene Mae P. Tengonciang, Raymond S. Rodolfo, Janneli Lea A. Soria, Eden G.

Baliatan, Engielle R. Paguican, John Burtkenley, T. Ong, Mark R. Lapus, Dan Ferdinand D. Fernandez, Zareth P. Quimba, and Christopher L. Uichanco. 2008. Science guides search and rescue after the 2006 Philippine landslide. ***Disasters*** **32 (3): 416-433.**

A rockslide debris avalanche destroyed the remote village of Guinsaugon in Southern Leyte, Philippines, on February 17, 2006. Although search-and-rescue procedures were implemented immediately, the scale of the landslide and a lack of information about its nature resulted in unfocused and imprecise efforts in the early days of the operation. Technical support was only introduced five days after the event, provided by a team of volunteer geologists, geophysicists, and meteorologists. By the time search and rescue operations were transferred to specific target sites, however, the chances of finding survivors trapped under the rubble had diminished. In such critical situations, speed, accuracy, and the maximum appropriation of resources are crucial. We emphasize here the need for a systematic and technically informed approach to search-and-rescue missions in large-scale landslide disasters, and the formulation of better disaster management policies in general. Standard procedures must be developed and enforced to improve how civil authorities respond to natural calamities.

Leventhal, Andrew, and Geoff Withycombe. 2009. Landslide risk management for Australia. ***The Australian Journal of Emergency Management*** **24 (1): 39-52.**

The Australian Geomechanics Society published a suite of guidelines in 2007 that have been recognized both within Australia and internationally as world leading, representing best practice in the field of landslide risk management. The three guidelines are supplemented by two commentaries to collectively provide advice to the Australian public, government regulators responsible for the management of landslide risk, and geotechnical practitioners who conduct assessments of landslide risk. As a consequence, these contribute to safer communities and therefore to a reduction in the costs of disasters. This paper discusses the development of the guidelines and their applications in land use planning, risk assessment, risk management, and the transfer of knowledge to practitioners, regulators, and the broader Australian public. The paper provides an overview of the status of landslide risk management in Australia. The landslide zoning guideline for land use planning has been the template for an international version which was published in late 2008 jointly by the three international technical societies representing geomechanics interests on the global stage.

Miles, S.B., and D.K. Keefer. 2009. Toward a comprehensive areal model of earthquake-induced landslides. ***Natural Hazards Review*** **10 (1): 19-28.**

This paper provides a review of regional scale modeling of earthquake-induced landslide hazard with respect to the needs for disaster risk reduction and sustainable development. It sets out important research themes and suggests computing with words (CW), a methodology that includes fuzzy logic systems, as a fruitful modeling methodology for addressing many of these research themes. A range of research, reviewed here, has been conducted applying CW to various aspects of earthquake-induced landslide hazard zonation, but none facilitate comprehensive modeling of all types of earthquake-induced landslides. A new comprehensive areal model of earthquake-induced landslides CAMEL is introduced here that was developed using fuzzy logic systems. CAMEL provides an integrated framework for modeling all types of earthquake-induced landslides using geographic information systems. CAMEL is designed to facilitate quantitative and qualitative representation of terrain conditions and knowledge about these conditions on the likely areal concentration of each landslide type. CAMEL is highly modifiable and adaptable. New knowledge can be easily added, while existing knowledge can be changed to better match local knowledge and conditions. As such, CAMEL should not be viewed as a complete alternative to other earthquake-induced landslide models. CAMEL provides an open framework for incorporating other models, such as Newmark's displacement method, together with previously incompatible empirical and local knowledge.

Nathan, Fabien. 2008. Risk perception, risk management and vulnerability to landslides in the hill slopes in the city of La Paz, Bolivia: A preliminary statement. ***Disasters*** **32 (3): 337-357.**

This article is drawn from preliminary findings of the author's PhD. Most of the results are still being analyzed and thus those discussed here are not definitive and are subject to revision. Conclusions have been drawn from almost two years fieldwork in the western hill slope of La Paz, using various techniques for data collection: constant participant observation with the inhabitants and their neighborhood representatives; in-depth interviews with more than 30 families at risk; informal interviews with other people at risk and with disaster victims; semi-directed interviews with dozens of 'old inhabitants' of the neighborhoods; in-depth interviews with dozens of "neighborhood presidents" and with many local authorities related to risk management; and analysis of documentation, maps, pictures, photographs, video collections, and other visual material. The in-depth interviews with people living with risk contained more than 120 questions; those related to risk, emergencies, and hazards were purposefully open-ended to see whether the theme appeared by itself in the interviewee's discourse and concerns. In this respect, the interview guide took into account advances in sociology, anthropology, and applied human security studies, focusing on what really mattered for the research subjects. This is a hybrid method combining the advantages of questionnaires, semistructured interviews, and life stories. It is adaptive and flexible but also allows for future statistical analysis.

Osuchowski, Monica. 2009. Bringing information management practices to natural disaster risk reduction. ***The Australian Journal of Emergency Management*** **24 (1): 53-59.**

The important role of information management in improving baseline data for natural hazards has been demonstrated through a collaborative pilot project between Geoscience Australia, Mineral Resources Tasmania and the University of Wollongong. The result

is a "virtual" landslide database that makes full use of diverse data across three levels of government and has enabled landslide data to be collated and accessed from a single source. Such a system establishes the foundation for a very powerful and coordinated information resource in Australia and provides a suitable basis for greater investment in data collection. This paper highlights the capacity to extend the methodology across all hazards and describes one solution in facilitating a sound knowledge base on natural disasters and disaster risk reduction.

Pande, Ravindra K., and Neeta Pande. 2008. Nainital: A landslide town of Uttarakhand (India). ***Disaster Prevention and Management*** **17 (4): 478-487.**
This paper describes natural problems faced by Uttaranchal and proposes systematic studies to deal with slope instability. Uttaranchal is a hilly state in the Himalayan region. More than 80 percent of Uttaranchal is prone to slope instability because of weak and highly-folded and fractured rocks, steep slopes, high seismicity, and unfavorable hydrogeological conditions. In addition, unsystematic development contributes to the problem. The newly-formed Uttaranchal state is developing, which requires the expansion of existing infrastructure. The natural rate of creep—indicated by the bending and disjointing of rock beds, disruption and drag-folding, and the tilted trees and poles on hills in and around Nainital town—which normally stretches over thousands of years, is accelerated by clear-felling in forests and by construction on steeper slopes. The depth of the creep movement is variable and depends largely on the nature and degree of rocks weathering, subsurface structure, and the amount of water present. Construction has given rise to new landslide problems or aggravated the existing slope instability. To keep the landslide problems to a minimum, systematic studies are needed.

Pfeifer, Christian. 2009. On probabilities of avalanches triggered by alpine skiers: An empirically driven decision strategy for backcountry skiers based on these probabilities. ***Natural Hazards*** **48 (3): 425-438.**
Most fatal avalanche accidents in the Alps are caused by skiers and snowboarders. It has been one aim from the beginning to give guidelines for backcountry skiers to avoid avalanche accidents. About 10 years ago, the mountain guide Werner Munter developed a strategy for backcountry skiers advising whether or not to go on a skiing tour. His decision strategy lacked empirical evidence because he did not take into account incidents without avalanche accidents. This article proposes a decision strategy for backcountry skiers based on probabilities of a logistic regression model using variables, such as danger level, incline of the slope and aspect of the slope, which turned out to be the most important ones. Additional information on frequencies of skiers on slopes under specific conditions is included in the model. The authors used accident data and avalanche forecasts in Tyrol reported by the Tyrolean avalanche information service within three seasons (1999 to 2002, 497 days of observations) for model building. Additionally we carried out a holdout validation using data of the same type within two seasons (2002 to 2004, 314 days of observation) in order to check the accuracy of the model. Our proposal shows a remarkable correlation with Munter's method.

Saunders, Wendy, and Phil Glassey. 2009. Taking a risk-based approach for landslide planning: An outline of the New Zealand landslide guidelines. ***The Australian Journal of Emergency Management*** **24 (1): 32-38.**
In December 2007, GNS Science released the publication 'Guidelines for assessing planning policy and consent requirements for landslide prone land' (Saunders & Glassey, 2007). Primarily for land use planners, the guidelines provide non-prescriptive guidance on how the landslide hazard can be incorporated into risk-based planning policy and consent requirements. Use of the guidelines is not a regulatory requirement, but is recommended as good, evidence-based practice. The guidelines propose a risk-based approach to land use planning and consenting, based on the Australian/New Zealand Risk Management Standard AS/NZS 4360:2004. This approach considers landslide recurrence interval, and a Building Importance Category of the building proposed for a site. This approach does not guarantee that a building will not suffer damage from a landslide, but it does establish if the risk of damage is sufficiently low to be generally accepted. This paper is based on four planning principles: 1) gather accurate landslide hazard information; 2) plan to avoid landslide hazards before development and subdivision occurs; 3) take a risk-based approach in areas already developed or subdivided; and 4) communicate the risk of landslides in built-up areas. This paper provides an overview of this risk management process presented in the guidelines, and how it can be utilized by land use planners, based on the above four overarching planning principles.

Public Health, Mental Health, & Emergency Medicine

Barnhart, Stephanie, Patrick M. Cody, and David E. Hogan. 2009. Multiple information sources in the analysis of a disaster. ***American Journal of Disaster Medicine*** **4 (1): 41-47.**
Disasters are complex events making epidemiologic studies and determination of accurate denominators difficult because of poor available records. However, these data are essential to perform useful calculations and provide accurate descriptions of disaster medical impacts. This study identifies the availability and utility of various information sources in the analysis of a mass casualty disaster. In addition, characteristics of cases presenting for care are described. This is a retrospective cohort study abstracting medical records and other documents relating to an explosion and fire. Public domain documents are obtained by written request or by filing a Freedom of Information

Act (FOIA) request. the setting is a rural EMS and tertiary hospital, including individuals directly exposed to the forces of the explosion. The number of cases was detected by various information sources. In addition, the demographics, dispositions, and nature of the physical injuries of the cases are reported. Seven sources of case information were identified. The most cases were identified by investigative agencies (33) and the fewest by medical records (18). Rates include; injury, 0.68; admission, 0.20; and operative, 0.14, with no deaths. Case locations during the explosion were determined for all cases. No association was noted between admission and location in the building. This study demonstrates the availability and usefulness of data in the public domain. Using FOIA requests or partnerships with public or private agencies may more clearly define denominator data in epidemiologic evaluations of disasters.

Bhushan, Braj, and J. Sathya Kumar. 2009. Emotional distress and posttraumatic stress in children: The impact of direct versus indirect exposure. ***Journal of Loss and Trauma*** **14 (1): 35-45.**

This study examined whether familiarity with the physical environment and verbal/pictorial exposure to a tsunami also induced posttraumatic stress symptoms in adolescents. The Impact of Event Scale (IES) and Pediatric Emotional Distress Scale (PEDS) were administered to 231 subjects (130 directly exposed and 101 indirectly exposed). The directly exposed group scored high on the IES and PEDS. A significant sex difference was observed on all three dimensions of the IES, and fearful and traumatic event-related dimensions of PEDS, with females at a higher risk compared to males. In the indirectly exposed group, no sex difference was observed for the IES (avoidance and total impact score) or the fearful, acting out, or traumatic experience related dimensions of the PEDS. Significant sex differences were observed in this group on the IES intrusion and PEDS withdrawal scores, with males higher on intrusion and females higher on withdrawal.

Broz, Dita, Elise C. Levin, Amy P. Mucha, Darlene Pelzel, William Wong, Victoria Persky, and Ronald C. Hershow. 2009. Lessons learned from Chicago's emergency response to mass evacuations caused by Hurricane Katrina. ***American Journal of Public Health*** **99 (8): 1-9.**

This article analyzes the response of the Chicago Department of Public Health with respect to its effectiveness in providing health care to Hurricane Katrina evacuees arriving in the city. Between September 12 and October 21, 2005, researchers conducted a real-time qualitative assessment of a medical unit in Chicago's Hurricane Victim Welcome and Relief Center. A semi structured guide was used to interview 33 emergency responders to identify key operational successes and failures. The medical unit functioned at a relatively high level, primarily as a result of the flexibility, creativity, and dedication of its staff and the presence of strong leadership. Chronic health care services and prescription refills were the most commonly mentioned services provided, and collaboration with a national pharmacy proved instrumental in reconstructing medication histories. The lack of a comprehensive and well-communicated emergency response plan resulted in several preventable inefficiencies. Findings highlight the need for improved planning for care of evacuee populations after a major emergency event and the importance of ensuring continuity of care for the most vulnerable. The article provides an emergency response preparedness checklist for local public health departments.

Carroll, Bob, Hazel Morbey, Ruth Balogh, and Gonzalo Araoz. 2009. Flooded homes, broken bonds, the meaning of home, psychological processes and their impact on psychological health in a disaster. ***Health and Place*** **15 (2): 540-547.**

In 2005, Carlisle suffered severe flooding that affected 1,600 houses. Social and health impacts were examined in a qualitative study that interviewed those whose homes had been flooded, as well as the workers who supported them. The findings showed many people suffered from severe disruption to their lives, damage to their homes, and psychological health issues. Phenomenological and transactional perspectives were used in analyzing the psychological processes (identity, attachment, alienation, and dialectics) that underlay the meaning of home and its impact on psychological health. Proposals for policy and practice are made.

Chaffee, Mary. 2009. Willingness of health care personnel to work in a disaster: An integrative review of the literature. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 42-56.**

Effective hospital surge response in disaster depends largely on an adequate number of personnel to provide care. Studies appearing since 1991 indicate health care personnel may not be willing to work in all disaster situations. If so, this could degrade surge response. A systematic review of the literature was conducted to determine the state of the evidence concerning the willingness of health care personnel to work in disaster. This review collates and assesses the literature concerning willingness of health care personnel to work during a disaster, to identify gaps in the literature as areas for future investigation, and to facilitate evidence-based disaster planning. Twenty-seven studies met inclusion criteria (25 quantitative and two qualitative studies). The current evidence indicates there may be certain factors related to willingness to work (or lack of willingness) in disaster including the type of disaster, concern for family, and concerns about personal safety. Barriers to willingness to work have been identified including pet care needs and the lack of personal protective equipment. This review describes the state of an emerging area of science. These findings have significant implications for community and organizational emergency planning and policy making in an environment defined by limited resources.

Dai, J., Y. Zhao, and G. Li. 2009. Wenchuan earthquake: Response of Chinese dental professionals. ***British Dental Journal*** **206 (5): 273-276.**

On May 12, 2008, an earthquake with a magnitude of 8.0 on the Richter scale hit Wenchuan, China. In the

aftermath of this disaster, Chinese dental professionals actively participated in the first emergency medical response team, definitive dental treatment, oral health services and education, and the recovery of local oral care infrastructure and resources. Learning from the experience and first-hand data of the Wenchuan earthquake, dental professionals can increase their awareness of the importance of collaborative emergency response health services in mass casualty events. Further research and emphasis is needed to encourage the participation of dental professionals in disaster preparation training and practice.

Edwards, Janine C., JungEun Kang, and Rasa Silenas. 2008. Promoting regional disaster preparedness among rural hospitals. ***The Journal of Rural Health*** **24 (3): 321-325.**
Rural communities face substantial risks of natural disasters but they also face multiple obstacles to preparedness. This article creates and demonstrates implementation of an effective training and planning exercise to assist individual rural hospitals in improving disaster preparedness, as well as to enhance regional collaboration among these hospitals. The exercise was offered to rural hospitals enrolled with the Rural and Community Health Institute of the Texas A&M University System Health Science Center. Seventeen hospitals participated in a three-hour tabletop exercise emphasizing regional issues in a pandemic avian influenza scenario followed by a one-hour debriefing implemented in three geographic clusters of hospitals. Trained emergency preparedness evaluators documented observations of the exercise on a standard form. Participants were debriefed after the exercise and provided written feedback. Observations included: insufficient staff for incident command; facility constraints; the need to further develop regional cooperation; and operational and ethical challenges in a pandemic. The tabletop exercise is a simple and acceptable tool for rural medical planners. It lends itself well to improving medical preparedness, analysis of weak spots, development of regional teamwork, and rapid response.

Eisenman, David P., Qiong Zhou, Michael Ong, Steven Asch, Deborah Glik, and Amy Long. 2009. Variations in disaster preparedness by mental health, perceived general health, and disability status. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 33-40.**
Chronic medical problems, mental illness, and disability increase vulnerability to disasters. National efforts have focused on preparing people with disabilities. Studies find them to be increasingly prepared, but less is known about people with chronic mental and medical illnesses. The authors examined the relationship between health status (mental health, perceived general health, and disability) and disaster preparedness (home disaster supplies and family communication plan). A random digit-dial telephone survey of the Los Angeles County population was conducted from October 2004 to January 2005 in 6 languages. Separate multivariate regressions modeled determinants of disaster preparedness, adjusting for sociodemographic covariates then sociodemographic variables and health status variables. Only 40.7 percent of people who rated their health as fair/poor have disaster supplies compared with 53.1 percent of those who rate their health as excellent ($P < 0.001$). Only 34.8 percent of people who rated their health as fair/poor have an emergency plan compared with 44.8 percent of those who rate their health as excellent ($P < 0.01$). Only 29.5 percent of people who have a serious mental illness have disaster supplies compared with 49.2 percent of those who do not have a serious mental illness ($P < 0.001$). People with fair/poor health remained less likely to have disaster supplies (adjusted odds ratio [AOR] 0.69, 95 percent confidence interval [CI] 0.500.96) and less likely to have an emergency plan (AOR 0.68, 95 percent CI 0.510.92) compared with those who rate their health as excellent, after adjusting for the sociodemographic covariates. People with serious mental illness remained less likely to have disaster supplies after adjusting for the sociodemographic covariates (AOR 0.67, 95 percent CI 0.480.93). Disability status was not associated with lower rates of disaster supplies or emergency communication plans in bivariate or multivariate analyses. Finally, adjusting for the sociodemographic and other health variables, people with fair/poor health remained less likely to have an emergency plan (AOR 0.66, 95 percent CI 0.480.92) and people with serious mental illness remained less likely to have disaster supplies (AOR 0.67, 95 percent CI 0.470.95). People who report fair/poor general health and probable serious mental illness are less likely to report household disaster preparedness and an emergency communication plan. The results could add to our understanding of why people with preexisting health problems suffer disproportionately from disasters. Public health may consider collaborating with community partners and health services providers to improve preparedness among people with chronic illness and people who are mentally ill.

Ferrer, Rizaldy R., Marizen Ramirez, Kori Sauser, Ellen Iverson, and Jeffrey S. Upperman. 2009. Emergency drills and exercises in healthcare organizations: Assessment of pediatric population involvement using after-action reports. ***American Journal of Disaster Medicine*** **4 (1): 23-32.**
The evaluation of pediatric disaster preparation is often lacking, even though the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) requires healthcare organizations to demonstrate disaster preparedness through the use of disaster exercises. This investigation identified, described, and assessed the involvement of pediatric victims in healthcare organization disaster drills using data from the after-action reports generated by healthcare organizations per JCAHO regulations. Forty-nine reports were voluntarily supplied. The authors analyzed the data using quantitative and qualitative approaches. Only nine reports suggested pediatric involvement. Hospitals with large bed capacity ($M = 465.6$) tended to include children in exercises more often compared with smaller facilities ($M = 350.8$). Qualitative content analysis revealed a lack of parent-child identification and family reunification systems, ineffective communication strategies, lack of pediatric resources and specific training, and unfamiliarity with altering standards of pediatric care during

a disaster. Although many organizations are performing disaster exercises, most do not include pediatric concerns. More work is needed to understand the basis of this emergency preparedness gap. Overall, pediatric emergency planning should be a high priority for this vulnerable population.

Galea, Sandro, Andrea R. Maxwell, and Fran Norris. 2008. Sampling and design challenges in studying the mental health consequences of disasters. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys*** **17 (S2): S21-S28.**

Disasters are unpredictable and frequently lead to chaotic post-disaster situations, creating numerous methodological challenges for the study of their mental health consequences. In this article, the authors expand on some of the issues addressed by Kessler and colleagues, largely focusing on the particular challenges of: (1) defining, finding, and sampling populations of interest after disasters; and (2) designing studies in ways that maximize the potential for valid inference. It discusses these challenges drawing on specific examples and suggests potential approaches to each that may be helpful as a guide for future work. The article further suggests research directions that may be most helpful in moving the field forward.

Ginzburg, Karni, and Zahava Solomon. 2008. Does one size fit all? The challenges of establishing a coordinating center for research of post-disaster needs assessment. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys*** **17 (S2): S36-S41.**

Needs assessment in the wake of disasters is most significant, yet highly complex and challenging. Kessler et al. propose a comprehensive disaster mental health research model. This model has several significant advantages: (1) Pre-prepared plans and resources allow rapid deployment of skilled professionals; (2) Continuity will ensure that lessons learned from one disaster will be retained and used in subsequent disasters; (3) Standardization will provide a solid basis for evaluation and comparison across events; (4) Continuous monitoring of needs over time will enable the capture of a full range of responses including delayed effects; and (5) The process will provide a valuable resource for researchers in the field. At the same time, there are a number of challenges that must be considered before the establishment and implementation of the proposed center and use of standardized measures. These challenges are associated with the observation that different disasters give rise to different problems and needs. There is considerable cultural variability, and differential power and agenda of stakeholders may result in a "tunnel vision" approach that may hamper new developments, creativity, and progress. Ways to overcome these challenges

and difficulties that are involved in the implementation of such a model are suggested.

Goffman, Thomas E. 2009. The current state of affairs for disaster planning for a nuclear terrorist attack. ***American Journal of Disaster Medicine*** **4 (1): 59-64.**

The author presents current thinking on the effects of an atomic bomb blast from a medical point of view. He argues current U.S. federal plans for a nuclear disaster are crude, insufficient, disarticulated, and rely on martial law as a means of crowd control. The physics of a fusion reaction bomb are discussed along with the plans of other countries. Apparently "secret" American plans show poor understanding of the physics of nuclear bombs along with poor insight into what will be needed to help the maximum number of citizens. An alternative plan involving computer modeling and educating the public to the effects of a fission explosion is presented. The key issue of statewide planning is discussed, since the federal government has dumped medical problems on "the local level."

Hamilton, Douglas R., Thomas F. Gavagan, Kieran T. Smart, Lori A. Upton, Nancy F. Weller, Umalr A. Shah, Avirm Fishkind, David Persse, Paul Shank, and Kenneth Mattox. 2008. Houston's medical disaster response to Hurricane Katrina: Part 1: The initial medical response from Trauma Service Area Q. ***Annals of Emergency Medicine*** **(ePub).**

After Hurricane Katrina hit the Gulf Coast on August 29, 2005, thousands of ill and injured evacuees were transported to Houston, TX. Houston's regional disaster plan was quickly implemented, leading to the activation of the Regional Hospital Preparedness Council's Catastrophic Medical Operations Center and the rapid construction of a 65-examination-room medical facility within the Reliant Center. A plan for triage of arriving evacuees was quickly developed and the Astrodome/Reliant Center Complex megashelter was created. This article discusses major elements of the regional disaster response, including regional coordination, triage and emergency medical service transfers into the region's medical centers, medical care in population shelters, and community health challenges.

Hamilton, Douglas R., Thomas F. Gavagan, Kieran T. Smart, Lori A. Upton, Nancy F. Weller, Umalr A. Shah, Avirm Fishkind, David Persse, Paul Shank, and Kenneth Mattox.. 2008. Houston's medical disaster response to Hurricane Katrina: Part II: Transitioning from emergency evacuee care to community health care. ***Annals of Emergency Medicine*** **ePub.**

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High, Erika H., Kay A. Lovelace, Bruce M. Gansneder, Robert W. Strack, Barbara Callahan, and Phillip Benson. 2008. Promoting community preparedness: Lessons learned from the implementation of a chemical disaster tabletop exercise. ***Health Promotion Practice*** **(ePub).**
Health educators are frequently called on to facilitate community preparedness planning. One planning tool is community-wide tabletop exercises. Tabletop exercises can improve the preparedness of public health system agencies to address disaster by bringing together individuals representing organizations with different roles and perspectives in specific disasters. Thus, they have the opportunity to identify each other's roles, capabilities, and limitations and to problem-solve about how to address the gaps and overlaps in a low-threat collaborative setting. In 2005, the North Carolina Office of Public Health Preparedness and Response developed a series of exercises to test the preparedness for chemical disasters in a metropolitan region in the southeastern United States. A tabletop exercise allowed agency heads to meet in an environment promoting inter- and intra-agency public-private coordination and cooperation. The evaluation results reported here suggest ways in which any tabletop exercise can be enhanced through recruitment, planning, and implementation.

Kanter, Robert K., John S. Andrake, Nancy M. Boeing, James Callahan, Arthur Cooper, Christine A. Lopez-Dwyer, James P. Marcin, Folafouuwa O. Odetola, Anne E. Ryan, Thomas E. Terndrup, and Joseph R. Tobin. 2009. Developing consensus on appropriate standards of disaster care for children. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 27-32.**
Neither professional consensus nor evidence exists to guide the choice of essential hospital disaster interventions. This study demonstrates a method for developing consensus on hospital disaster interventions that should be regarded as essential, quantitatively balancing needs and resources. A panel of pediatric acute care practitioners developed consensus using a modified Delphi process. Interventions were chosen such that workload per staff member would not exceed the previously validated maximum according to the Therapeutic Intervention Scoring System. Based on published models, it was assumed that the usual numbers of staff would care for a disaster surge of four times the usual number of intensive care and non-intensive care hospital patients. Using a single set of assumptions on constrained resources and overwhelming needs, the panel ranked and agreed on essential interventions. A number of standard interventions would exceed crisis workload constraints, including detailed recording of vital signs and fluid balance, administration of vasoactive agents, invasive monitoring of pressures (central venous, intraarterial, and intracranial), dialysis, and tube feedings. The quantitative methodology and consensus development process described in the present report may have utility in future planning. Groups with appropriate expertise must develop action plans according to authority within each jurisdiction, addressing likely disaster scenarios, according to the needs in each medical service region, using available regional resources, and accounting for the capabilities of each institution.

Karrasch, B., M. Mehrens, and U. Link. 2009. Increased incidence of saprophytic bacteria, coliforms and E. coli following severe flooding requires risk assessment for human health: Results of the River Elbe flood in August 2002. ***Journal of Flood Risk Management*** **2 (1): 16-23.**
In August 2002, flooding in the Elbe valley caused severe damage of sewage treatment plants and networks. This article investigates the impact of flooding on the bacteriological water quality (colony-forming units of saprophytic bacteria, coliform bacteria and Escherichia coli) compared with levels from previous and subsequent years. The flood introduced organic matter and elevated saprophytic bacteria levels, and a general increase of coliform bacteria. Markedly high loads of coliforms and E. coli were detected in the water column in areas where damage to sewage treatment plants was rife, exceeding the European Commission's Bathing Water Directive. The rapid disappearance from the water column may partly be caused by sedimentation creating deposits on pasture, farmland and in built-up areas, which could represent a health hazard. Future flood risk reduction should therefore be focused on the protection of sewage systems and hygienic monitoring of floodwater and flood sediments.

Kasapoglu, Aytul, Feryal Turan, and Ali Donmez. 2009. Impacts of disasters: Comparisons of several worries in Turkey. ***Stress and Health*** **25 (1): 63-70.**
This paper defines respondents' levels of worries to find out the main predictors of each worry factor by comparing the results of earthquake (2001) and bird flu (2006) studies carried out in Turkey. Assuming that the critical power-conflict perspective was appropriate; several types of worries, namely, traffic accidents, natural disasters, unemployment, health and sickness, nuclear plants, war and terrorism, and environmental problems defined by Kamano have been analyzed using parametric and non-parametric statistical significance tests. The results revealed that earthquake hazards affected respondents' level of worries more than bird flu disease, mainly because of the enormous economic and human losses of the 1999 earthquake. It was also found that the main predictors were not the same for both studies: the education variable was more effective on the level of worries of earthquake survivors, and gender was more influential for the bird flu study.

Kessler, Ronald C., Terence M. Keane, Robert J. Ursano, Ali Mokdad, and Alan M. Zaslavsky. 2008. Sample and design considerations in postdisaster mental health needs assessment tracking surveys. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys*** **17 (S2): S6-S20.**
Although needs assessment surveys are carried out after many large natural and man-made disasters, synthesis of findings across these surveys and disaster situations about patterns and correlates of need is hampered by inconsistencies in study designs and measures. Recognizing this problem, the U.S. Substance Abuse

and Mental Health Services Administration (SAMHSA) assembled a task force in 2004 to develop a model study design and interview schedule for use in post-disaster needs assessment surveys. The U.S. National Institute of Mental Health subsequently approved a plan to establish a center to implement post-disaster mental health needs assessment surveys in the future using an integrated series of measures and designs of the sort proposed by the SAMHSA task force. A wide range of measurement, design, and analysis issues will arise in developing this center. Given that the least widely discussed of these issues concerns study design, the current report focuses on the most important sampling and design issues proposed for this center based on our experiences with the SAMHSA task force, subsequent Katrina surveys, and earlier work in other disaster situations.

Kessler, Ronald C., and Hans-Ulrich Wittchen. 2008. Post-disaster mental health needs assessment surveys: The challenge of improved future research. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys*** **17 (S2): S1-S5.**

Disasters are very common occurrences, becoming increasingly prevalent throughout the world. The number of natural disasters either affecting more than 100 people or resulting in a call for international assistance, increased from roughly 100 per year worldwide in the late 1960s, to over 500 per year in the past decade. Population growth, environmental degradation, and global warming all play parts in accounting for these increases. There is also the possibility of a pandemic. This paper covers a topic of growing worldwide importance: mental health needs assessment in the wake of large-scale disasters. Although natural and human-made disasters are known to have substantial effects on the mental health of the people who experience them, research shows that the prevalence of post-disaster psychopathology varies enormously from one disaster to another in ways that are difficult to predict merely by knowing the objective circumstances of the disaster. Mental health needs assessment surveys are consequently carried out after many large-scale natural and human-made disasters to provide information for service planners on the nature and magnitude of need for services. These surveys vary greatly, though, in the rigor with which they assess disaster-related stressors and post-disaster mental illness. Synthesis of findings across surveys is hampered by these inconsistencies. The typically limited focus of these surveys with regard to the inclusion of risk factors, follow-up assessments, and evaluations of treatment, also limit insights concerning post-disaster mental illness and treatment response. The papers in this issue discuss methodological issues in the design and implementation of post-disaster mental health needs assessment surveys aimed at improving on the quality of previous such surveys. The many recommendations in these papers will help to foster improvements in the next generation of post-disaster mental health surveys.

Krewski, Daniel, Louise Lemyre, Michelle C. Turner, Jennifer E.C. Lee, Christine Dallaire, Louise Bouchard, Kevin Brand, and Pierre Mercier. 2009. Public perception of population health risks in Canada: Health hazards and health outcomes. ***International Journal of Risk Assessment and Management*** **11 (3/4): 299-318.**

The focus of this article is a descriptive account of the perceptions of five health hazards (motor vehicles, climate change, recreational physical activity, cellular phones, and terrorism) and five health outcomes (cancer, long-term disabilities, asthma, heart disease, and depression) from a recent survey of 1,503 Canadians. To shed light on factors that influence risk perception in Canada, the extent to which these exemplars are perceived as high in risk and controllability, as well as the extent to which knowledge and uncertainty surrounding them is high, was examined. The degree to which these exemplars are deemed acceptable and generate worry among Canadians was also examined. Variation was observed in the extent to which different health hazards and outcomes are perceived on the various dimensions. Perceptions of health hazards and outcomes also vary significantly by gender, age, and education. Findings are compared to existing research on risk perception.

Lazar, Eliot J., Nicholas V. Cagliuso, and Kristine M. Gebbie. 2009. Are we ready and how do we know? The urgent need for performance metrics in hospital emergency management. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 57-60.**

An extraordinary number of health care quality and patient safety indicators have been developed for hospitals and other health care institutions. However, few meaningful indicators exist for comprehensive assessment of hospital emergency management. Although health care institutions have invested considerable resources in emergency management preparedness, the need for universally accepted, evidence-based performance metrics to measure these efforts remains largely unfulfilled. The authors suggest that this can be remediated through the application of traditional health care quality paradigms, coupled with novel analytic approaches to develop meaningful performance data in hospital emergency management.

Lin, Yi-Chun. 2009. Impact of the spread of infectious disease on economic development: A study in risk management. ***International Journal of Risk Assessment and Management*** **11 (3/4): 209-218.**

At the peak of the worldwide SARS epidemic, apprehension arising out of partially disclosed, if not concealed, information on the status has driven many foreign-based companies to withdraw their business in Taiwan or move their bases elsewhere. Normal trading, investment, and travel were suspended or came to a standstill. This paper traces the spread of SARS in Taiwan and the corresponding measures undertaken. Proposals on emergency action in crisis management are also made, which can serve as references for investors in risk control assessment.

Lommen, Mirian J.J., Angelique Sanders, Nicole Buck, and Arnoud Arntz. 2009. Psychosocial predictors of chronic Post-Traumatic Stress Disorder in Sri Lankan tsunami survivors. ***Behavior Research and Therapy*** **47 (1): 60-65.**

This study aimed to determine whether psychological factors associated with Post-Traumatic Stress Disorder (PTSD) identified in Western samples generalize to low Social-Economical-Status (SES) populations in an underdeveloped Asian country. The study included 113 survivors of the 2004 tsunami on the south coast of Sri Lanka, recruited from four preschools and 10 villages for displaced persons. With logistic regressions the relations between interview-based PTSD diagnosis and psychological factors were assessed, controlling for putative confounders. Fifteen months post-trauma the prevalence of PTSD was 52.2 percent. Multivariate analyses indicated that negative interpretation of tsunami memories was significantly ($P < 0.005$) related to PTSD. Of the putative confounders, gender and (non-replaced) lost work equipment were related to current PTSD ($P < 0.05$). The results indicate that the relation between negative interpretation of trauma memories and PTSD is quite universal, suggesting that interventions focusing on this factor may be important in treatment of tsunami survivors who are suffering from chronic PTSD.

Louie, Richard F., Stephanie L. Sumner, Shaunye Belcher, Ron Mathew, Tran. Nam K., and Gerald J. Kost. 2009. Thermal stress and point-of-care testing performance: Suitability of glucose test strips and blood gas cartridges for disaster response. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 13-17.**
Point-of-care testing (POCT) devices are deployed in the field for emergency onsite testing under a wide range of environmental conditions. The objective was to evaluate the performance of glucose meter test strips and handheld blood gas analyzer cartridges following thermal stresses that simulate field conditions. The authors evaluated electrochemical and spectrophotometric glucose meter systems and a handheld blood gas analyzer. Glucose test strips were cold-stressed (21°C) and heat-stressed (40°C) for up to four weeks. Blood gas cartridges were stressed at 21°C, 2°C, and 40°C for up to 72 hours. Test strip and cartridge performance was evaluated using aqueous quality control solutions. Results were compared with those obtained with unstressed POCT strips and cartridges. Heated glucose test strips and blood gas cartridges yielded elevated results. Frozen test strips and cooled cartridges yielded depressed glucose and blood gas results, respectively. Frozen cartridges failed. The performance of glucose test strips and blood gas cartridges was affected adversely by thermal stresses. Heating generated elevated results, and cooling depressed results. Disaster medical assistance teams and emergency medical responders should be aware of these risks. Field POCT devices must be robust to withstand adverse conditions. The authors recommend that industry produce POCT devices and reagents suitable for disaster medical assistance teams.

Manley, Dawn K., and Dena M. Bravata. 2009. A decision framework for coordinating bioterrorism planning: Lessons from the BioNet program. ***American Journal of Disaster Medicine*** **4 (1): 49-57.**
Effective disaster preparedness requires coordination across multiple organizations. This article describes a detailed framework developed through the BioNet program to facilitate coordination of bioterrorism preparedness planning among military and civilian decision makers. The authors conducted a series of semistructured interviews with civilian and military decision makers from public health, emergency management, hazardous material response, law enforcement, and military health in the San Diego area. Decision makers used a software tool that simulated a hypothetical anthrax attack, which allowed them to assess the effects of a variety of response actions (e.g., issuing warnings to the public, establishing prophylaxis distribution centers) on performance metrics. From these interviews, the authors characterized the information sources, technologies, plans, and communication channels that would be used for bioterrorism planning and responses. The authors used influence diagram notation to describe the key bioterrorism response decisions, the probabilistic factors affecting these decisions, and the response outcomes. Results: The authors present an overview of the response framework and provide a detailed assessment of two key phases of the decision-making process: (1) pre-event planning and investment; and (2) incident characterization and initial responsive measures. The framework enables planners to articulate current conditions; identify gaps in existing policies, technologies, information resources, and relationships with other response organizations; and explore the implications of potential system enhancements. Use of this framework could help decision makers execute a locally coordinated response by identifying the critical cues of a potential bioterrorism event, the information needed to make effective response decisions, and the potential effects of various decision alternatives.

Masterson, Lori, Christel Steffen, Michael Brin, Mary Frances Kordick, and Steve Christos. 2009. Willingness to respond: Of emergency department personnel and their predicted participation in mass casualty terrorist events. ***The Journal of Emergency Medicine*** **36 (1): 43-49.**
In May, 2003, the TOPOFF 2 national disaster drill demonstrated inadequate preparedness for mass casualty terrorist events and failed to address the willingness of Emergency Department (ED) personnel to assist with these events. The objective of this study was to examine ED personnel willingness to respond to various multiple casualty events. A prospective voluntary survey of ED personnel from multiple hospitals was randomly administered in the form of vignette-based questionnaires. The survey of 204 participants at eight hospitals in the Chicago area revealed that staff members were more willing to work additional hours for victims of an airplane crash (98.0 percent), than for a radioactive bomb (85.3 percent), or a biologic agent (54.0 percent). For the biologic agent only, men were significantly more likely to respond than women. Hospital management should anticipate significant reductions in workforce during biologic and radioactive disaster events. Employees' willingness to respond was not augmented by any incentives offered by hospitals, although enhanced financial remuneration and disability coverage showed the most potential to increase response.

Ooi, Giok Ling, and Kai Hong Phua. 2009. SARS in Singapore:

Challenges of a global health threat to local institutions. ***Natural Hazards*** **48 (3): 317-327.**
SARS (Severe Acute Respiratory Syndrome) has been declared by the World Health Organization as a global health threat. Within a period of four to five months in 2003, the disease infected some 8,000 people in more than 25 countries and left 774 dead. The many studies that have been done on the spread of SARS in Asia as well as countries as far flung as Germany and Canada have focused on the global dimension of the infectious disease as well as the speed of its spread upon emergence in southern China and then Hong Kong. Less attention has been paid to its spatial distribution at the national and local scales. This discussion focuses on the spread of SARS at the national and local spatial scales. In the process, the study presents the management of a hazard, in this case, an emerging infectious disease by national health care institutions such as the hospitals that ultimately proved to have been wholly unprepared for coping with at least the health aspects of the outcome of a globalized national agenda for growth and economic progress.

Pfefferbaum, Betty, and Carol S. North. 2008. Research with children exposed to disasters. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys*** **17 (S2): S49-S56.**
A number of logistical issues complicate child disaster research. Like adult studies, much child research has used a single cross-sectional assessment of non-representative samples, fails to consider pre-disaster contribution to post-disaster problems, and leaps to unwarranted causal conclusions from results that provide mere associations. Despite concern about the accuracy of parental reports and concern about children's understanding of terms, most child studies use a single source of information—either the children themselves or their parents. As the field matures, greater attention to the sophistication of research methods and design will increase our understanding of children in the context of disasters.

Rubin, G. James, Richard Amlot, Lisa Page, and Simon Wessely. 2008. Methodological challenges in assessing general population reactions in the immediate aftermath of a terrorist attack. ***International Journal of Methods in Psychiatric Research - Special Issue: Post-Disaster Mental Health Needs Assessment Surveys*** **17 (S2): S29-S35.**
Assessing mental health needs following a disaster is important, particularly within high-risk groups like first responders or individuals directly caught up in the incident. Following events involving widespread destruction, ingenuity and hard work are required to study these issues. When considering responses among the general population following less devastating events such as a conventional terrorist attack, or following an event involving a chemical, biological, radiological, or nuclear agent, other variables may become more relevant for determining the population's overall psychosocial well-being. Trust, perceived risk, sense of safety, willingness to take prophylaxis and unnecessary attendance at medical facilities will all be important in determining the overall psychological, medical, economic, and political impact of such attacks. Assessing these variables can help government agencies and nongovernmental organizations adjust their communication and outreach efforts. To provide these data quickly, telephone surveys using short time windows for data collection or which use quota samples are often required. It is unclear whether slower, more conventional, and more expensive survey methods with better response rates would produce different results compared to these quicker and cheaper methods, and whether those differences would have a major impact on any resulting policy decisions. This empirical question would benefit from further study.

Schneider, Robert O. 2009. H5N1 planning concerns for local governments. ***Journal of Emergency Management*** **7 (1): 65-70.**
The objectives of this essay are twofold. First, it review the threat an avian influenza pandemic poses to local communities. Second, it identifies several unaddressed but critical concerns that require the attention of local governments as they refine their pandemic preparedness planning. It concludes that greater coordination with the private sector, improved public health surveillance efforts, planning for public education, and greater attention to ethical issues are essential concerns that should be on the agenda of local governments as they proceed with their preparations.

Sneath, Julie Z., Russell Lacey, and Pamela A. Kennett-Hensel. 2009. Coping with a natural disaster: Losses, emotions, and impulsive and compulsive buying. ***Marketing Letters*** **20 (1): 45-60.**
Using data collected from 427 US Gulf Coast residents who were impacted by Hurricane Katrina, a structural model based on life event theory is proposed and empirically tested. Results show that perceived lack of control and loss of possessions contribute directly to stress, and event-induced stress impacts depression. Depressive states, in turn, lead to impulsive and compulsive buying behaviors. Multi-group analysis reveals that income moderates the relationship between depression and compulsive buying, but age, gender, and insurance coverage do not. The depression-impulsive buying relationship is not moderated by any of these factors. Disaster victims engage in distinct purchasing behaviors to manage emotional states, recoup losses, and restore their sense of self. In the aftermath of a traumatic event, impulsive buying appears to be a rational and beneficial behavior; compulsive buying does not. The results have ethical and social responsibility implications for marketers and public policy makers.

Soeteman, Rik J.H., C. Joris Yzermans, M.M. Spreeuwenberg, Tina Dorn, Jan J. Kerssens, Wil J.H.M. van de Bosch, and Jouke van der Zee. 2009. Does disaster affect immigrant victims more than non-immigrant victims in Dutch general practice: A matched cohort study. ***Journal of Public Health*** **17 (1): 27-32.**
In the literature, immigrant victims appear to be more vulnerable to health effects of a disaster than indigenous victims. Most of these studies were performed without

pre-disaster measurement and without using a control group. The aim of this study is to monitor differences between two groups of victims—Turkish immigrants and indigenous Dutch, in utilization and morbidity as presented in general practice after a human-caused disaster. A matched cohort study was performed with pre-disaster (one year) and post-disaster (four years) measurements of patients from 30 general practices in Enscheda. Turkish victims (N=303) and Dutch victims (N=606), matched on age, gender and socioeconomic status, were included. Main outcome measures were psychological problems and physical symptoms as recorded by the general practitioner, using the International Classification of Primary Care. The Turkish victims showed higher utilization than the Dutch victims prior to the disaster. In the first post-disaster year, both groups of victims showed an increase in utilization, but the increases did not differ significantly. The Turkish group showed no significantly greater increase than the Dutch group in the five most prevalent clusters of health problems (psychological, respiratory, skin, musculoskeletal, and digestive). The Turkish victims in general practice were as vulnerable as the Dutch victims for the effects on their health of this man-made disaster. Differences between Turkish and native Dutch victims of this man-made disaster can largely be explained by the differences that existed already before the disaster.

Terranova, Andrew M., Paul Boxer, and Amanda Sheffield Morris. 2009. Changes in children's peer interactions following a natural disaster: How pre-disaster bullying and victimization rates changed following Hurricane Katrina. ***Psychology in the Schools*** **46 (4): 333-347.**
Youth exposed to disasters experience stress and adjustment difficulties, which likely influence their interactions with peers. In this study, the authors examined changes in bullying and peer victimization in two cohorts of children. Youth from an area affected by Hurricane Katrina were assessed pre and post-disaster (n = 96, mean [M] = 10.9 years old, 53 percent female), and a comparison group from a nearby area was assessed over the same time interval one year prior (n = 120, M = 10.2 years old, 52 percent female). Within the hurricane group, relations between symptoms of post-traumatic stress disorder with bullying and victimization also were examined. Following the hurricane, the hurricane group reported increased relational and overt bullying relative to the nonhurricane group, and PTSD symptoms predicted increased victimization. Thus, school personnel should be vigilant and prepared to respond to increased bullying following disasters and for increased victimization in youth experiencing PTSD symptoms.

Wood, Karen M. 2009. Community health centers: The untapped resource for public health and medical preparedness. ***Homeland Security Affairs*** **(ePub) 5 (1).**
HSPD-21 was recently released to the public calling for a transformation in the national approach to public health and medical preparedness in the United States. The latest deliberations, as prioritized by this strategy, are to bolster the nation's ability to manage a public health crisis by stimulating improvements in the areas of biosurveillance, countermeasure distribution, mass casualty care, and community resilience. The objective is to create a much more tightly integrated systems approach toward public health and medical preparedness. Community Health Centers (CHCs), by philosophic orientation, geographic location, and as publicly-funded entities, are well-positioned to provide medical services, education, and other human services to prevent, prepare for, respond to, mitigate, and recover from the public health impact of a bioterrorist event or other biological disease outbreak. Aggressive investment in CHCs and their emergency management programs serves a dual purpose that will: (1) create greater social equity by reducing health disparities and make public health emergency management more accessible to special needs populations; and (2) support many of the objectives identified in the Public Health and Medical Preparedness Strategy.

Zoraster, Richard M. 2009. "Social Worth" will not affect allocation of scarce resources in a pandemic or disaster: Political correctness, sophistry, or reality? ***American Journal of Disaster Medicine*** **4 (1): 5-7.**

Risk and Decision Making

Ardalan, Ali, Kourosh Holakouie Naieni, Mohamad-Javad Kabir, Ali-Mohamad Zanganeh, Abbas-Ali Keshtkar, Mohamad-Reza Honarvar, Hanieh Khodaie, and Mehdi Osooli. 2009. Evaluation of Golestan Province's early warning system for flash floods, Iran, 2006-2007. ***International Journal of Biometeorology*** **ePub.**
Golestan, a province located in northeastern Iran, is well known for deadly flash floods. This study evaluated the region's early warning system (EWS) for flash floods using an adapted version of the questionnaire developed by the United Nations International Strategy for Disaster Reduction (UNISDR). Golestan EWS documents were reviewed and a qualitative study using interviews of experts and affected people in Kalaleh and Minoodasht, was conducted. Results were discussed by an expert panel. Risk knowledge included a hazard map at the Provincial Disaster Taskforce (PDT), although no risk analysis was available. Local people were aware of exposure to flooding, but not aware of the hazard map or their vulnerability. In terms of monitoring and warning, PDT faced serious limitations in issuing early warnings, including the inability to make point predictions of rainfall or create a warning threshold. Meteorological Office communications followed a top-to-bottom flow and messages were not clearly understood by institutions, nor did they reach potential recipients in an appropriate time frame. A comprehensive response plan with adequate exercises was needed and no evaluation framework existed. Golestan EWS is in dire need of improvement. To fill in the gaps and ensure local people receive timely warnings, the authors propose a community-based model called Village Disaster Taskforce (VDT), in which individual villages act as operational units but are interlinked with other villages and the PDT.

Baxter, P.J., W.P. Aspinall, A. Neri, G. Zuccaro, R.J.S. Spence, R.

Cioni, and G. Woo. 2008. Emergency planning and mitigation at Vesuvius: A new evidence-based approach. *Journal of Volcanology and Geothermal Research* 178 (3): 454-473.
The infrequency of disasters from volcanic eruptions limits emergency planning and mitigation experience for such situations. As populations expand into areas of active volcanoes, the need for developing more robust methods of risk assessment and decision making in volcanic crises is increasing. Vesuvius, where thousands of people live in the shadow of one of the world's most dangerous volcanoes, is an example of the challenges caused by this dynamic. This article describes how evidence-based volcanology in EXPLORIS contributes to crisis planning and management for eruptions and long-term land use planning. An analytical approach enumerates and quantifies volcano hazards that influence risk. This challenge combined field data on the vulnerability of the built environment, humans in past volcanic disasters, and theoretical research on the volcano's state—including field evidence from previous eruptions and numerical simulation modeling of eruptive processes. An event tree for future eruption types, including probability and hypothetical casualty outcomes, was created using formal probabilistic reasoning under uncertainty and a decision analysis approach. For emergency planning purposes, likely eruption scenarios were derived from this event tree and elaborated on using geological and historical record. Modeling the impacts in these scenarios provide realistic assessments for disaster planning and show the potential risk benefit of mitigation—mainly timely evacuation and building and infrastructure protection. This work suggests risk-based methods could have an important role in volcanic crisis management.

Benn, Suzanne, Dexter Dunphy, and Andrew Martin. 2009. Governance of environmental risk: New approaches to managing stakeholder involvement. *Journal of Environmental Management* 90 (4): 1567-1575.
Disputes concerning industrial legacies such as the disposal of toxic wastes illustrate changing pressures on corporations and governments. Businesses and governments are now confronted with managing the expectations of a society increasingly aware of the social and environmental impacts and risks associated with economic development, demanding more equitable distribution and democratic management of such risks. The closed managerialist decision making of the powerful bureaucracies and corporations of the industrial era is informed by traditional management theory which cannot provide a framework for the adequate governance of these risks. Recent socio-political theories have conceptualized some key themes that must be addressed in a more appropriate approach to governance. This article identifies recent management and governance theory addressing these themes and develops a process-based approach to governance of environmental disputes, allowing for the evolving nature of stakeholder relations in a highly complex multiple stakeholder arena.

Berenbrock, C., R.R. Mason, and S.F. Blanchard. 2009. Mapping Hurricane Rita inland storm tide. *Journal of Flood Risk Management* 2 (1): 76-82.
Flood inundation data are most useful for decision makers when presented in the context of maps of affected communities and areas. But because the data are scarce and rarely cover the full extent of flooding, interpolation and extrapolation of the information are needed. Many geographic information systems provide various interpolation tools, but these tools often ignore the effects of the topographic and hydraulic features that influence flooding. A barrier mapping method was developed to improve maps of storm tide produced by Hurricane Rita. Maps were developed for the maximum storm tide and at three hour intervals from midnight (00:00 hours) through noon (12:00 hours) on September 24, 2005. The improved maps depict storm tide elevations and the extent of flooding. The extent of storm tide inundation from the improved maximum storm tide map was compared with the extent of flood inundation from a map prepared by the Federal Emergency Management Agency (FEMA). The boundaries from these two maps generally compared quite well especially along the Calcasieu River. Also a cross-section profile that parallels the Louisiana coast was developed from the maximum storm tide map and included FEMA high-water marks.

Bosher, Lee, Andrew Dainty, Patricia Carillo, Jacqueline Glass, and Andrew Price. 2009. Attaining improved resilience to floods: A proactive multi-stakeholder approach. *Disaster Prevention and Management* 18 (1): 9-22.
There is a need to proactively address strategic weaknesses in protecting the built environment from a range of hazards. This paper seeks to focus on the mitigation for flood hazards in the United Kingdom, particularly in understanding the extent of the problem, collating key guidance and legislation related to flood hazard mitigation, identifying who the key construction decision makers are, and the most opportune stages of the design-construction-operation process when key decisions are needed. A pluralistic research design was adopted for the study, which included a UK-wide questionnaire survey and a set of semi-structured interviews involving a range of professionals from construction, planning, insurance, emergency management and local/national government agencies was undertaken. Despite the publication of a range of guidance on flood hazard mitigation in the UK, there is still insufficient evidence that key construction stakeholders are playing an active role in mitigating flood risk. The preconstruction phase of a building's life cycle is identified as the critical stage at which key stakeholders must adopt flood hazard mitigation strategies. The socio-institutional constraints to the proactive attainment of built-in resilience are highlighted, as are recommendations about how these constraints can be addressed. The paper reports on the provisional findings of an ongoing project but these findings nonetheless provide essential foundations for the latter development of the PRE-EMPT toolkit and raise some important considerations about flood resilience in the UK. The findings presented reveal how stakeholders should be more involved, and what issues must be addressed regarding the integration of built-in resilience into construction decision making.

Brody, Samuel D., Sammy Zahran, Wesley E. Highfield, Sarah P. Bernhardt, and Arnold Vedlitz. 2009. Policy learning for flood mitigation: A longitudinal assessment of the Community Rating System in Florida. ***Risk Analysis*** **(ePub).**

Floods continue to inflict the most damage upon human communities among all natural hazards in the United States. Because localized flooding tends to be spatially repetitive over time, local decision makers often have an opportunity to learn from previous events and make proactive policy adjustments to reduce the adverse effects of a subsequent storm. Despite the importance of understanding the degree to which local jurisdictions learn from flood risks and under what circumstances, little if any empirical, longitudinal research has been conducted along these lines. This article addresses the research gap by examining the change in local flood mitigation policies in Florida from 1999 to 2005. It tracks 18 different mitigation activities organized into four series of activities under the Federal Emergency Management Agency's (FEMA) Community Rating System (CRS) for every local jurisdiction in Florida participating in the FEMA program on a yearly time step. The article then identifies the major factors contributing to policy changes based on CRS scores over the seven-year study period. Using multivariate statistical models to analyze both natural and social science data, the effects of several variables are isolated and categorized into the following groups: hydrologic conditions, flood disaster history, and socioeconomic and human capital controls. Results indicate that local jurisdictions do in fact learn from histories of flood risk and this process is expedited under specific conditions.

De Brujin, K.M., and F. Klijn. 2009. Risky places in the Netherlands: A first approximation for floods. ***Journal of Flood Risk Management*** **2 (1): 58-67.**

Flood risk maps are considered useful tools for flood risk management, including spatial planning. In the Netherlands, flood risk is usually assessed for large geographical units at the dike-ring scale. Flood risk differences within dike rings can be large, however. Maps providing information on flood risks and a more detailed spatial scale of risk can help prioritize flood control measures or land-use planning. This paper focuses on the identification of risky places in the Netherlands, i.e. places where many flood fatalities can be expected because of their hazards and vulnerability. The method factors the likelihood and number of fatalities into hazard, vulnerability, and exposure factors.

Ebert, Annemarie, Norman Kerle, and Alfred Stein. 2009. Urban social vulnerability assessment with physical proxies and spatial metrics derived from air- and spaceborne imagery and GIS data. ***Natural Hazards*** **48 (2): 275-294.**

Risk management in urban planning is of increasing importance to mitigate the growing amount of damage and the increasing number of casualties caused by natural disasters. Risk assessment to support management requires knowledge about present and future hazards, elements at risk, and different types of vulnerability. This article deals with the assessment of social vulnerability (SV). In the past this has been neglected because of a lack of data and assessment difficulties. Existing approaches for SV assessment, primarily based on community-based methods or on census data, have limited efficiency and transferability. In this article a new method based on contextual analysis of image and GIS data is presented. An approach based on proxy variables that were derived from high-resolution optical and laser scanning data was applied, in combination with elevation information and existing hazard data. Object-oriented image analysis was applied for the definition and estimation of those variables, focusing on SV indicators with physical characteristics. A reference Social Vulnerability Index (SVI) was created from census data available for the study area on a neighborhood level and tested for parts of Tegucigalpa, Honduras. For the evaluation of the proxy variables, a stepwise regression model to select the best explanatory variables for changes in the SVI was applied. Eight out of 47 variables explained almost 60 percent of the variance, whereby the slope position and the proportion of built-up area in a neighborhood were found to be the most valuable proxies. This work shows that contextual segmentation-based analysis of geospatial data can substantially aid in SV assessment and, when combined with field-based information, leads to optimization in terms of assessment frequency and cost.

Emblemsvag, Jan. 2008. On probability in risk analysis of natural disasters. ***Disaster Prevention and Management*** **17 (4): 508-518.**

This paper shows how the common practice of applying the frequency interpretation of probability in risk analysis of so-called low-probability, high-consequence disasters can be flawed, and to present a possible remedy. The common practice is reviewed by using the the Aknes case from Norway where an up to 100 million m3 rock slide is threatening one of Norway's most visited tourist sites, Geiranger. The same case is also reworked using the alternative approach and then a comparison is made. The paper clearly shows the fallacy of using the frequency interpretation of probability in cases where the data are limited because the natural disasters under study appear very rarely. By exploiting the fact that responsible decision makers in public offices cannot claim that human losses today are worse than human losses tomorrow (human lives cannot be discounted, as it were), the alternative approach provides much more realistic decision support. The paper presents a new approach to analyzing the risk of low probability, high impact natural disasters that can be readily applied in other low probability, high consequence cases. As far as is known, the paper presents an original contribution to the analysis of risk of low-probability, high-consequence natural disasters since it shows that the commonly used frequency interpretation of probability can prove to be flawed in such cases. An alternative approach is provided.

Escudero, Laureano F., and Juan F. Monge. 2008. A model for risk minimization on water resource usage failure. ***International Journal of Risk Assessment and Management*** **10 (4): 386-403.**

The authors present a framework for solving the strate-

gic problem of assigning transboundary water resources to demand centers under uncertainty in the water exogenous inflow in the reservoirs and other segments of the basin system along the time horizon. The function to maximize is the probability of satisfying different targets on the stored water and different demands over a set of scenarios. A scenario tree-based scheme is used to represent the Deterministic Equivalent Model (DEM) of the stochastic mixed 0-1 program with complete recourse. The constraints are modeled by a splitting variable representation via scenarios and, so, a Stochastic Integer Programming (SIP) scheme can be used to exploit the excess probability functional structure as well as the non-anticipativity constraints for the water assignment.

Fontaine, Matthew M., and Anne C. Steinemann. 2009. Assessing vulnerability to natural hazards: Impact-based method and application to drought in Washington State. ***Natural Hazards Review*** **10 (1): 11-18.**

This article presents a vulnerability assessment technique using measures of exposure, sensitivity, and adaptive capacity. Historically, vulnerability assessments focused on analyzing the hazard without considering causes or mitigation. The vulnerability assessment method (VAM), presented here, acquires data and information from affected stakeholders to assess not only the hazard, but also the causes of vulnerability, potential for adaptation, previous impacts, and ways to mitigate future impacts. Researchers applied the VAM to a case study of Washington State that assessed drought vulnerability across 34 subsectors. Results indicate the highest vulnerability for dry land farmers, farmers with junior water rights, fisheries, ski area operators, berry farmers, and the green industry. Through validation exercises, they demonstrate the VAM's internal consistency and external applicability. Contributions of the VAM include incorporation of stakeholder data, integrated and quantitative assessments of vulnerability components, and applicability to other regions, scales, and types of hazards.

Gabriel, Paul. 2009. Victoria's state-level emergency risk assessment method. ***The Australian Journal of Emergency Management*** **24 (1): 5-10.**

Victoria's State Emergency Mitigation Committee has developed a method for initial comparative assessment of emergency-related risks at state level. Adapting existing municipal-level models, a method has been developed and successfully implemented. The main adaptations have been the use of a curve to represent the risk rating, the placement of colored risk zones on the graph, the recalibration of consequence descriptors to the state-level context, and the use of logarithmic scales.

Ganoulis, Jacques, and Eugene Levner. 2008. Risk-based integrated management of transboundary water resources: A general framework. ***International Journal of Risk Assessment and Management*** **10 (4): 291-311.**

Integrated management of transboundary surface waters and groundwater aquifers faces not only difficult problems and uncertainties at a national level, but also because these water bodies cross international borders. After showing the importance of internationally shared waters at the global scale in terms of spatial extension, quantity, and water uses, this paper develops an integrated risk-based framework for managing shared waters at the basin scale. The definition of risk as a performance index in achieving four different objectives—technical reliability, environmental security, economic efficiency, and social equity—allows different management options to be compared and the most sustainable one to be selected. The Risk-based Integrated Transboundary Water Resources Management (RITWRM) framework is based on the quantification of the four different risk indices, which can be evaluated by combining expert opinions, available data and information, and mathematical modeling. The RITWRM problem can be set as a multiportfolio choice problem, which allows a scientifically motivated compromise to be found between the individual interests of stakeholders where technological, economic and social conditions are taken into account.

Gerber, Elaine. 2009. Describing tragedy: The information access needs of blind people in emergency-related circumstances. ***Human Organization*** **68 (1): 73-81.**

Audio description is a technique used for "translating" visual material to aural readers/blind people. In this article, exploratory research on audio description (AD) is presented, which raises important questions in the field of applied anthropology and emergency planning: How does one translate visual material for a non-seeing audience? From the point of view of blind consumers, what constitutes "good" description? What specific information access needs do they have in event of emergencies? Selected results are presented from three telephone focus groups on AD, conducted with 39 blind or visually impaired people nationwide in the United States during September and October 2005. This paper addresses emergency planning, audio description, and the need for more accurate information access for blind people during public warning broadcasts and in delivering the news. Further, it examines existing guidelines for the inclusion of blind people in the provision of emergency information, concluding that successful emergency preparedness must include first-hand expertise of disabled people themselves.

Gonen, Amnon, and Naomi Zeitouni. 2008. Using risk management to increase the flexibility of transboundary water conflict resolutions. ***International Journal of Risk Assessment and Management*** **10 (4): 373-385.**

With the increase in world population and the diminishing water quality and quantity, water scarcity is increasing. As access to water is essential to the prosperity of communities, the threat of conflict over the use of transboundary water is increasing. Surface and groundwater that cross international boundaries present increased challenges to regional stability because hydrologic needs can often be overwhelmed by political considerations. The success of an agreement over water conflicts greatly depends on the flexibility of the agreement in the presence of new risks and challenges. This flexibility may be accomplished through the establishment of formal institutions and/or legislation set

up for the purpose of problem solving. These institutions are essential for the maintenance of cooperative interactions over water. This work suggests the use of the risk management method most commonly utilized in the planning and developing of complex industrialized projects to increase the flexibility of transboundary agreements.

Grace, Martin F., and Robert W. Klein. 2009. The perfect storm: Hurricanes, insurance and regulation. ***Risk Management and Insurance Review*** **12 (1): 81-124.**
The intense hurricane seasons of 2004 and 2005 caused considerable instability in property insurance markets in coastal states with the greatest problems occurring in Florida and the Southeast. Insurers have substantially raised rates and decreased their exposures. While no severe hurricanes struck the United States in 2006 and 2007, market pressures remain strong given the high risk still facing coastal states. These developments generate considerable concern and controversy among various stakeholder groups. Government responses have varied. In Florida, political pressures prompted a wave of legislation and regulations to expand government underwriting and subsidization of hurricane risk and constrain insurers' rates and market adjustments. Other states' actions seem more moderate. In this context, it is important to understand how property insurance markets have been changing and governments have been responding to increased catastrophe risk. This article examines important market developments and evaluates associated government policies. The article comments on how regulation is affecting the equilibration of insurance markets and offer opinions on policies that are helpful and harmful.

Haruvy, Nava, Sarit Shalhevet, and Yehunda Bachmat. 2008. Risk management of transboundary water resources: Sustainable water management of the River Jordan basin area. ***International Journal of Risk Assessment and Management*** **10 (4): 339-356.**
The River Jordan basin suffers from regional water scarcity, wide economic discrepancies, and a long-lasting dispute over land ownership. Prolonged, widespread unsustainable management has significantly decreased the water flow and aggravated water pollution. The river is now seriously at risk of drying up, with the loss of a unique ecosystem with important religious and cultural significance. Sustainable management practices are needed, based on the local physical and hydrological conditions, the available technologies, the economic costs, and the potential policy options. Our multidimensional model incorporates these factors. It provides a decision-making tool that supports urban and agricultural water supply planning, with predetermined water quality for each use. A case study in Israel yielded a framework for application of the model to transboundary water management, by adjusting it for the differing costs and technologies in the various countries involved. A variety of potential international agreements were considered as scenarios for the model.

Heidari, A. 2009. Structural master plan of flood mitigation measures. ***Natural Hazards and Earth System Sciences*** **9 (1): 61-75.**
Flood protection is one of the practical methods in damage reduction. Although it not possible to be completely protected from flood disaster, a major part of the damage can be reduced by mitigation plans. In this paper, the optimum flood mitigation master plan is determined by economic evaluation, trading off construction costs and the expected value of damage reduction as the benefit. Size of certain mitigation alternatives is also obtained from risk analysis by accepting the possibility of flood overtopping. Different flood mitigation alternatives are investigated from various aspects in the Dez and Karun river floodplain areas as a case study in southwest Iran. The results show that detention dam and flood diversion are the best alternatives of flood mitigation methods, along with enforcing the flood control purpose of upstream multipurpose reservoirs. Dike and levees are not justifiable because of negative impact on downstream by enhancing routed flood peak discharge magnitude and flood damages as well.

Heitz, Carine, Sandrine Spaeter, Anne-Veronique Auzet, and Sandrine Glatron. 2009. Local stakeholders' perception of muddy flood risk and implications for management approaches: A case study in Alsace (France). ***Land Use Policy*** **26 (2): 443-451.**
The inventory of muddy floods in France indicates that the occurrence of these events seriously increased in the northwest and east of the country. Muddy floods triggering can largely be explained by physical characteristics such as a hilly topography, soils prone to crust, or heavy rainfall in spring. Although the physical processes are well known, and despite increasing information about the need of mitigation measures, no significant reduction of these disasters has been registered. Therefore, this should be explained by factors others than scientific reasons or technical knowledge acquisition difficulties. This paper deals with a study of muddy flood risk in five municipalities belonging to three catchments (AlsaceNE France). These catchments have suffered from several muddy flood events in the past 20 years, and, despite the implementation of mitigation measures, no decrease of their frequency has occurred. This study focuses on risk perception. The authors assume that obtaining information on risk perception contributes to the understanding of the main social factors that should be taken into account in an efficient muddy flood risk management policy. To gather data, they used surveys based on individuals' interviews and questionnaires, focusing on the local stakeholders in charge of the risk management. A sampling strategy based on a spatial distinction of runoff areas was used to select the areas to be surveyed. The survey results highlight significant differences in perception among respondents. These differences depend in particular on their location within the catchment (i.e., erosion or sedimentation area). Moreover, almost the half of the respondents trust information provided by the local authorities. The results provide some insights about the type and the source of information related to risk mitigation that should be considered when implementing an efficient regulation policy.

Heltberg, Rasmus, Paul Bennett Siegel, and Steen Lau Jorgensen. 2009. Addressing human vulnerability to climate change: Toward a 'no-regrets' approach. ***Global Environmental Change*** **19 (1): 89-99.**
This paper presents and applies a conceptual framework to address human vulnerability to climate change. Drawing upon social risk management and asset-based approaches, the conceptual framework provides a unifying lens to examine links between risks, adaptation, and vulnerability. The result is an integrated approach to increase the capacity of society to manage climate risks to reduce the vulnerability of households and to maintain or increase the opportunities for sustainable development. It identifies 'no-regrets' adaptation interventions, meaning actions that generate net social benefits under all future scenarios of climate change and impacts. The article also makes the case for greater support for community-based adaptation and social protection and propose a research agenda.

Hochrainer, Stefan, Reinhard Mechler, and Georg Pflug. 2008. Climate change and financial adaptation in Africa: Investigating the impact of climate change on the robustness of index-based microinsurance in Malawi. ***Mitigation and Adaptation Strategies for Global Change*** **14 (3): 231-250.**
This paper discusses the applicability of crop insurance for the case of Malawi. It explores the potential impact of climate change on the viability of the Malawi weather insurance program, using of scenarios of climate change-induced variations in rainfall patterns. By combining catastrophe insurance modeling with climate modeling, the methodology demonstrates the feasibility, albeit with large uncertainties, of estimating the effects of climate variability and climate change on the near- and long-term future of microinsurance schemes serving the poor. By providing a model-based estimate of insurance back-up capital necessary to avoid ruin under climate variability and climate change, along with the associated uncertainties and data limitations, this methodology can quantitatively demonstrate the need for financial assistance to protect micro-insurance pools against climate-induced insolvency. This is of major concern to donors, nongovernmental organizations and others supporting these innovative systems, those actually at-risk and insurers providing insurance. A quantitative estimate of the additional burden that climate change imposes on weather insurance for poor regions is of interest to organizations funding adaptation. Further, by linking catastrophe modeling to regionalized climate modeling, the analysis identifies key modeling inputs necessary as well as important constraints. The article ends with a discussion of the opportunities and limits to similar modeling and weather predictability for Sub-Saharan Africa beyond the case of Malawi.

Holler, Peter. 2007. Avalanche hazards and mitigation in Austria: A review. ***Natural Hazards*** **43 (1): 81-101.**
At all times, natural hazards like torrents or avalanches pose a threat to settlements and infrastructures in the Austrian Alps. Since 1950 more than 1,600 persons have been killed by avalanches in Austria, which is an average of about 30 fatalities per year. In particular, the winter periods 1950/1951 and 1953/1954 stand out, with more than 100 fatalities. Those events led to an increase of avalanche control programs in the following decades. While from the 1950s to the 1970s emphasis was placed on permanent measures (technical structures, afforestations, hazard zoning, and so on), additional programs such as avalanche warning and forecasting have supplemented avalanche control measures in recent decades. Current research is focused on avalanche simulation, risk management, and the influence of the forest on avalanche formation. An important area of future research is to develop improved methods for avalanche forecasting and to intensify the investigation of the dynamics of avalanches.

Ikeda, Keiko. 2009. How women's concerns are shaped in community-based disaster risk management in Bangladesh. ***Contemporary South Asia*** **17 (1): 65-78.**
This article elaborates on how concerns regarding gender in community-based disaster risk management are shaped through interaction between local agents of development and communities in Bangladesh. Since women and men have different experiences in disaster, gender concerns should be fully addressed by the community and integrated into the action they take up to reduce disaster risks. The term "local agents of development" refers to individuals engaged in implementation of development policy in their own community. Recent trends in community-based disaster risk management policy seek what is called a "whole community approach," engaging various stakeholders such as traditional village elite, "local civil society," and leaders of community-based organizations—mostly poor villagers supported by non-governmental organizations. Within the context of the historical evolution of community development approaches in Bangladesh, this is quite new in terms of bringing together traditional leaders and poor target groups, including women's groups. By drawing from the experience of women and focusing on the functioning of local agents of development during the flood of 2004, the author assesses the gaps between the primary concerns of women and those taken up in the risk-reduction action, to see whether, why, and when they have widened or been bridged.

Kiker, Gregory A., Rafael Munoz-Carpena, Piotr Wolski, Anna Cathey, Andrea Gaughan, and Jongbum Kim. 2008. Incorporating uncertainty into adaptive, transboundary water challenges: A conceptual design for the Okavango River basin. ***International Journal of Risk Assessment and Management*** **10 (4): 312-338.**
The authors present a review and conceptual design to integrate hydrological/ecological models, global uncertainty and sensitivity analysis, integrative modeling, and decision analysis for complex and adaptive transboundary challenges. The research uses the transboundary issues within the Okavango River basin, a shared water resource among the nations of Angola, Namibia and Botswana, as an example for constructing these integrated tools. The objective of this paper is to present a design that integrates a set of tools that builds systematically on past basin modeling research to incorporate the inherent uncertainty within the system and its applica-

tion for answering practical management questions.

Krewski, Daniel, Louise Lemyre, Michelle C. Turner, Jennifer E.C. Lee, Christine Dallaire, Louise Bouchard, Kevin Brand, and Pierre Mercier. 2009. Public perception of population health risks in Canada: Health hazards and health outcomes. ***International Journal of Risk Assessment and Management*** **11 (3/4): 299-318.**
The focus of this article is a descriptive account of the perceptions of five health hazards (motor vehicles, climate change, recreational physical activity, cellular phones, and terrorism) and five health outcomes (cancer, long-term disabilities, asthma, heart disease, and depression) from a recent survey of 1,503 Canadians. To shed light on factors that influence risk perception in Canada, the extent to which these exemplars are perceived as high in risk and controllability, as well as the extent to which knowledge and uncertainty surrounding them is high, was examined. The degree to which these exemplars are deemed acceptable and generate worry among Canadians was also examined. Variation was observed in the extent to which different health hazards and outcomes are perceived on the various dimensions. Perceptions of health hazards and outcomes also vary significantly by gender, age, and education. Findings are compared to existing research on risk perception.

Lein, James K., and Nicole I. Stump. 2009. Assessing wildfire potential within the wildland-urban interface: A southeastern Ohio example. ***Applied Geography*** **29 (1): 21-34.**
Spreading cities and suburbs remain a common phenomenon throughout the United States. Urban spread, and the desire to move beyond the subdivision for a more natural setting in the country, creates both opportunities and challenges for natural resource managers. Perhaps no challenge is as great as those related to wildfire risk within the lands describing the urban-wildland interface. The need to gain a better understanding of the wildland-urban interface is critical to policy makers charged with risk reduction responsibilities. This paper develops a methodology that characterizes the spatial distribution of wildfire risk potential in southeastern Ohio, using a geospatial technology solution to model critical hazard and risk variables associated with wildfire. The results demonstrate that the association of wildfire with hazard and risk variables can be exploited to improve wildfire potential mapping and a validation assessment of the geographic information systems (GIS)-based prescriptive model displays a strong agreement with the pattern of historic wildfire for the region.

Leventhal, Andrew, and Geoff Withycombe. 2009. Landslide risk management for Australia. ***The Australian Journal of Emergency Management*** **24 (1): 39-52.**
The Australian Geomechanics Society published a suite of guidelines in 2007 that have been recognized both within Australia and internationally as world leading, representing best practice in the field of landslide risk management. The three guidelines are supplemented by two commentaries to collectively provide advice to the Australian public, government regulators responsible for the management of landslide risk, and geotechnical practitioners who conduct assessments of landslide risk. As a consequence, these contribute to safer communities and therefore to a reduction in the costs of disasters. This paper discusses the development of the guidelines and their applications in land use planning, risk assessment, risk management, and the transfer of knowledge to practitioners, regulators, and the broader Australian public. The paper provides an overview of the status of landslide risk management in Australia. The landslide zoning guideline for land use planning has been the template for an international version which was published in late 2008 jointly by the three international technical societies representing geomechanics interests on the global stage.

Levner, Eugene, David Alcaide Lopez de Pablo, and Jacques Ganoulis. 2008. Risk management of transboundary water resources using the green supply chain approach. ***International Journal of Risk Assessment and Management*** **10 (4): 357-372.**
The problem considered is the coordination of the ecological risks of all stakeholders in a transboundary river basin using the "green" (environmental) Supply Chain (SC) approach. Using a combination of two managerial concepts "the environmental SC" and "the house-of-quality," a decision-making model that quantitatively estimates the integrated risk level is constructed. A mathematical model is proposed that allows the integrated risk to population and society in a transboundary river basin under geo-hydrological, economic, technological and social constraints to be mitigated.

Li, Geraldine M. 2009. Tropical cyclone risk perceptions in Darwin, Australia: A comparison of different residential groups. ***Natural Hazards*** **48 (3): 365-382.**
Different individuals and groups perceive risk differently. This can significantly affect risk management and mitigation practices and requirements. This paper presents findings from a study of tropical cyclone risk perceptions in the city of Darwin in the Northern Territory of Australia. Primary in-depth interview data and other secondary data are analyzed, focusing in particular on wind damage, storm surge, and life safety risk perceptions of residents since Cyclone Tracy—which struck in 1974—and perceptions of future climate change as it relates to tropical cyclone risk. The analysis reveals that a number of perceptions prevail. In particular, the study reveals a wide difference of perceptions between short-term residents (Group 1) and long-term and expert residents (Group 2) in relation to wind damage, storm surge and life safety risk. It also reveals a large division between laypersons (Group 3) and expert residents' (Group 4) perceptions of climate change risk as it relates to tropical cyclone risk. The author recommends that flexible, multiple and integrative management and mitigation approaches are required to deal with such different perceptions and divisions in the resident population.

Li, Yue, and Bruce R. Ellingwood. 2009. Framework for multihazard risk assessment and mitigation for wood-frame residential construction. ***Journal of Structural Engineering*** **135 (2): 159-168.**
Wood-frame residential construction represents a major

investment in the United States which, when exposed to hurricanes, earthquakes, and other natural hazards, may sustain substantial damage. Although in many parts of the country one natural hazard dominates, in certain areas multiple hazards may pose a significant threat to buildings. Building design and construction practices should address the overall risk to residential construction from multiple hazards to achieve design strategies and risk levels that are consistent with occupant expectations and social objectives. This paper presents a framework for multihazard risk assessment using hurricane and earthquake hazards as an example. Structural reliability-based methods that describe natural hazard and structural system response probabilistically are essential for quantifying expected losses from natural disasters and for developing appropriate strategies to manage risk. The framework permits the main sources of uncertainty that affect building performance to be identified, and provides insight on strategies for effective multihazard mitigation efforts.

Lin, Yi-Chun. 2009. Impact of the spread of infectious disease on economic development: A study in risk management. ***International Journal of Risk Assessment and Management*** **11 (3/4): 209-218.**
At the peak of the worldwide SARS epidemic, apprehension arising out of partially disclosed, if not concealed, information on the status has driven many foreign-based companies to withdraw their business in Taiwan or move their bases elsewhere. Normal trading, investment, and travel were suspended or came to a standstill. This paper traces the spread of SARS in Taiwan and the corresponding measures undertaken. Proposals on emergency action in crisis management are also made, which can serve as references for investors in risk control assessment.

Lopez-Vazquez, E. 2009. Risk perception and coping strategies for risk from Popocatépetl Volcano, Mexico. ***Geofisica International*** **48 (1): 133-147.**
The goal of this study is to explore risk perception and coping strategies used by adults living near the volcano Popocatépetl in Mexico. Qualitative and semi-quantitative data were collected with a questionnaire from 192 adult respondents. These respondents were divided into four groups (G1-G4) according to the risk zone in which they live (generally the degree of hazard decreases with increasing distances from the volcano). Analyses of the completed questionnaires were made according to sex and age range of the respondents. Not surprisingly volcanic risk was perceived as more worrisome by people living in the zone nearest the volcano's crater (G1). However, when asked what risks could affect them directly, perceptions changed, and volcanic risk was appraised as the most important risk potentially affecting them and their homes for risk zones G1, G2 and G3. Despite sporadic information given by the civil defense authorities, a high percentage of people exposed to volcanic hazards do not feel prepared to face an eruptive event, and people have no strategy to cope with general perceived risks. A high percentage of participants in the four groups stated that they would leave the area if an eruptive event occurred. This statement reflects the serious misinformation, because civil authorities do not require people living in the third and fourth zones to evacuate. The results of study demonstrate the critical need to reinforce public information campaigns regarding volcanic risk in communities vulnerable to direct damage in the event of a stronger eruption of the volcano Popocatépetl.

McGee, Tara K., Bonita L. McFarlane, and Jeji Varghese. 2009. An examination of the influence of hazard experience on wildfire risk perceptions and adoption of mitigation measures. ***Society and Natural Resources*** **22 (4): 308-323.**
Previous experience with a hazard has been identified as influencing risk perception and adoption of adjustments. However, this relationship is not clear and may depend on the differences in experiences that may occur within a community. This article describes residents' wildfire experiences and explores how these experiences may influence risk perceptions and implementation of mitigation measures one year after the 2003 Lost Creek and McLure wildfires in western Canada. Interviews were conducted with 40 residents with different wildfire experiences, including losing their home, being evacuated, self-evacuating early, staying in their house during a wildfire, and being away from the area. Results suggest that differences in hazard experiences can impact post-event risk perceptions and adoption of mitigation measures. Management implications are discussed.

Meyer, Volker, Sebastian Scheuer, and Dagmar Haase. 2009. A multicriteria approach for flood risk mapping exemplified at the Mulde River, Germany. ***Natural Hazards*** **48 (1): 17-39.**
This paper develops a GIS-based multicriteria flood risk assessment and mapping approach. This approach includes flood risks which are not measured in monetary terms. It shows the spatial distribution of multiple risks, and it is able to deal with uncertainties in criteria values to show their influence on the overall flood risk assessment. The approach demonstrates the spatial allocation of the flood effects if risk reduction measures are implemented. The approach is applied to a pilot study for the River Mulde in Saxony, Germany, heavily affected by the hazardous flood in 2002. A GIS database of economic, social, and environmental risk criteria was created. Two different multicriteria decision rules—a disjunctive and an additive weighting approach—are utilized for an overall flood risk assessment in the area. For implementation, a software tool (FloodCalc) was developed supporting both, the risk calculation of the single criteria as well as the multicriteria analysis.

Mosquera-Machado, Silvia, and Maxx Dilley. 2009. A comparison of selected global disaster risk assessment results. ***Natural Hazards*** **48 (3): 439-456.**
The authors compare country risk rankings derived from two recently published global disaster risk analyses. One set of country rankings is based on the Disaster Risk Index developed by the United Nations Environment Program Division of Early Warning and Assessment Global Resource Information Database project under a contract to the United Nations Development

Program. The other is based on an index of disaster mortality risk developed by the Global Natural Disaster Risk Hotspots project implemented by Columbia University, the World Bank and associated partners. The authors convert data from these sources into two comparable indexes of disaster mortality risk and rank countries according to the resulting values for a set of natural hazards common to both studies. The country rankings are moderately correlated, ranging from .41 to .56 for individual hazards to .31 for multi-hazard mortality risks. The authors identify the top 25 countries according to the mortality risk values recomputed from each study's results to show the degree to which countries are highly ranked in common. The numbers of countries common to both lists for individual hazards range from seven to 16 out of 25. The correspondence among the top 25 ranked countries is lowest for earthquakes and floods. Only six out of 25 countries are common to both lists in the multihazard case. The authors suggest that while the convergence in the results for some hazards is encouraging, more work is needed to improve data and methods, particularly with respect to assessing the role of vulnerability in the creation of risk and the calculation of multi-hazard risks.

Nathan, Fabien. 2008. Risk perception, risk management and vulnerability to landslides in the hill slopes in the city of La Paz, Bolivia: A preliminary statement. *Disasters* 32 (3): 337-357.

This article is drawn from preliminary findings of the author's PhD. Most of the results are still being analyzed and thus those discussed here are not definitive and are subject to revision. Conclusions have been drawn from almost two years fieldwork in the western hill slope of La Paz, using various techniques for data collection: constant participant observation with the inhabitants and their neighborhood representatives; in-depth interviews with more than 30 families at risk; informal interviews with other people at risk and with disaster victims; semi-directed interviews with dozens of 'old inhabitants' of the neighborhoods; in-depth interviews with dozens of "neighborhood presidents" and with many local authorities related to risk management; and analysis of documentation, maps, pictures, photographs, video collections, and other visual material. The in-depth interviews with people living with risk contained more than 120 questions; those related to risk, emergencies, and hazards were purposefully open-ended to see whether the theme appeared by itself in the interviewee's discourse and concerns. In this respect, the interview guide took into account advances in sociology, anthropology, and applied human security studies, focusing on what really mattered for the research subjects. This is a hybrid method combining the advantages of questionnaires, semistructured interviews, and life stories. It is adaptive and flexible but also allows for future statistical analysis.

Osuchowski, Monica. 2009. Bringing information management practices to natural disaster risk reduction. *The Australian Journal of Emergency Management* 24 (1): 53-59.

The important role of information management in improving baseline data for natural hazards has been demonstrated through a collaborative pilot project between Geoscience Australia, Mineral Resources Tasmania and the University of Wollongong. The result is a "virtual" landslide database that makes full use of diverse data across three levels of government and has enabled landslide data to be collated and accessed from a single source. Such a system establishes the foundation for a very powerful and coordinated information resource in Australia and provides a suitable basis for greater investment in data collection. This paper highlights the capacity to extend the methodology across all hazards and describes one solution in facilitating a sound knowledge base on natural disasters and disaster risk reduction.

Pfeifer, Christian. 2009. On probabilities of avalanches triggered by alpine skiers: An empirically driven decision strategy for backcountry skiers based on these probabilities. *Natural Hazards* 48 (3): 425-438.

Most fatal avalanche accidents in the Alps are caused by skiers and snowboarders. It has been one aim from the beginning to give guidelines for backcountry skiers to avoid avalanche accidents. About 10 years ago, the mountain guide Werner Munter developed a strategy for backcountry skiers advising whether or not to go on a skiing tour. His decision strategy lacked empirical evidence because he did not take into account incidents without avalanche accidents. This article proposes a decision strategy for backcountry skiers based on probabilities of a logistic regression model using variables, such as danger level, incline of the slope and aspect of the slope, which turned out to be the most important ones. Additional information on frequencies of skiers on slopes under specific conditions is included in the model. The authors used accident data and avalanche forecasts in Tyrol reported by the Tyrolean avalanche information service within three seasons (1999 to 2002, 497 days of observations) for model building. Additionally we carried out a holdout validation using data of the same type within two seasons (2002 to 2004, 314 days of observation) in order to check the accuracy of the model. Our proposal shows a remarkable correlation with Munter's method.

Saunders, Wendy, and Phil Glassey. 2009. Taking a risk-based approach for landslide planning: An outline of the New Zealand landslide guidelines. *The Australian Journal of Emergency Management* 24 (1): 32-38.

In December 2007, GNS Science released the publication 'Guidelines for assessing planning policy and consent requirements for landslide prone land' (Saunders & Glassey, 2007). Primarily for land use planners, the guidelines provide non-prescriptive guidance on how the landslide hazard can be incorporated into risk-based planning policy and consent requirements. Use of the guidelines is not a regulatory requirement, but is recommended as good, evidence-based practice. The guidelines propose a risk-based approach to land use planning and consenting, based on the Australian/New Zealand Risk Management Standard AS/NZS 4360:2004. This approach considers landslide recurrence interval, and a Building Importance Category of the building

proposed for a site. This approach does not guarantee that a building will not suffer damage from a landslide, but it does establish if the risk of damage is sufficiently low to be generally accepted. This paper is based on four planning principles: 1) gather accurate landslide hazard information; 2) plan to avoid landslide hazards before development and subdivision occurs; 3) take a risk-based approach in areas already developed or subdivided; and 4) communicate the risk of landslides in built-up areas. This paper provides an overview of this risk management process presented in the guidelines, and how it can be utilized by land use planners, based on the above four overarching planning principles.

Sjoberg, Lennart, and Britt-Marie Drottz-Sjoberg. 2009. Public risk perception of nuclear waste. ***International Journal of Risk Assessment and Management*** **11 (3/4): 248-280.**
Nuclear waste has emerged as a very salient issue in the nuclear power debate. In the present study, a broad range of risk perception and attitude dimensions concerned with nuclear waste was investigated. It was found that most respondents from the general public were not willing to accept a local high-level nuclear waste repository in their home region. Nuclear waste was seen by the public as a very important issue. Regression analysis of perceived nuclear waste risk yielded a high level of explained variance (about 65 percent). Fear of radiation appeared to be an important determinant of the perceived risk and so was attitude to nuclear power, risk sensitivity, and a pooled measure of the traditional psychometric dimensions of risk perception. A structural equations model of acceptance of a local repository was quite successful in explaining acceptance.

Somers, Scott, and James H. Svara. 2009. Assessing and managing environmental risk: Connecting local government management with emergency management. ***Public Administration Review*** **69 (2): 181-193.**
Ensuring that a community is prepared to deal with a disaster is among the many tasks public managers are charged with addressing. Disaster preparedness and response requires adherence to standard planning practices, yet disasters are typically unpredictable. Dealing with disasters, therefore, requires a blend of traditional management skills and improvisation. Furthermore, like other aspects of administrative leadership, the top administrator must blend initiation and responsiveness in interactions with elected officials and a careful delineation of responsibility in handling actual emergencies. This article discusses how local administrators assess risk and balance preparedness needs within a universe of daily operational needs. Managing environmental risk is also explored from a political and legal context.

Turoff, Murray, Starr Roxanne Jiltz, Connie White, Linda Plotnick, Art Hendela, and Xiang Yao. 2009. The past as the future of emergency preparedness and management. ***International Journal of Information Systems for Crisis Response and Management*** **1 (1): 12-28.**
Emergency preparedness, planning, and response suffer from shortcomings that impede the potential for effectiveness. This article provides an overview of emergency preparedness and management, including insights into the shortcomings of current practices, a discussion of relevant theories (e.g., High Reliability Organizations, muddling through), and recommendations to promote more effective planning, management, and response. The recommendations include system support for the principles of High Reliability Organizations and muddling through, rethinking risk analysis to have a longer-term view. They reflect more than just monetary loss, creating ways to better inform and involve the public, and encouraging collaboration and collective intelligence through such means as a dynamic Delphi voting system.

Technological Hazards

Doocy, Shannon, Amy Daniels, and Daniel Aspilcueta. 2009. Mortality and injury following the 2007 Ica earthquake in Peru. ***American Journal of Disaster Medicine*** **4 (1): 15-22.**
This paper quantifies earthquake injury and mortality from the 2007 Ica earthquake in Peru and assesses earthquake-related risk and vulnerability. The design was a population-based cluster survey of households in the region most affected by the quake. A stratified cluster survey design was used to allow for comparison between urban, peri-urban, and rural areas, where different outcomes were anticipated as a result of variation in building practices and access to post-earthquake assistance. A total of 42 clusters of 16 households were planned to allow for comparison between the location types and to ensure adequate spatial coverage. The four affected provinces are in southern Peru: Ica, Pisco, Chincha, and Canete. A total of 672 randomly selected households with a combined population of 3,608 individuals, of which 3,484 (97 percent) were reported as household members on the day of the earthquake. Mortality and injury rates in the four most affected provinces were estimated at 1.4 deaths per 1,000 exposed (95 CI: 0.5-3.3) and 29 injuries per 1,000 exposed (95 CI: 6-52). Older adults and members of households of lower socioeconomic status faced increased risk of injury. No significant differences in injury rates were observed between rural, urban, and peri-urban residence areas. Populations of lower socioeconomic status faced increased risk of injury. However, no differences in injury rates were observed between rural, urban, and peri-urban communities. Study findings suggest that earthquake preparedness and mitigation efforts should focus on population subgroups of lower socioeconomic in both rural and urban areas of earthquake-prone regions.

Eisenman, David P., Qiong Zhou, Michael Ong, Steven Asch, Deborah Glik, and Amy Long. 2009. Variations in disaster preparedness by mental health, perceived general health, and disability status. ***Disaster Medicine and Public Health Preparedness*** **3 (1): 33-40.**
Chronic medical problems, mental illness, and disability increase vulnerability to disasters. National efforts have focused on preparing people with disabilities. Studies find them to be increasingly prepared, but less is known about people with chronic mental and medi-

cal illnesses. The authors examined the relationship between health status (mental health, perceived general health, and disability) and disaster preparedness (home disaster supplies and family communication plan). A random digit-dial telephone survey of the Los Angeles County population was conducted from October 2004 to January 2005 in 6 languages. Separate multivariate regressions modeled determinants of disaster preparedness, adjusting for sociodemographic covariates then sociodemographic variables and health status variables. Only 40.7 percent of people who rated their health as fair/poor have disaster supplies compared with 53.1 percent of those who rate their health as excellent ($P < 0.001$). Only 34.8 percent of people who rated their health as fair/poor have an emergency plan compared with 44.8 percent of those who rate their health as excellent ($P < 0.01$). Only 29.5 percent of people who have a serious mental illness have disaster supplies compared with 49.2 percent of those who do not have a serious mental illness ($P < 0.001$). People with fair/poor health remained less likely to have disaster supplies (adjusted odds ratio [AOR] 0.69, 95 percent confidence interval [CI] 0.500.96) and less likely to have an emergency plan (AOR 0.68, 95 percent CI 0.510.92) compared with those who rate their health as excellent, after adjusting for the sociodemographic covariates. People with serious mental illness remained less likely to have disaster supplies after adjusting for the sociodemographic covariates (AOR 0.67, 95 percent CI 0.480.93). Disability status was not associated with lower rates of disaster supplies or emergency communication plans in bivariate or multivariate analyses. Finally, adjusting for the sociodemographic and other health variables, people with fair/poor health remained less likely to have an emergency plan (AOR 0.66, 95 percent CI 0.480.92) and people with serious mental illness remained less likely to have disaster supplies (AOR 0.67, 95 percent CI 0.470.95). People who report fair/poor general health and probable serious mental illness are less likely to report household disaster preparedness and an emergency communication plan. The results could add to our understanding of why people with preexisting health problems suffer disproportionately from disasters. Public health may consider collaborating with community partners and health services providers to improve preparedness among people with chronic illness and people who are mentally ill.

Nakamura, Karen. 2009. Disability, destitution, and disaster: Surviving the 1995 Great Hanshin Earthquake in Japan. *Human Organization* 68 (1): 82-88.

On the morning of January 17, 1995, a magnitude 7.3 earthquake struck the port city of Kobe, Japan. 6,400 people died and over $80 billion in property damage occurred. Among those rendered homeless was a small group of people with severe disabilities. Over the next decade, this group leveraged discourses surrounding civil society, disability, poverty, and the role of government in natural disasters, to become one of the most powerful and vocal proponents of disability rights in Japan. This article discusses what lessons can we learn to make disability advocacy a leading, rather than trailing, element of social policy.

Tornado

Schmidlin, Thomas W., Barbara O. Hammer, Yuichi Ono, and Paul S. King. 2009. Tornado shelter-seeking behavior and tornado shelter options among mobile home residents in the United States. *Natural Hazards* 48 (2): 191-201.

Residents of 401 mobile homes in Georgia, Mississippi, Illinois, and Oklahoma were surveyed after they heard a tornado warning. Most residents (69 percent) did not seek shelter during the warning. Half of those who sought shelter went to the frame house of a friend, neighbor, or relative, and 25 percent of those sought shelter in a basement or underground shelter. Some of the places where residents sought shelter were of dubious quality, such as their own mobile home, another mobile home, or in an out-building. Twenty-one percent of mobile home residents believed that they had a basement or underground shelter available as shelter during a tornado warning, and about half of those said they would drive to the shelter. Residents said they would drive if the shelter was more than 200 meters away. Fifteen percent actually had a basement or underground shelter suitable as shelter within 200m of their mobile home, but only 43 percent of the residents would use those shelters. The most common reason cited for not using the shelters was that they did not know the people who lived there. Likewise, a frame house or other sturdy building was within 200m of 58 percent of the mobile homes, but only 35 percent of the residents stated they would use those houses for shelter. Thirty-one percent of mobile home residents had a ditch that was at least 0.5m deep within 200m of the mobile home. However, 44 percent of these ditches had utility lines overhead, 23 percent had water in them, and 20 percent had trees overhead. The limited tornado shelter options among mobile home residents in the United States needs to be incorporated into safety instructions so that residents without nearby shelter are allowed to drive to safer shelter.

Tsunami

Bhushan, Braj, and J. Sathya Kumar. 2009. Emotional distress and posttraumatic stress in children: The impact of direct versus indirect exposure. *Journal of Loss and Trauma* 14 (1): 35-45.

This study examined whether familiarity with the physical environment and verbal/pictorial exposure to a tsunami also induced posttraumatic stress symptoms in adolescents. The Impact of Event Scale (IES) and Pediatric Emotional Distress Scale (PEDS) were administered to 231 subjects (130 directly exposed and 101 indirectly exposed). The directly exposed group scored high on the IES and PEDS. A significant sex difference was observed on all three dimensions of the IES, and fearful and traumatic event-related dimensions of PEDS, with females at a higher risk compared to males. In the indirectly exposed group, no sex difference was observed for the IES (avoidance and total impact score) or the fearful, acting out, or traumatic experience related dimensions of the PEDS. Significant sex differences were observed in this group on the IES intrusion and PEDS

withdrawal scores, with males higher on intrusion and females higher on withdrawal.

Heidarzadeh, Mohammad, Moharram D. Pirooz, Nasser H. Zaker, and Ahmet C. Yalciner. 2009. Preliminary estimation of the tsunami hazards associated with the Makran subduction zone at the northwestern Indian Ocean. ***Natural Hazards*** **48 (2): 229-243.**

The authors present a preliminary estimation of tsunami hazard associated with the Makran subduction zone (MSZ) at the northwestern Indian Ocean. Makran is one of the two main tsunamigenic zones in the Indian Ocean, producing some tsunamis in the past. The northwestern Indian Ocean remains one of the least studied regions in the world in terms of tsunami hazard assessment. Hence, a scenario-based method is employed to provide an estimation of tsunami hazard in this region for the first time. The numerical modeling of tsunami is verified using historical observations of the 1945 Makran tsunami. Then, a number of tsunamis each resulting from a 1945-type earthquake and spaced evenly along the MSZ are simulated. The results indicate that by moving a 1945-type earthquake along the MSZ, the southern coasts of Iran and Pakistan will experience the largest waves with heights of between 5 and 7 meters, depending on the location of the source. The tsunami will reach a height of about 5 m and 2 m in northern coast of Oman and eastern coast of the United Arab Emirates, respectively.

Jaiswal, R.K., A.P. Singh, and B.K. Rastogi. 2009. Simulation of the Arabian Sea Tsunami propagation generated due to 1945 Makran Earthquake and its effect on western parts of Gujarat (India). ***Natural Hazards*** **48 (2): 245-258.**

The 1945 tsunami generated due to Makran Earthquake in the Arabian Sea was the most devastating tsunami in the history of the Arabian Sea, causing severe damage to property and loss of life. The earthquake occurred on November 28, 1945, 21:56 UTC (03:26 IST) with a magnitude of 8.0, originating off the Makran Coast of Pakistan in the Arabian Sea. It impacted as far as Mumbai in India and was noticed up to Karvar Coast, Karnataka. More than 4,000 people were killed as a result of the earthquake and the tsunami. In this paper an attempt is made for a numerical simulation of the tsunami generation from the source, its propagation into the Arabian Sea, and its effect on the western coast of India through the use of a numerical model, referred to as Tsunami-N2. The present simulation is carried out for a duration of 300 minutes. It is observed from the results that the simulated arrival time of tsunami waves at the western coast of India is in good agreement with the available data sources. The paper also presents run-up elevation maps prepared using Shuttle Radar Topographic Mission (SRTM) data, showing the possible area of inundation due to various wave heights along different parts of the Gujarat Coast. These results will be useful in planning protection measures against inundation due to tsunami and in the implementation of a warning system.

Lee, A.C.K. 2008. Local perspectives on humanitarian aid in Sri Lanka after the tsunami. ***Public Health*** **122 (12): 1410-1417.**

This article examines the impact of humanitarian aid from the perspective of local stakeholders in Sri Lanka following the tsunami disaster of December, 2004. Key informant and focus group interviews were conducted with tsunami survivors, community leaders, the local authorities, and aid workers. Collected data were analyzed using thematic analysis. Researchers found that aid aggravated social tensions and the lack of community engagement led to grievances. There was a perceived lack of transparency, beneficiary expectations were not always met, and it was difficult to match aid to needs. Rapid participatory approaches to obtain beneficiary feedback in post-disaster settings are possible but have limitations due to respondent bias. In order to mitigate adverse social impacts of their programs, humanitarian aid agencies need to better understand the context in which aid is delivered. Beneficiary feedback is essential in disaster planning and response so that disaster response can be better matched to the needs of beneficiaries.

Lommen, Mirian J.J., Angelique Sanders, Nicole Buck, and Arnoud` Arntz. 2009. Psychosocial predictors of chronic Post-Traumatic Stress Disorder in Sri Lankan tsunami survivors. ***Behavior Research and Therapy*** **47 (1): 60-65.**

This study aimed to determine whether psychological factors associated with Post-Traumatic Stress Disorder (PTSD) identified in Western samples generalize to low Social-Economical-Status (SES) populations in an underdeveloped Asian country. The study included 113 survivors of the 2004 tsunami on the south coast of Sri Lanka, recruited from four preschools and 10 villages for displaced persons. With logistic regressions the relations between interview-based PTSD diagnosis and psychological factors were assessed, controlling for putative confounders. Fifteen months post-trauma the prevalence of PTSD was 52.2 percent. Multivariate analyses indicated that negative interpretation of tsunami memories was significantly ($P < 0.005$) related to PTSD. Of the putative confounders, gender and (non-replaced) lost work equipment were related to current PTSD ($P < 0.05$). The results indicate that the relation between negative interpretation of trauma memories and PTSD is quite universal, suggesting that interventions focusing on this factor may be important in treatment of tsunami survivors who are suffering from chronic PTSD.

McAdoo, Brian, Andrew Moore, and Jennifer Baumwoll. 2009. Indigenous knowledge and the near field population response during the 2007 Solomon Islands tsunami. ***Natural Hazards*** **48 (1): 73-82.**

The magnitude 8.1 earthquake and subsequent tsunami killed 52 people when it hit the Solomon Islands on April 2, 2007. That number would have likely been higher were it not for the appropriate reaction of the indigenous coastal populations and a helpful physical geography. Buffering coral reefs reflected some wave energy back to sea, reducing the power of the wave. Hills a short distance behind the coastal villages provided accessible havens. Despite this beneficial

physiography, immigrant populations died at disproportionately high rates in comparably damaged areas because they did not recognize the signs of the impeding tsunami. The indigenous population of Tapurai, which lacks a steep barrier reef to reflect the incoming energy, experienced a much more powerful wave, and the population suffered heavy losses. Indigenous knowledge as an integral tool in basin wide tsunami warning systems has the potential to mitigate disasters in the near field. Community-based disaster management plans must be cognizant of educating diverse populations that have different understandings of their environment.

Nirupama, N. 2009. Analysis of the global tsunami data for vulnerability and risk assessment. ***Natural Hazards*** **48 (1): 11-16.**

Past tsunami observations are necessary for the assessment of tsunami risk and vulnerability. The U.S. National Geophysical Data Center has prepared the world's most comprehensive tsunami databases, with Web site listings for oceans, as well as the Caribbean, Mediterranean, Black Sea, Red Sea, and the Gulf of Mexico. The dataset goes back as far as the first century A.D. and lists events on a confidence rating scale of 0-4—zero being an erroneous entry and four being a definite tsunami. Based on these different geographical datasets, this study created a comprehensive global dataset that included only tsunamis with confidence ratings of 3-4, meaning either probable or definite. There geographic distinction in this database, nor is there distinction based on a tsunami's coastal impact strength. The simple and straightforward statistical analysis suggests almost complete randomness. With a few minor exceptions, no patterns useful for future tsunami predictions emerged.

Nirupama, N. 2009. Socio-economic implications based on interviews with fishermen following the Indian Ocean tsunami. ***Natural Hazards*** **48 (1): 1-9.**

The need of those affected by the devastating 2004 Indian Ocean tsunami to be heard led to a survey conducted in the tsunami-affected regions of India, including the southern states of Tamil Nadu, Kerala and Andhra Pradesh, and the Union Territory of Pondicherry. The 16-question survey was conducted in early 2005 by total of eight people working simultaneously. The results of 161 villages surveyed are reported here. Among many observations, the most prominent is the need for capacity building during the construction process, relocation and housing, and tsunami education and awareness.

Ruwanpura, Kanchana N. 2008. Temporality of disasters: The politics of women's livelihoods 'after' the 2004 tsunami in Sri Lanka. ***Singapore Journal of Tropical Georgraphy*** **29 (3): 325-340.**

The devastation caused by the 2004 Indian Ocean tsunami in Sri Lanka is represented as a "natural disaster." Yet the tsunami did not occur in a sociopolitical and historical vacuum. How people responded to the tsunami, the challenges of and attitudes to relocation and post-tsunami livelihoods were shaped by uneven development, social exclusion, and ethnonationalist war. All these responses are embedded in structures of gender, caste, class, and ethnicity. The tsunami brought to the forefront preexisting inequalities, showing up complexities in the temporality of disasters. Drawn from fieldwork in two coastal areas in the southern and eastern provinces, this paper shows how gendered structures within the local political economy influenced the ways that institutional actors as well as the displaced communities and women initially devised livelihood strategies. These reactions show how place matters as much as preexisting gendered political economy conditions and reveal the complex ways in which women continue to mediate and negotiate everyday responses in the aftermath of a "natural" disaster.

Volcano

Baxter, P.J., W.P. Aspinall, A. Neri, G. Zuccaro, R.J.S. Spence, R. Cioni, and G. Woo. 2008. Emergency planning and mitigation at Vesuvius: A new evidence-based approach. ***Journal of Volcanology and Geothermal Research*** **178 (3): 454-473.**

The infrequency of disasters from volcanic eruptions limits emergency planning and mitigation experience for such situations. As populations expand into areas of active volcanoes, the need for developing more robust methods of risk assessment and decision making in volcanic crises is increasing. Vesuvius, where thousands of people live in the shadow of one of the world's most dangerous volcanoes, is an example of the challenges caused by this dynamic. This article describes how evidence-based volcanology in EXPLORIS contributes to crisis planning and management for eruptions and long-term land use planning. An analytical approach enumerates and quantifies volcano hazards that influence risk. This challenge combined field data on the vulnerability of the built environment, humans in past volcanic disasters, and theoretical research on the volcano's state—including field evidence from previous eruptions and numerical simulation modeling of eruptive processes. An event tree for future eruption types, including probability and hypothetical casualty outcomes, was created using formal probabilistic reasoning under uncertainty and a decision analysis approach. For emergency planning purposes, likely eruption scenarios were derived from this event tree and elaborated on using geological and historical record. Modeling the impacts in these scenarios provide realistic assessments for disaster planning and show the potential risk benefit of mitigation—mainly timely evacuation and building and infrastructure protection. This work suggests risk-based methods could have an important role in volcanic crisis management.

Lopez-Vazquez, E. 2009. Risk perception and coping strategies for risk from Popocatépetl Volcano, Mexico. ***Geofisica International*** **48 (1): 133-147.**

The goal of this study is to explore risk perception and coping strategies used by adults living near the volcano Popocatépetl in Mexico. Qualitative and semi-quantitative data were collected with a questionnaire from 192 adult respondents. These respondents were divided into

four groups (G1-G4) according to the risk zone in which they live (generally the degree of hazard decreases with increasing distances from the volcano). Analyses of the completed questionnaires were made according to sex and age range of the respondents. Not surprisingly volcanic risk was perceived as more worrisome by people living in the zone nearest the volcano's crater (G1). However, when asked what risks could affect them directly, perceptions changed, and volcanic risk was appraised as the most important risk potentially affecting them and their homes for risk zones G1, G2 and G3. Despite sporadic information given by the civil defense authorities, a high percentage of people exposed to volcanic hazards do not feel prepared to face an eruptive event, and people have no strategy to cope with general perceived risks. A high percentage of participants in the four groups stated that they would leave the area if an eruptive event occurred. This statement reflects the serious misinformation, because civil authorities do not require people living in the third and fourth zones to evacuate. The results of study demonstrate the critical need to reinforce public information campaigns regarding volcanic risk in communities vulnerable to direct damage in the event of a stronger eruption of the volcano Popocatépetl.

Warnings & Evacuation

Ardalan, Ali, Kourosh Holakouie Naieni, Mohamad-Javad Kabir, Ali-Mohamad Zanganeh, Abbas-Ali Keshtkar, Mohamad-Reza Honarvar, Hanieh Khodaie, and Mehdi Osooli. 2009. Evaluation of Golestan Province's early warning system for flash floods, Iran, 2006-2007. ***International Journal of Biometeorology*** **(ePub).**
Golestan, a province located in northeastern Iran, is well known for deadly flash floods. This study evaluated the region's early warning system (EWS) for flash floods using an adapted version of the questionnaire developed by the United Nations International Strategy for Disaster Reduction (UNISDR). Golestan EWS documents were reviewed and a qualitative study using interviews of experts and affected people in Kalaleh and Minoodasht, was conducted. Results were discussed by an expert panel. Risk knowledge included a hazard map at the Provincial Disaster Taskforce (PDT), although no risk analysis was available. Local people were aware of exposure to flooding, but not aware of the hazard map or their vulnerability. In terms of monitoring and warning, PDT faced serious limitations in issuing early warnings, including the inability to make point predictions of rainfall or create a warning threshold. Meteorological Office communications followed a top-to-bottom flow and messages were not clearly understood by institutions, nor did they reach potential recipients in an appropriate time frame. A comprehensive response plan with adequate exercises was needed and no evaluation framework existed. Golestan EWS is in dire need of improvement. To fill in the gaps and ensure local people receive timely warnings, the authors propose a community-based model called Village Disaster Taskforce (VDT), in which individual villages act as operational units but are interlinked with other villages and the PDT.

Baxter, P.J., W.P. Aspinall, A. Neri, G. Zuccaro, R.J.S. Spence, R. Cioni, and G. Woo. 2008. Emergency planning and mitigation at Vesuvius: A new evidence-based approach. ***Journal of Volcanology and Geothermal Research*** **178 (3): 454-473.**
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Broz, Dita, Elise C. Levin, Amy P. Mucha, Darlene Pelzel, William Wong, Victoria Persky, and Ronald C. Hershow. 2009. Lessons learned from Chicago's emergency response to mass evacuations caused by Hurricane Katrina. ***American Journal of Public Health*** **99 (8): 1-9.**
This article analyzes the response of the Chicago Department of Public Health with respect to its effectiveness in providing health care to Hurricane Katrina evacuees arriving in the city. Between September 12 and October 21, 2005, researchers conducted a real-time qualitative assessment of a medical unit in Chicago's Hurricane Victim Welcome and Relief Center. A semi-structured guide was used to interview 33 emergency responders to identify key operational successes and failures. The medical unit functioned at a relatively high level, primarily as a result of the flexibility, creativity, and dedication of its staff and the presence of strong leadership. Chronic health care services and prescription refills were the most commonly mentioned services provided, and collaboration with a national pharmacy proved instrumental in reconstructing medication histories. The lack of a comprehensive and well-communicated emergency response plan resulted in several preventable inefficiencies. Findings highlight the need

for improved planning for care of evacuee populations after a major emergency event and the importance of ensuring continuity of care for the most vulnerable. The article provides an emergency response preparedness checklist for local public health departments.

Gerber, Elaine. 2009. Describing tragedy: The information access needs of blind people in emergency-related circumstances. *Human Organization* 68 (1): 73-81.
Audio description is a technique used for "translating" visual material to aural readers/blind people. In this article, exploratory research on audio description (AD) is presented, which raises important questions in the field of applied anthropology and emergency planning: How does one translate visual material for a non-seeing audience? From the point of view of blind consumers, what constitutes "good" description? What specific information access needs do they have in event of emergencies? Selected results are presented from three telephone focus groups on AD, conducted with 39 blind or visually impaired people nationwide in the United States during September and October 2005. This paper addresses emergency planning, audio description, and the need for more accurate information access for blind people during public warning broadcasts and in delivering the news. Further, it examines existing guidelines for the inclusion of blind people in the provision of emergency information, concluding that successful emergency preparedness must include first-hand expertise of disabled people themselves.

Hahn, Erin, and Adrian Wilairat. 2009. Alien concept: The propriety of conducting immigration paperwork checks during evacuations. *Journal of Emergency Management* 7 (1): 13-18.

Hamilton, Douglas R., Thomas F. Gavagan, Kieran T. Smart, Lori A. Upton, Nancy F. Weller, Umalr A. Shah, Avirm Fishkind, David Persse, Paul Shank, and Kenneth Mattox. 2008. Houston's medical disaster response to Hurricane Katrina: Part 1: The initial medical response from Trauma Service Area Q. *Annals of Emergency Medicine* (ePub).
After Hurricane Katrina hit the Gulf Coast on August 29, 2005, thousands of ill and injured evacuees were transported to Houston, TX. Houston's regional disaster plan was quickly implemented, leading to the activation of the Regional Hospital Preparedness Council's Catastrophic Medical Operations Center and the rapid construction of a 65-examination-room medical facility within the Reliant Center. A plan for triage of arriving evacuees was quickly developed and the Astrodome/ Reliant Center Complex megashelter was created. This article discusses major elements of the regional disaster response, including regional coordination, triage and emergency medical service transfers into the region's medical centers, medical care in population shelters, and community health challenges.

Hamilton, Douglas R., Thomas F. Gavagan, Kieran T. Smart, Lori A. Upton, Nancy F. Weller, Umalr A. Shah, Avirm Fishkind, David Persse, Paul Shank, and Kenneth Mattox. 2008. Houston's medical disaster response to Hurricane Katrina: Part II: Transitioning from emergency evacuee care to community health care. *Annals of Emergency Medicine* (ePub).
After Hurricane Katrina hit the Gulf Coast on August 29, 2005, thousands of ill and injured evacuees were transported to Houston, TX. Houston's regional disaster plan was quickly implemented, leading to the activation of the Regional Hospital Preparedness Council's Catastrophic Medical Operations Center and the rapid construction of a 65-examination-room medical facility within the Reliant Center. A plan for triage of arriving evacuees was quickly developed and the Astrodome/ Reliant Center Complex mega-shelter was created. Herein, we discuss major elements of the regional disaster response, including regional coordination, triage and emergency medical service transfers into the region's medical centers, medical care in population shelters, and community health challenges.

Jaiswal, R.K., A.P. Singh, and B.K. Rastogi. 2009. Simulation of the Arabian Sea Tsunami propagation generated due to 1945 Makran Earthquake and its effect on western parts of Gujarat (India). *Natural Hazards* 48 (2): 245-258.
The 1945 tsunami generated due to Makran Earthquake in the Arabian Sea was the most devastating tsunami in the history of the Arabian Sea, causing severe damage to property and loss of life. The earthquake occurred on November 28, 1945, 21:56 UTC (03:26 IST) with a magnitude of 8.0, originating off the Makran Coast of Pakistan in the Arabian Sea. It impacted as far as Mumbai in India and was noticed up to Karvar Coast, Karnataka. More than 4,000 people were killed as a result of the earthquake and the tsunami. In this paper an attempt is made for a numerical simulation of the tsunami generation from the source, its propagation into the Arabian Sea, and its effect on the western coast of India through the use of a numerical model, referred to as Tsunami-N2. The present simulation is carried out for a duration of 300 minutes. It is observed from the results that the simulated arrival time of tsunami waves at the western coast of India is in good agreement with the available data sources. The paper also presents run-up elevation maps prepared using Shuttle Radar Topographic Mission (SRTM) data, showing the possible area of inundation due to various wave heights along different parts of the Gujarat Coast. These results will be useful in planning protection measures against inundation due to tsunami and in the implementation of a warning system.

McAdoo, Brian, Andrew Moore, and Jennifer Baumwoll. 2009. Indigenous knowledge and the near field population response during the 2007 Solomon Islands tsunami. *Natural Hazards* 48 (1): 73-82.
The magnitude 8.1 earthquake and subsequent tsunami killed 52 people when it hit the Solomon Islands on April 2, 2007. That number would have likely been higher were it not for the appropriate reaction of the indigenous coastal populations and a helpful physical geography. Buffering coral reefs reflected some wave energy back to sea, reducing the power of the wave. Hills a short distance behind the coastal villages

provided accessible havens. Despite this beneficial physiography, immigrant populations died at disproportionately high rates in comparably damaged areas because they did not recognize the signs of the impeding tsunami. The indigenous population of Tapurai, which lacks a steep barrier reef to reflect the incoming energy, experienced a much more powerful wave, and the population suffered heavy losses. Indigenous knowledge as an integral tool in basin wide tsunami warning systems has the potential to mitigate disasters in the near field. Community-based disaster management plans must be cognizant of educating diverse populations that have different understandings of their environment.

McGee, Tara K., Bonita L. McFarlane, and Jeji Varghese. 2009. An examination of the influence of hazard experience on wildfire risk perceptions and adoption of mitigation measures. *Society and Natural Resources* 22 (4): 308-323.

Previous experience with a hazard has been identified as influencing risk perception and adoption of adjustments. However, this relationship is not clear and may depend on the differences in experiences that may occur within a community. This article describes residents' wildfire experiences and explores how these experiences may influence risk perceptions and implementation of mitigation measures one year after the 2003 Lost Creek and McLure wildfires in western Canada. Interviews were conducted with 40 residents with different wildfire experiences, including losing their home, being evacuated, self-evacuating early, staying in their house during a wildfire, and being away from the area. Results suggest that differences in hazard experiences can impact post-event risk perceptions and adoption of mitigation measures. Management implications are discussed.

Smith, Stanley K., and Chris McCarty. 2009. Fleeing the storm(s): An examination of evacuation behavior during Florida's 2004 hurricane. *Demography* 46 (1): 127-145.

The 2004 hurricane season was the worst in Florida's history, with four hurricanes causing at least 47 deaths and some $45 billion in damages. To collect information on the demographic impact of those hurricanes, this study surveyed households throughout the state and in the local areas that sustained the greatest damage. It is estimated that one-quarter of Florida's population evacuated prior to at least one hurricane. In some areas, well over one-half of the residents evacuated at least once, and many evacuated several times. Most evacuees stayed with family or friends and were away from home for only a few days. Through logistic regression analysis, the study found that the strength of the hurricane and the vulnerability of the housing unit had the greatest impact on evacuation behavior; additionally, several demographic variables had significant effects on the probability of evacuating and the choice of evacuation lodging (family/friends, public shelters, or hotels/motels). With continued population growth in coastal areas and the apparent increase in hurricane activity caused by global warming, threats posed by hurricanes are rising and this study will help government officials plan more effectively for future hurricane evacuations.

Zhao, C.M., S.M. Lo, and S.P. Zhang. 2009. A post-fire survey on the pre-evacuation human behavior. *Fire Technology* 45 (1): 71-95.

A delay in the pre-evacuation reaction may be one reason causing occupants to be "trapped" in a dangerous zone. In fire situations, people behave differently. Some may evacuate immediately, some may ignore the fire alarms and continue their activities, and others may help fight the fire. These behavioral reaction patterns are influenced by factors such as occupant characteristics, building characteristics, and fire characteristics. This study investigates the pre-evacuation behavior of occupants in a fire and explores the associations between these factors and human behavior. To obtain the human behavioral information in real fire, a post-fire survey for a multistory office building fire in a major city in mainland China was carried out with the assistance of local fire professionals. Some factors that might influence the occupants' actions at recognition and response stages were examined. Behavioral reaction at recognition and response stage was mainly dependent on the human characteristics and building characteristics. The results also implied that pre-evacuation time was typically influenced by the occupant characteristics.

Wildfire

Bates, Benjamin R., Brian L. Quick, and Aaron A. Kloss. 2009. Antecedents of intention to help mitigate wildfire: Implications for campaigns promoting wildfire mitigation to the general public in the wildland-urban interface. *Safety Science* 47 (3): 374-381.

This investigation sought to examine the association between knowledge of the causes of wildfire in the wildland-urban interface (WUI) and intentions on the part of members of the public to help mitigate wildfire. In doing so, antecedents from the theory of planned behavior were employed to enhance our understanding of the relationships among wildfire knowledge, attitudes, subjective norms, perceived behavioral control, and intention to help mitigate wildfire in the WUI. Participants (N = 408) living in the WUI in Appalachian, Ohio were sampled as a means of conducting formative research prior to developing messages promoting wildfire mitigation. Results reveal that, among the variables in the theory of planned behavior, the only paths that consistently explain individual's intention to help mitigate wildland fire in the WUI in protecting both homes and the environment are associations between knowledge about wildfire and perceived behavioral control and between perceived behavioral control and intention. Findings are discussed with a focus on message design for wildland fire mitigation professionals and a focus on implications for the theory of planned behaviors for academics with interests in wildland fire and other environmental issues.

Byrne, Gerry. 2009. I-Zone planning: Supporting frontline firefighters. *The Australian Journal of Emergency Management* 24 (1): 17-24.

This paper focuses on bushfires that impact on the built environment in the bushland-urban interface or I-Zone.

These fires are transitional by nature with the fuel source of the fire changing from vegetation to structural, as the fire travels from a bushfire prone area to an urban area. It is this transitional nature that causes the greatest challenges for a largely urban fire service such as the NSW Fire Brigades. A simple definition of an interface area is "any area where structures (whether residential, industrial, recreational or agricultural) are located adjacent to or among combustible (bushland) fuels" (Cottrell, 2005:110). NSW Fire Brigades use I-Zone as an abbreviated term for any bushland urban interface.

Hine, Brian, Mark Stephens, and Bob Flett. 2009. The Wildfire Project: An integrated spatial application to protect Victoria's assets from wildfire. ***The Australian Journal of Emergency Management*** **24 (1): 25-31.**

This paper provides an overview of the Wildfire Project undertaken by Victoria's Office of the Emergency Services Commissioner in collaboration with Spatial Vision Innovations Pty Ltd, the Country Fire Authority, the Department of Sustainability and Environment, and the Municipal Association of Victoria. The Wildfire Project provides an opportunity to bring together the best quality statewide datasets to identify, classify, quantify and value the state's economic, environmental and social assets to assist fire management planners to enhance their capability to plan for, respond to, and recover from wildfire, using a standard set of online statewide spatial information products.

Lein, James K., and Nicole I. Stump. 2009. Assessing wildfire potential within the wildland-urban interface: A southeastern Ohio example. ***Applied Geography*** **29 (1): 21-34.**

Spreading cities and suburbs remain a common phenomenon throughout the United States. Urban spread, and the desire to move beyond the subdivision for a more natural setting in the country, creates both opportunities and challenges for natural resource managers. Perhaps no challenge is as great as those related to wildfire risk within the lands describing the urban-wildland interface. The need to gain a better understanding of the wildland-urban interface is critical to policy makers charged with risk reduction responsibilities. This paper develops a methodology that characterizes the spatial distribution of wildfire risk potential in southeastern Ohio, using a geospatial technology solution to model critical hazard and risk variables associated with wildfire. The results demonstrate that the association of wildfire with hazard and risk variables can be exploited to improve wildfire potential mapping and a validation assessment of the geographic information systems (GIS)-based prescriptive model displays a strong agreement with the pattern of historic wildfire for the region.

McGee, Tara K., Bonita L. McFarlane, and Jeji Varghese. 2009. An examination of the influence of hazard experience on wildfire risk perceptions and adoption of mitigation measures. ***Society and Natural Resources*** **22 (4): 308-323.**

Previous experience with a hazard has been identified as influencing risk perception and adoption of adjustments. However, this relationship is not clear and may depend on the differences in experiences that may occur within a community. This article describes residents' wildfire experiences and explores how these experiences may influence risk perceptions and implementation of mitigation measures one year after the 2003 Lost Creek and McLure wildfires in western Canada. Interviews were conducted with 40 residents with different wildfire experiences, including losing their home, being evacuated, self-evacuating early, staying in their house during a wildfire, and being away from the area. Results suggest that differences in hazard experiences can impact post-event risk perceptions and adoption of mitigation measures. Management implications are discussed.

Preston, B.L., C. Brooke, T.G. Measham, T.F. Smith, and R. Gorddard. 2009. Igniting change in local government: Lessons learned from a bushfire vulnerability assessment. ***Mitigation and Adaptation Strategies for Global Change*** **14 (3): 251-283.**

Local governments and communities have a critical role to play in adapting to climate variability and change. Spatial vulnerability assessment is one tool that can facilitate engagement between researchers and local stakeholders through the visualization of climate vulnerability and the integration of its biophysical and socio-economic determinants. This has been demonstrated by a case study from Sydney, Australia, where a bushfire vulnerability assessment was undertaken as the first step in a project to investigate local government perceptions of climate vulnerability and adaptive capacity. A series of relevant biophysical and socioeconomic indicators was identified that represented the region's exposure, sensitivity, and adaptive capacity with respect to bushfires. These indicators were then combined to develop maps of net landscape vulnerability to bushfire. When presented in a workshop setting, vulnerability maps were successful in capturing the attention of stakeholders while simultaneously conveying information about the diversity of vulnerability contributors. Stakeholders, however, were reluctant to embrace representations of vulnerability that differed from their own understanding of hazard, necessitating the demonstration of agreement between the vulnerability assessment and more conventional hazard assessment tools. This validation opened the door for public dissemination of vulnerability maps, the use of the assessment in local government risk planning, and more focused case studies on barriers to adaptation.

Sherrah, Meryl. 2009. A fresh approach to development assessment in Bushfire Protection Areas. ***The Australian Journal of Emergency Management*** **24 (1): 11-16.**

In late 2006 and 2007, changes were made to the planning and building requirements for new dwellings to be built in certain identified bushfire risk areas of South Australia. The changes affected 39 councils located throughout SA, including Eyre Peninsula, Yorke Peninsula, Kangaroo Island, the South-East, the Riverland, Murray Bridge, mid-North, Mt. Lofty Ranges and parts of the metropolitan Adelaide region. Under the changes, parts of these councils have now been designated as Bushfire Protection Areas. Each of these areas has been thoroughly assessed and categorized

into one of three bushfire risk levels—high bushfire risk, medium bushfire risk, or general bushfire risk. There are also areas which are "excluded." Different planning and building requirements now apply depending on the designated level of bushfire risk. The Department of Planning and Local Government has prepared an online search tool to assist people in identifying whether a particular property in the 39 councils is in a Bushfire Protection Area and the property's assigned bushfire risk. A web mapping application to assist in development assessment in Bushfire Protection Areas has also been produced for Country Fire Service and council staff involved in development assessment. The development of the online search tool and the web mapping application was funded under the Natural Disaster Mitigation Program and has received Australian and State Government financial support.

Trainor, Sarah F., Monika Calef, David Natcher, F. Stuart Chaplin, A. David McGuire, Orville Huntington, Paul Duffy, T. Scott Rupp, La'Ona DeWilde, Nancy Fresco, and Amy Lauren Lovecraft. 2009. Vulnerability and adaptation to climate-related fire impacts in rural and urban interior Alaska. ***Polar Research*** **28 (1): 100-118.** This paper explores whether fundamental differences exist between urban and rural vulnerability to climate-induced changes in the fire regime of interior Alaska. It examines how communities and fire managers have responded to these changes and what additional adaptations could be put in place. It also engages a variety of social science methods, including demographic analysis, semi-structured interviews, surveys, workshops, and observations of public meetings. This work is part of an interdisciplinary study of feedback and interactions between climate, vegetation, fire, and human components of the boreal forest social-ecological system of interior Alaska. Findings show that although urban and rural communities in interior Alaska face similar increased exposure to wildfire as a result of climate change, important differences exist in their sensitivity to these biophysical, climate-induced changes. In particular, reliance on wild foods, delayed suppression response, financial resources, and institutional connections vary between urban and rural communities. These differences depend largely on social, economic, and institutional factors, and are not necessarily related to biophysical climate impacts per se. Fire management and suppression action motivated by political, economic, or other pressures can serve as unintentional or indirect adaptation to climate change. However, this indirect response alone may not sufficiently reduce vulnerability to a changing fire regime. More deliberate and strategic responses may be required, given the magnitude of the expected climate change and the likelihood of an intensification of the fire regime in interior Alaska.

Wind Storm, Winter Storm, Lightning, Other Severe Storms

Bissell, Richard A., Andrew Bumbak, Matthew Levy, and Patrick Echebi. 2009. Long-term global threat assessment: Challenging new roles for emergency managers. ***Journal of Emergency Management*** **7 (1): 19-37.** Based on currently available published data and literature from multiple disciplines, this article introduces medium- and long-term global developments and changes that will likely impact human society in disastrous or even catastrophic fashion, with significant impact on the roles and challenges of emergency managers. Some of the phenomena described include the following: (1) loss of fresh water, (2) significant sea level rise with resultant flooding, (3) increased heat leading to desertification and crop losses, (4) storms that are both more frequent and more violent, (5) massive food emergencies as crops fail for lack of water and/or saltwater inundation, (6) loss of the petroleum-based economy, and (7) massive population relocations on a level the world has never experienced. The perspective used is global, in that the trends described do not respect political boundaries. We also recognize that mitigation and response activities may well involve many nations simultaneously. The article concludes with suggestions of steps emergency management should take in preparing to serve new and more complex tasks to meet coming challenges, and a "call to action" for emergency managers to assume a more active role in confronting the risks imposed by forces that are now underway.

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