Research Digest

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

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All Hazards

Bayrak, Tuncay. 2009. Identifying requirements for a disaster monitoring system. ***Disaster Prevention and Management*** **18 (2): 86-99.**

The importance of disaster monitoring and response systems increased in recent years because of an increase in the numbers of deaths, the numbers of people affected by disasters, and their devastating impacts on human life, economy and environment. These systems have the potential to significantly reduce losses from natural disasters. This study proposes a model which may be valuable to state and federal agencies, public sector managers and administrators, system analysts, trainers in disaster management, researchers and practitioners involved in disaster and emergency response studies, managers of police, fire, and ambulance systems, and mayors and governors. Its main objective is to identify and define three sets of factors that might be useful for designing a disaster monitoring and response system. First, a literature (meta) analysis is presented using academic research. The method was mainly based on a review of the scientific literature. The paper then identifies three sets of factors that may be employed when designing disaster monitoring and response systems. Findings reveal that the successful operation of an organization that hosts a disaster monitoring system requires that operators and computers work together. While the model itself in this study is not all-inclusive, an issue that deserves to be looked into is what role other technical, human, and organizational factors play in system performance.

Berke, Philip R., Yan Song, and Mark Steven. 2009. Integrating hazard mitigation into new urban and conventional developments. ***Journal of Planning Education and Research.***

The twentieth century model of the sprawling metropolis has fostered a massive buildup of highly vulnerable development. "New Urbanism" has emerged to counter many of the societal ills of sprawl, but

there is growing concern about placing this compact urban form in harm's way. Using 33 matched pairs of new urban and conventional low-density developments the authors examine how well new urban developments located in hazardous areas incorporate hazard mitigation techniques. Findings indicate that New Urban developments are compounding the growing risk to hazards by potentially adding higher density development than in the past. The authors recommend changes in new urban model codes, and public policy that places more emphasis on mitigation through comprehensive planning.

Chen, Nong, and Ajantha Dahanayake. 2009. Role-based, situation-aware information seeking and retrieval service design approach for crisis response. ***International Journal of Information Systems for Crisis Response and Management 1*** **(3): 19-55.**
Crisis response involves handling information intensive processes, and the coordination of large quantities of information from and for different relief-response organizations. The information needs and responses of these organizations are closely related to the situations and roles these organizations are involved in during a crisis relief-response process. The information seeking and retrieval processes associated with crisis situations influence the effectiveness of response vigor and the coordination of relief-response activities. To provide an effective solution for a European main port's crisis response needs, a role-based, situation-aware information seeking and retrieval conceptual framework is formulated. The conceptual framework, the design approach, and the implementation of a prototype are presented as an approach to design future crisis response information seeking and retrieval services.

Cross, John A. 2009. Teaching hazards by geographers: A decade of change. ***Environmental Hazards Human and Policy Dimensions*** **8 (1): 70-85.**
This paper reviews the status of college-level hazards courses and updates the findings of a survey conducted a decade earlier. The surveys sought information regarding hazards courses taught by geographers throughout the United States and Canada. Instructors were asked whether they emphasized physical or social aspects of hazards, what specific physical hazards and human response topics are considered, and what hazards models or paradigms are discussed, among other topics. Information was gathered about the instructors' education and their involvement in hazards research. The majority of instructors altered their courses in response to Hurricane Katrina, yet an emphasis upon the physical aspects of hazards continued in courses. Only slight changes were noted in coverage of many physical and social aspects of hazards. Discussion of models of human response to hazards decreased over the decade. Textbooks are increasingly authored by geologists. Geographers who are actively engaged in hazards research, as shown by graduate theses and dissertations, publication of journal articles reporting hazards research, presentation of hazards papers at professional meetings, membership in AAG hazards specialty groups, and subscriptions to Natural Hazards Observer, significantly differ from other instructors in their approaches to teaching hazards geography coursework. They typically spend more class time discussing social aspects of hazards and human response models in their classrooms.

Doberstein, Brent. 2009. Post-disaster assessment of hazard mitigation for small and medium magnitude debris flow disasters in Bali, Indonesia and Jimani, Dominican Republic. ***Natural Hazards*** **50 (1): 361-377.**
This article explores whether past exposure to debris flow disasters with a human dimension (e.g., caused in part by deforestation) results in adaptive hazard mitigation and improved environmental and resource management practices in affected areas. When guiding hazard mitigation practice, the "adaptive hazard mitigation" approach views mitigation as a multidimensional experiment, with the associated need for post-experiment monitoring, evaluation, learning, adjustment, and attention paid to multiple scales (Bogardi 2004). This article explores how the concept of adaptive hazard mitigation has emerged, linking this "adaptive management" used increasingly in resource and environmental management. Two case studies of disasters linked to human-induced environmental change are examined, and the mitigation responses of local communities, nongovernmental organizations, and government agencies are documented. Data sources include secondary data (journal articles, web-based disaster reports and gray literature) on each disaster, key informant interviews (n = 8) and direct observation over the 2005-2006 period of postdisaster mitigation actions implemented after each disaster. The research indicates that in both case studies, a limited range of hazard mitigation actions was employed, including both structural and nonstructural approaches. However, the research also found that causal factors involving human-induced environmental change (e.g., deforestation) were not addressed and, overall, the hazard mitigation strategies adopted lacked monitoring, learning and adjustment. In both case studies, responses to disaster were judged to be examples of "trial-and-error" adaptation, rather than either "passive" or "active" adaptation.

Duffy, Neil. 2009. Natural hazards education in Australian schools: How can we make it more effective?

Australian Journal of Emergency Management **24 (2): 13-16.**
Most of Australia's emergency management authorities have developed and implemented some type of education program for youth. Generally, these programs are delivered through schools. Even though these activities have the potential to build community resilience to natural hazards, some may not be as effective as they could be. This article provides guidelines to improve the effectiveness of school natural hazard programs and identifies further research required through program evaluation.

Elwood, Alan. 2009. Using the disaster crunch/release model in building organizational resilience. ***Journal of Business Continuity and Emergency Planning 3*** **(3): 241-247.**
Systems or process models aim to simplify a specific problem by isolating the major influencing factors (although at the expense of other factors). In so doing, they enable their users to predict how systems or processes will behave as those preselected criteria alter. They are of course limited, as they do not fully represent reality, and their effectiveness degrades as social phenomena are included. Nonetheless, they are helpful in guiding understanding. The field of organizational resilience already boasts certain models, such as the cultural web and the 7Cs of crisis management. This paper argues that other models from related fields can aid resilience planning. In particular the paper takes the crunch/release model for disaster management, and explores how a model developed to assist with the management of major emergencies in nation-states can help organizations to build resilience. The paper describes the model, then adapts it to the tangible, intangible and social or cohesive factors of organizational resilience. By using this model to understand these resilience components, organizations can gain clarity on what ultimately determines their own resilience levels and how best to enhance that resilience.

Ganewatta, Gaminda, and John Handmer. 2009. The value of volunteers in State Emergency Services. ***Australian Journal of Emergency Management*** **24 (2): 26-32.**
This paper presents estimates of the economic value of volunteers in the State Emergency Services (SES) of New South Wales, Victoria and South Australia. The value is based on the value of the time provided by volunteers. The estimates are based on a detailed survey conducted on volunteer time allocation, and data on the activities of SES volunteers over several years in NSW, Victoria and South Australia. The authors used two methods for valuing time: the "global substitution" method where an average wage rate is used to value all activities, and the "task specific substitution" method where each task is valued at its market wage rate. The value of volunteer time given for community services, operational response, training and unit management averaged around A$52 million, $19 million and $12 million a year in NSW, Victoria and South Australia respectively. They also extended the analysis by counting the standby time of volunteers to present a complete picture of the value of time volunteers contributed to the State Emergency Services. The addition of standby time greatly increases the value of the time provided.

Hassel, Henrik, Henrik Tehler, and Marcus Abrahamsson. 2009. Evaluating the seriousness of disasters: An empirical study of preferences. ***International Journal of Emergency Management*** **6 (1): 33-54.**
In making societal decisions concerning hazards with potentially disastrous consequences, it is important to have sound knowledge of how people evaluate the seriousness of disasters. In this study, a group of students evaluated the seriousness of disasters in terms of four basic attributes (and their ranges): number of fatalities (0-1000), number of serious injuries (0-4000), economic loss (SEK 0-40 billion), and cause of the disaster (natural, accidental, terrorism). Attribute weights were elicited by two separate methods, which taken together provide insight into the uncertainty of the elicited weights. Most participants regarded the attributes related to physical harm (especially the number of fatalities) as most serious, a finding that must be seen in relation to the ranges of the attributes. In addition, the cause of a disaster also affected many of the participants' judgments of its seriousness. This paper's findings are of value to societal decision making, particularly in the case of small to medium-sized projects in which specific elicitations of stakeholders' values are rarely made.

Hecker, Edward J., and Andrew J. Bruzewicz. 2009. Emergency management international: Improving national and international disaster preparedness and response. ***International Journal of Emergency Management*** **5 (3/4): 250-260.**
Since 1998, the US Army Corps of Engineers has been responsible for managing activities of the Civil Military Emergency Preparedness program, in Europe and Central Asia. CMEP supports international partner nation's national and regional strategies related to disaster preparedness and consequence management for all hazards, including the development and exercise of national and regional plans. The use of available technologies including the Internet, remote sensing and GIS, and reliable civil-military planning processes, are key program components. More than 55 seminars, workshops, and table top exercises have occurred since the program's inception. In 2005, USACE developed Emergency Management International, a program designed to provide CMEP a broader range of USACE expertise globally. This paper explains these programs and provides a review of their evolution and services offered. It examines the necessary conditions for effective disaster planning, preparedness, and response for large disasters requiring national and international coordination and cooperation, and examples of techniques used and outcomes of CMEP activities. The paper concludes with a discussion of a proposed approach to addressing all hazards responses for oil-related disasters in Africa.

Hurst, Jessica L., and Jessica P. George. 2009. Preparing communications: The critical integration of faith-based organizations into emergency planning and response. *Journal of Emergency Management* 7 (3): 11-20.

This article discusses the paradigm shift that is taking place in emergency management planning with regard to the integration of faith-based organizations in federal, state, and local preparedness, response, and recovery efforts. It also explores potential legal issues related to government funding and support of faith-based emergency planning among faith-based organizations to fully utilize the unique knowledge these groups have of the needs of their communities.

Kapucu, Naim. 2009. Interorganizational coordination in complex environments of disasters: The evolution of intergovernmental disaster response systems. *Journal of Homeland Security and Emergency Management* 6 (1).

This article evaluates the Federal Response Plan (FRP), the National Response Plan (NRP), and the National Response Framework (NRF) from the perspectives of interorganizational networks and complex adaptive systems. It uses the theoretical approach of complexity theory and dynamic network analysis to assess the relationships among organizations using the NRP/NRF as the structure that shapes their functional and organizational relationships. It also examines the applicability of concepts from complexity science for emergency and crisis management, to the evolution of NRP/NRF from the earlier FRP. The article uses the network analysis method in evaluating changes from FRP to NRF. The network analysis results demonstrate increases in complexity in the disaster and crises response and recovery plans over time.

Li, Hua, George E. Apostolakis, Joseph Gifun, William VanSchalkwyk, Susan Leite, and David Barber. 2009. Ranking the risks from multiple hazards in a small community. *Risk Analysis* 29 (3): 438-456.

Natural hazards, human-induced accidents, and malicious acts have caused great losses and disruptions to society. After September 11, 2001, critical infrastructure protection has become a national focus in the United States and is likely to remain one for the foreseeable future. Damage to the infrastructures and assets could be mitigated through pre-disaster planning and actions. A systematic methodology was developed to assess and rank the risks from these multiple hazards in a community of 20,000 people. It is an interdisciplinary study that includes probabilistic risk assessment, decision analysis, and expert judgment. Scenarios are constructed to show how the initiating events evolve into undesirable consequences. A value tree, based on multi-attribute utility theory, is used to capture the decision maker's preferences about the impacts on the infrastructures and other assets. The risks from random failures are ranked according to their expected performance index, which is the product of frequency, probabilities, and consequences of a scenario. Risks from malicious acts are ranked according to their PI, since the frequency of attack is not available. A deliberative process is used to capture the factors that could not be addressed in the analysis and to scrutinize the results. This methodology provides a framework for the development of a risk-informed decision strategy. Although this study uses the Massachusetts Institute of Technology campus as a case study, it is a general methodology that could be used by other similar communities and municipalities.

Porfiriev, Boris. 2009. Community resilience and vulnerability to disasters: Qualitative models and megacities—a comparison with small towns. *Environmental Hazards Human and Policy Dimensions* 8 (1): 23-37.

This paper contrasts the resilience to disasters of megacities with small towns, using vulnerability as a key variable. As an instrument of this comparison a formal model of the communities' vulnerability, further deconstructed into a set of specific modules, is developed and used. It is argued that the megacities' high resilience capacity in the main ensures only a debilitating (although undoubtedly major) effect on them by disaster agents. Meanwhile, the impact on the small towns is often disastrous and sometimes turns into a real catastrophe with some communities totally devastated. However, this observation does not preclude some notable exceptions. To corroborate and highlight the key findings above, empirical data from the Russian experience of the late twentieth to early twenty-first centuries are provided, supplement by some international illustrations.

Rietjens, Sebastiaan J.H., Kirsten Verlaan, Thijs W. Brocades Zaalberg, and Sirp J. de Boer. 2009. Interorganizational communication in civil-military cooperation during complex emergencies: *A case study in Afghanistan. Disasters* 33 (3): 412-435.

This paper contributes to improved information management and exchange between humanitarian organizations and military agents in complex emergencies. A theoretical information management process model was developed and applied to the case of information management between International Security Assistance Force troops and humanitarian organizations such as Cordaid, DACAAR, and the International Office for Migration in Kabul, Afghanistan. Based on this analysis the main shortcomings and problems in each stage of the information management process were identified. These include a lack of structured information databases, the absence of identification of information needs, and an over-classification of documents by the military. Using a logical framework analysis, six major improvement tactics were developed, including the creation of more overlap in rotations of personnel, the specification of aims and tasks regarding information management, the improvement of skills and competences of personnel involved, and the introduction of regular joint civil-military evaluations.

Schlager, Edella, and Tanya Heikkila. 2009. Resolving water conflicts: A comparative analysis of interstate river compacts. *Policy Studies Journal* 37 (3): 367-392.
This paper examines compacts used by U.S. western states to engage in shared governance of interstate rivers. Compacts are viewed as inflexible, rigid governance structures incapable of responding to changing environmental and institutional settings because of the use of unanimity rules and the inability to directly regulate water users. Using data from a study of 14 western interstate river compacts this article examines this claim. In particular, it explores the response of compacts to water conflicts. Research finds that members of compacts, closely related water agencies, and compact governments are capable of responding to conflicts. To better understand this finding, the article identifies the conditions under which compacts are likely to address conflicts, as well as the types of conflict solutions compact governments adopted.

Tadele, Feleke, and Siambabala Bernard Manyena. 2009. Building disaster resilience through capacity building in Ethiopia. *Disaster Prevention and Management* 18 (3): 317-326.
Building institutional capacity to prevent, prepare for, and respond to disasters is among aspects emphasized in the Hyogo Framework for Action 2005-2015 to enhance the resilience of disaster-affected communities. Lessons from past programs could help the design and implementation of future capacity building interventions to make them both a means and an end in themselves in building disaster resilience of communities and nations. This paper explores the issues. Based on experiences and reports in institutional capacity building in Ethiopia, the authors find that institutional capacity building programs should adopt a non-intervention approach, using existing structures. Programs should be demand-driven and beneficiary-based rather than supply-driven. They should also be holistic and integrated, with coordination an important ingredient. Capacity building is a slow process. Unless all partners are willing to make a choice in favor of assessing and working, the holistic and integrated capacity building will struggle to make a lasting influence in reducing disasters and their impacts to Ethiopians. With capacity building being at the center of building community resilience, coordination by donors as well as government agencies is fundamental. The paper illuminates areas of good practice as well as complexities surrounding the delivery of the disaster resilience through capacity building and shows how governments, development, and humanitarian agencies are implicated.

Tilt, Bryan, Yvonne Braun, and Daming He. 2009. Social impacts of large dam projects: A comparison of international case studies and implications for best practice. *Journal of Environmental Management* 90 (3): S249-S257.
This paper applies the tool of social impact assessment to understand the effects of large dam projects on human communities. The authors draw upon data from two recent projects: the Lesotho Highlands Water Project in southern Africa, and the Manwan Dam, located on the upper Mekong River in southwestern China. These two cases allow us to examine the social impacts of large dam projects through time and across various geographical scales. They focus on a range of social impacts common to many large-scale dam projects, including: the migration and resettlement of people near the dam sites; changes in the rural economy and employment structure; effects on infrastructure and housing; impacts on non-material or cultural aspects of life; and impacts on community health and gender relations. By identifying potential impacts in advance of a large dam project, agencies and policy makers can make better decisions about which interventions should be undertaken, and how. We conclude our analysis with an overview of lessons learned from the case studies and suggestions for best practice in assessing the social impacts of large dams. Conducting proper social impact assessments can help to promote development strategies that address the most important concerns for local populations, enhancing the long-term sustainability of dam projects.

Tullos, Desiree. 2009. Assessing the influence of environmental impact assessments on science and policy: An analysis of the Three Gorges Project. *Journal of Environmental Management* 90 (3): S208-S223.
The need to understand and minimize negative environmental outcomes associated with large dams has both contributed to and benefited from the introduction and subsequent improvements in the Environmental Impact Assessment process. However, several limitations in the EIA process remain, including those associated with the uncertainty and significance of impact projections. These limitations are directly related to the feedback between science and policy, with information gaps in scientific understanding discovered through the EIA process contributing valuable recommendations on critical focus areas for prioritizing and funding research within the fields of ecological conservation and river engineering. This paper presents an analysis of the EIA process for the Three Gorges Project in China as a case study for evaluating this feedback between the EIA and science and policy. For one of the best-studied public development projects in the world, this paper presents an investigation into whether patterns exist between the scientific interest (via number of publications) in environmental impacts and (a) the identification of impacts as uncertain or priority by the EIA, (b) decisions or political events associated with the dam, and (c) impact type. This analysis includes the compilation of literature on TGP, characterization of ecosystem interactions and responses to TGP through a hierarchy of impacts, coding of EIA impacts as "uncertain" impacts that require additional study and "priority" impacts that have particularly high significance, mapping of an event chronology to relate policies, institutional changes, decisions about TGP as "events" that could influence the focus and intensity of scientific investigation, and analysis of

the number of publications by impact type and order within the impact hierarchy. From these analyses, it appears that the availability and consistency of scientific information limit the accuracy of environmental impact projections. These analyses also suggest a lack of direct feedback between the EIA process and emerging science, as indicated by the failure of literature to focus on issues related to the design and management of TGP, ultimately challenging the environmental sustainability of the project. While the EIA process has enormous potential for improving both the basic sciences and the planning and sustainability of hydropower development, important institutional changes need to occur for this potential to be realized. This paper concludes with recommendations about those institutional changes needed to improve the feedback between the science and policy, and ultimately the environmental sustainability, of large dams.

Business Continuity

Bierenbaum, Arnold B., Beth Neiley, and Craig R. Savageau. 2009. Importance of business continuity in health care. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S7-S9.**

Hoffmann, Volder, H., David C. Sprendel, Andreas Ziegler, Matthias Kolb, and Bruno Abegg. 2009. Determinants of corporate adaptation to climate change in winter tourism: An econometric analysis. ***Global Environmental Change*** **18 (2): 256-264.**
While corporate adaptation strategies in response to climate change have been characterized, the determinants of adaptation have not been comprehensively analyzed. Knowledge of these determinants is particularly useful for policy makers to provide favorable conditions in support of corporate adaptation measures. Based on unique data from a survey of Swiss ski lift operators, this paper empirically examines such determinants at the business level. The econometric analysis with linear regression and count data models finds a positive influence of the awareness of possible climate change effects on the scope of corporate adaptation. Surprisingly, no significant influence of the vulnerability to climate change effects on the scope of adaptation could be found. Finally, the dependency on the affected business and the ability to adapt influence the specific strategic directions of corporate adaptation.

Howie, Luke. 2009. A role for business in the war on terror. ***Disaster Prevention and Management*** **18 (2): 100-107.**
This paper presents research findings that improve our understanding of the role for business in the "War on Terror." It should assist managers in preparing their response to terrorism and the threat it poses to their business. It is not about examining counter-terrorism commodities or products. Rather, it examines management attitudes and techniques for creating images of security that work to reduce the risk of terrorism. Since research on terrorism and business is rare and often underdeveloped, this study contributes to our understanding of how businesses must confront and respond to terrorism. A brief exploration of the literature informs the research that was carried out in Melbourne, Australia, in 2005 with managers in organizations located in Melbourne's central business district. It comprised in-depth interviews of 40-60 minutes in length. In total, 12 managers were interviewed. Two key respondents emerged and their views are presented in this paper. The author argues that managers are compelled to engage in counter-terrorism in order to protect customers, clients, and the public. Yet counter-terrorism security is often not what it seems. When businesses are engaged in countering terrorism they are engaged in creating images of security.

Kemp, Chris. 2009. Event tourism: A strategic methodology for emergency management. ***Journal of Business Continuity and Emergency Planning*** **3 (3): 227-240.**
Threat and risk have both economic and environmental implications for tourism event settings. The threat of natural or man-made activity disrupting the transport, communications, or economic infrastructure of any civilization is a high priority in any cultural context. The delivery of analytical processes and assessment and management protocols related to threat and risk depends on a range of activities encompassed by intelligence and counterintelligence networks. These networks are supported by rigorous training and educational frameworks related to the staging of events, although one may argue that they are in part preceded by measures designed to aid disaster recovery and business continuity in the event of an emergency. The same aspects and parameters apply in event tourism, but are specifically focused on the context of the event as a tourism destination. Adapting an existing model, this paper combines existing best practice and supportive strategies with recent research to create a methodology based upon the three stages of an event: before, during, and after. In this manner it creates a strategic model which identifies issues and allows flexibility to support those in the tourism event industry.

Merz, Mirjam, Michael Hiete, and Valentin Bertsch. 2009. Multicriteria decision support for business conti-

nuity planning in the event of critical infrastructure disruptions. ***International Journal of Critical Infastructures*** **5 (1/2): 156-174.**
Industrial production sites and critical infrastructures (CIs) may be severely damaged by external events, such as manmade or natural hazards. Particularly, a disruption in the electricity supply may cause physical damages and production downtimes associated with substantial economic losses. Due to the tight interdependencies within the different CI sectors and the complex network structure of modern supply chains, these losses are, in most cases, not restricted to single companies. The resultant negative consequences may be propagated via cascading effects into far-off supply chain links. In order to reduce the negative consequences, speed up business recovery, and enhance the overall coping capacity of industrial production sites and global supply chains in the event of CI disruptions, many companies have implemented business continuity planning (BCP) programs. Within this study, we assess the negative impacts of CI disruptions on production industry and introduce a quantitative method for BCP from the field of multicriteria decision analysis to evaluate the potential BCP measures.

Rapaport, Carmit, and Alan Kirschenbaum. 2009. Business continuity as an adaptive social process. ***International Journal of Emergency Management*** **5 (3/4): 338-347.**
The authors argue that "business continuity" is primarily a social rather than an economic process. By examining the actual behavior of both managers and employees in work organizations during a crisis, they were able to better predict the organization's preparedness and ability to cope with disasters. This argument is based on evidence from a study completed during the 2006 Kityusha rocket bombardment of northern Israel and included 13 work organizations. The results point out that organizational response to a disaster includes a process of adaptation to new and changing conditions. On the one hand, the organizations' managers react according to their values, culture, and past experience. The day-to-day operations, however, are maintained as employees adapt their own behavior to the changing demands of the situation. The analysis further showed that although plans, drills, and emergency guidance are important to determine the desirable performance behaviors during the emergency, it was employees' adaptive behaviors that contributed to maintaining business operations. These adaptive work behaviors depended on a series of socially related predictors such as their past experience, family and community attitudes, and social networks at the workplace. Overall, the evidence demonstrates that successful business continuity is best predicted by a series of social processes, depending primarily on employees' ability to adapt to dynamic emergency situations.

Swanson, David A. 2009. Hurricane Katrina: A case study of its impacts on medical service providers and their client populations. ***Open Demography*** **2: 8-17.**
There is a great deal of literature in the areas of: (1) medical demography; (2) the effect of disasters on first responders; (3) measuring the immediate demographic and social effects of a disaster; and (4) the short- and long-term economic and financial effects of disasters. However, there is very little about the demographic effects of large-scale disasters on medical providers once rescue operations have been completed and operations move into the relief and recovery/rehabilitation phases associated with a disaster. This paper seeks to bridge this gap by providing a "recovery/ rehabilitation" case studY: estimates of the effects of Hurricane Katrina on the client populations and candidates for a specific medical procedure in the service areas associated with two medical facilities on the Mississippi gulf coast. The estimates presented here show that Katrina had a substantial demographic impact and that this translated into an adverse impact on the client base of both medical facilities. Although the results come from a single case study, they suggest that the effects of a disaster can have substantial impacts on medical care providers and their ability to continue business that goes well beyond physical damage. That is, the impact of demographic effects of a disaster on a client base can be more important than physical damage—a fact that does not appears to be widely recognized. The first step in effectively dealing with a disaster is the presence of a plan. It is typical of organizations to have both "disaster recovery" plans and "business continuation" plans. Given the long-term effects of Katrina on client populations found in this case study, it would be prudent that medical care providers include estimates of demographic impacts on their client populations in these plans, particularly in regard to the long-term "effects horizon" of a given disaster.

Vogel, Coleen. 2009. Business and climate change: Initial explorations in South Africa. ***Climate and Development*** **1 (1): 82-97.**
Climate change is one of a complex array of risks facing the planet and society. It is argued that adaptation to and mitigation of climate change will be required

to avert or reduce adverse impacts. Governments are developing climate change adaptation (CCA) strategies. The business community is also seeing to the need to adapt to and mitigate climate change, but progress has been slow, particularly in the case of adaptation. This paper explores emerging perceptions of the need for adaptation and some initial adaptation actions within a "business as usual" economic mode of operation. It also identifies constraints to further action among a cross-section of actors in the business community in South Africa. Data from semi-structured interviews and scrutiny of reports reveals that there are a number of constraints preventing business from engaging more fully in CCA. These findings correspond with findings in other business sector and CCA studies. They include: issues of terminology (adaptation versus risk management); uncertainty over climate change projections and scenarios; and concerns about how such information can be used effectively in decision making, particularly long-term business planning. Despite these challenges, some potential synergies between policy, planning, and the business community for promoting adaptation are suggested.

Climate Change, Drought & El Nino

Ayers, Jessica M., and Saleemul Huq. 2009. Development and climate change: A mainstreaming approach for assessing economic, social, and environmental impacts of adaptation measures. ***Environmental Management*** **43 (5): 765-778.**

The paper introduces the so-called climate change mainstreaming approach, where vulnerability and adaptation measures are assessed in the context of general development policy objectives. The approach is based on the application of a limited set of indicators. These indicators are selected as representatives of focal development policy objectives, and a stepwise approach for addressing climate change impacts, development linkages, and the economic, social, and environmental dimensions related to vulnerability and adaptation are introduced. Within this context it is illustrated how development policy indicators in practice can be used to assess climate change impacts and adaptation measures based on three case studies: a road project in flood prone areas of Mozambique; rainwater harvesting in the agricultural sector in Tanzania; and malaria protection in Tanzania. The paper concludes that climate risks can be reduced at relatively low cost, but uncertainty remains about some of the wider development impacts of implementing climate change adaptation measures.

———. 2009. The value of linking mitigation and adaptation: A case study of Bangladesh. ***Environmental Management*** **43 (5): 753-764.**

There are two principal strategies for managing climate change risks—mitigation and adaptation. Until recently, mitigation and adaptation have been considered separately in both climate change science and policy. Mitigation has been treated as an issue for developed countries, which hold the greatest responsibility for climate change, while adaptation is seen as a priority for the South, where mitigative capacity is low and vulnerability is high. This conceptual divide has hindered progress against the achievement of the fundamental sustainable development challenges of climate change. Recent attention to exploring the synergies between mitigation and adaptation suggests that an integrated approach could go some way to bridging the gap between the development and adaptation priorities of the South and the need to achieve global engagement in mitigation. These issues are explored through a case study analysis of climate change policy and practice in Bangladesh. Using waste-to-compost projects, a mitigation-adaptation-development nexus is demonstrated, as projects contribute to mitigation through reducing methane emissions; adaptation through soil improvement in drought-prone areas; and sustainable development, because poverty is exacerbated when climate change reduces the flows of ecosystem services. Further, linking adaptation to mitigation makes mitigation action more relevant to policymakers in Bangladesh, increasing engagement in the international climate change agenda in preparation for a post-Kyoto global strategy. This case study strengthens the argument that while combining mitigation and adaptation is not a magic bullet for climate policy, synergies, particularly at the project level, can contribute to the sustainable development goals of climate change and are worth exploring.

Bridges, K.W., and Will C. McClatchey. 2009. Living on the margin: Ethnoecological insights from Marshall Islanders at Rongelap atoll. ***Global Environmental Change*** **18 (2): 140-146.**

Pacific Islanders who live on atolls are among the first people who have begun to be seriously impacted by the effects of global climate change. These are the people whose entire landscape is typically no higher than one meter above sea level. Extreme environmental changes are nothing new to these communities. Over many generations these atoll cultures have survived major, unpredictable, and locally devastating changes of the same magnitude as those expected from climate changes. An examination of traditional ecological knowledge of Marshall Islanders at Rongelap atoll serves to illustrate some of the coping strategies that have enabled these people to be resilient in the past and in the current environmental crisis. Interviews revealed that these atoll dwellers actively manage the resources that are most likely to be impacted by climate change.

Bunce, Matthew, Laurence Mee, Lynda D. Rodwell, and Richard Gibb. 2009. Collapse and recovery in a remote small island: A tale of adaptive cycles or downward spirals? ***Global Environmental Change*** **19 (2): 213-226.**

The science of climate change is full of uncertainty, but the greater vulnerability of poor countries to the impacts of climate change is one aspect that is widely acknowledged. This paper adapts Dryzek's "components" approach to discourse analysis to explore the media construction of climate change and development in UK "quality" newspapers between 1997 and 2007. Eight discourses are identified from more than 150 articles, based on the entities recognized, assumptions about natural relationships, agents and their motives, rhetorical devices, and normative judgments. They show a wide range of opinions regarding the impacts of climate change on development and the appropriate action to be taken. Discourses concerned with likely severe impacts have dominated coverage in the Guardian and the Independent since 1997, and in all four papers since 2006. Previously discourses proposing that climate change was a low development priority had formed the coverage in the Times and the Telegraph. The classification of different discourses allows an inductive, nuanced analysis of the factors influencing representation of climate change and development issues; an analysis which highlights the role of key events, individual actors, newspaper ideology and wider social and political factors. Overall the findings demonstrate media perceptions of a rising sense of an impending catastrophe for the developing world that is defenseless without the help of the West, perpetuating to an extent views of the poor as victims.

Clifton, Helen, and Nancy J. Turner. 2009. "It's so different today": Climate change and indigenous lifeways in British Columbia, Canada. ***Global Environmental Change*** **19 (2): 180-190.**

Indigenous peoples of British Columbia have always had to respond to environmental change. Oral histories, recollections of contemporary elders, and terms in indigenous languages all reflect peoples' responses to such change, especially since the coming of Europeans. Very recently, however, many people have noted signs of greater environmental change and challenges to their resilience than they have faced in the past: species declines and new appearances; anomalies in weather patterns; and declining health of forests and grasslands. These observations and perspectives are important in discussions and considerations of global climate change.

Costa-Font, Joan, Elias Mossialos, and Caroline Rudisill. 2009. Optimism and the perceptions of new risks. ***Journal of Risk Research*** **12 (1): 27-41.**

While many risks, especially new ones, are not objectively quantifiable, individuals still form perceptions of risks using incomplete or unclear evidence about the true nature of those risks. In the case of well-known risks, such as smoking, individuals perceive risks to be smaller for themselves than others, exhibiting "optimism bias." Although existing evidence supports optimism bias occurring in the case of risks about which individuals are familiar, evidence does not yet exist to suggest that optimism bias applies for new risks. This paper addresses this question by examining the gap in perceptions of risks individuals have for themselves versus society and the environment, conceptualized as social and/or environmental optimism biases. The authors draw upon the 2002 UEA-MORI Risk Survey to examine the existence of optimism bias and its effects on risk perceptions and acceptance regarding five science- and technology-related topics: climate change, mobile phones, radioactive waste, genetically modified food, and genetic testing. Findings provide evidence of social and environmental optimism bias following similar patterns and optimism bias appearing greater for those risks bringing sizable benefit to individuals (e.g. mobile phone radiation) rather than those more acutely affecting society or the environment (e.g. GM food or climate change). Social optimism bias is found to reduce risk perceptions for risks that have received large amounts of media attention, namely, climate change and GM food. On the other hand, optimism bias appears to increase risk perceptions about genetic testing.

de Chazala, Jacqueline, and Mark D.A. Rounsevella. 2009. Land-use and climate change within assessments of biodiversity change: A review. ***Global Environmental Change*** **19 (2): 306-315.**

Projected changes in biodiversity are likely inadequately estimated when climate and land use change effects are examined in isolation. A review of studies of the effects of these drivers singly and in combination highlights little discussed complexities in revising these estimates. In addition to considering interactions, different characterizations of climate change, land use change, and biodiversity greatly influence estimates. Habitat loss leading to decreased species richness is the most common land use change and biodiversity relationship considered with less attention being given to other land use changes (e.g. other conversions, fragmentation, different management intensities) and biodiversity characterizations and responses (e.g. selected groups of species, increased species richness). Characterizations of more complex relationships among climate change, land use change, and biodiversity are currently limited by a lack of process understanding, data availability, and inherent scenarios uncertainties.

Debels, P., C. Szlafsztein, P. Aldunce, C. Neri, Y. Carvajal, M. Quintero-Angel, M. Bezanilla Celis, A., and D. Martýnez. 2009. IUPA: A tool for the evaluation of the general usefulness of practices for adaptation to climate change and variability. ***Natural Hazards*** **50 (1): 211-233.**

A prototype multipurpose index is proposed for use in the evaluation of practices for adaptation to climate variability and change. The Index of Usefulness of Practices for Adaptation allows the user to assign weights and scores to a set of user-defined evalua-

tion criteria. Individual criterion scores are aggregated into a final index value. Both the final value and the individual parameter scores provide useful information for improved decision making in the context of climate change. An innovative aspect of IUPA is that guidance is given to the user through the inclusion of recommendations on evaluation criteria and criterion-specific weight factors. These have been defined by a panel of experts from the Latin-American and Caribbean Region. Application of the index is demonstrated for an existing adaptation practice from the Coquimbo Region, Chile. The IUPA tool is recommended for use in the evaluation of adaptation practices in their design, implementation, and post-implementation phase. It is practical for a quick first assessment or when limited financial resources are available, making the tool especially useful for practitioners in the developing world. The index is flexible both from the perspective of its construction and use. Additional expert opinions can easily be included in the future versions of the tool.

Dolšak, Nives. 2009. Climate change policy implementation: A cross-sectional analysis. *Review of Policy Research* 26 (5): 551-570.

Why would countries invest resources to protect the global atmosphere, a global common pool resource? After all, this is an open-access resource with no restrictions on appropriating its benefits. Furthermore, why would they do so under the aegis of a weak global regime (the United Nations Framework Convention on Climate Change, UNFCCC) that has virtually no provisions for sanctioning noncompliance and when the largest contributor to the problem is not participating in the regime? This article examines why a number of countries have implemented the UNFCCC. This article hypothesizes that countries implement UNFCCC because they corner domestic environmental benefits, namely reduction in local pollution. An empirical analysis of 127 countries, employing an ordinal logistic regression model found that local air pollution is associated with higher levels of implementation of the UNFCCC. Thus, the article concludes that the incentives to implement a relatively weak global regime can be found in the domestic political economy.

Doulton, Hugh, and Katrina Brown. 2009. Ten years to prevent catastrophe?: Discourses of climate change and international development in the UK press. *Global Environmental Change* 19 (2): 191-202.

The science of climate change is full of uncertainty, but the greater vulnerability of poor countries to the impacts of climate change is one aspect that is widely acknowledged. This paper adapts Dryzek's "components" approach to discourse analysis to explore the media construction of climate change and development in UK "quality" newspapers between 1997 and 2007. Eight discourses are identified from more than 150 articles, based on the entities recognized, assumptions about natural relationships, agents and their motives, rhetorical devices and normative judgments. They show a wide range of opinions regarding the impacts of climate change on development and the appropriate action to be taken. Discourses concerned with likely severe impacts have dominated coverage in the Guardian and the Independent since 1997, and in all four papers since 2006. Previously discourses proposing that climate change was a low development priority had formed the coverage in the Times and the Telegraph. The classification of different discourses allows an inductive, nuanced analysis of the factors influencing representation of climate change and development issues; an analysis which highlights the role of key elements, individual actors, newspaper ideology and wider social and political factors. Overall the findings demonstrate media perceptions of a rising sense of an impending catastrophe for the developing world that is defenseless without the help of the West, perpetuating to an extent views of the poor as victims.

Flannigan, Mike D., Meg A. Krawchuk, William J. De Groot, Mike B. Wotton, and Lynn M. Gowman. 2009. Implications of changing climate for global wildland fire. *International Journal of Wildland Fire* 18 (5): 483-507.

Wildland fire is a global phenomenon, a result of interactions among climate, weather, fuels, and people. Our climate is changing rapidly, primarily through the release of greenhouse gases that may have profound and unexpected impacts on global fire activity. The present paper reviews the current understanding of what the future may bring with respect to wildland fire and discusses future options for research and management. To date, research suggests a general increase in area burned and fire occurrence but there is a lot of spatial variability, with some areas of no change or even decreases in area burned and occurrence. Fire seasons are lengthening for temperate and boreal regions and this trend should continue in a warmer world. Future trends of fire severity and intensity are difficult to determine owing to the complex and nonlinear interactions among weather, vegetation, and people. Improved fire data are required, along with continued global studies that dynamically include weather, vegetation, people, and other disturbances. Lastly, we need more research on the role of policy, practices, and human behavior. Most global fire activity is directly attributable to people.

Hallegatte, Stephanie. 2009. Strategies to adapt to an uncertain climate change. *Global Environmental Change* 19 (2): 240-247.

Many decisions concerning long-lived investments already need to take into account climate change. But doing so is not easy for at least two reasons. First, due to the rate of climate change, new infrastructure will have to be able to cope with a large range of changing climate conditions, which will make design more difficult and construction more expensive. Second, uncertainty in future climate makes it impossible to directly use the output of a single climate model as an input for infrastructure design, and there are good reasons to think that the needed climate information will not be available soon. Instead of optimizing based on the climate conditions projected by models, therefore, future infrastructure should be made more robust to possible changes in climate conditions. This aim implies that users of climate information must also change their

practices and decision-making frameworks, for instance by adapting the uncertainty-management methods they currently apply to exchange rates or research and development outcomes. Five methods are examined: (1) selecting "no-regret" strategies that yield benefits even in absence of climate change; (2) favoring reversible and flexible options; (3) buying "safety margins" in new investments; (4) promoting soft adaptation strategies, including long-term prospective; and (5) reducing decision time horizons. Moreover, it is essential to consider both negative and positive side effects and externalities of adaptation measures. Adaptation-mitigation interactions also call for integrated design and assessment of adaptation and mitigation policies, which are often developed by distinct communities.

Helferty, Anjali, and Amelia Clarke. 2009. Student-led campus climate change initiatives in Canada. ***International Journal of Sustainability in Higher Education*** **10 (3): 2009.**

This paper presents different types of student-led climate change initiatives, the roles students have played in these initiatives, and the implications for youth engagement in creating climate change solutions. It provides a comprehensive list of student-led, campus-based climate change initiatives, and offers details on many specific cases. The paper also documents the roles students have played and considers the larger youth engagement implications. Many of these initiatives can be replicated elsewhere, thereby providing a starting point for students wanting to begin an initiative or providing ideas for other campus stakeholders wanting to engage students in initiatives. Campus reports were collected by the Sierra Youth Coalition from 65 Canadian universities and colleges. This qualitative information was coded for student-led, climate-related initiatives, and for the roles students played in those initiatives. The patterns were identified and clustered, and are presented in this paper. Students were found to be successfully leading eight different types of campus climate change-related initiatives, both with the support of other campus stakeholders and without this support. Students were also found to be able to successfully take on a variety of types of leadership roles in these initiatives. Youth engagement ranged from socialization to influence to power, depending on the type of initiative. A limitation of this research is that only 65 of the approximately 227 colleges and universities in Canada participated. Also, it is possible that some schools may not have reported all student-led initiatives, or all the student roles. In addition, the data were limited to the 2007-2008 academic year, so is limited to the initiatives which occurred in that year.

Hoffmann, Volder, H., David C. Sprendel, Andreas Ziegler, Matthias Kolb, and Bruno Abegg. 2009. Determinants of corporate adaptation to climate change in winter tourism: An econometric analysis. ***Global Environmental Change*** **18 (2): 256-264.**

While corporate adaptation strategies in response to climate change have been characterized, the determinants of adaptation have not been comprehensively analyzed. Knowledge of these determinants is particularly useful for policy makers to provide favorable conditions in support of corporate adaptation measures. Based on unique data from a survey of Swiss ski lift operators, this paper empirically examines such determinants at the business level. The econometric analysis with linear regression and count data models finds a positive influence of the awareness of possible climate change effects on the scope of corporate adaptation. Surprisingly, no significant influence of the vulnerability to climate change effects on the scope of adaptation could be found. Finally, the dependency on the affected business and the ability to adapt influence the specific strategic directions of corporate adaptation.

Malka, Ariel, Jon A. Krosnick, and Gary Langer. 2009. The association of knowledge with concern about global warming: Trusted information sources shape public thinking. ***Risk Analysis*** **29 (5): 633-647.**

During the last decade, a great deal of news media attention has focused on informing the American public about scientific findings on global warming. Has learning this sort of information led the American public to become more concerned about GW? Using data from two surveys of nationally representative samples of American adults, this article shows that the relation between self-reported knowledge and concern about GW is more complex than what previous research has suggested. Among people who trust scientists to provide reliable information about the environment, and among Democrats and Independents, increased knowledge has been associated with increased concern. But among people who are skeptical about scientists and among Republicans more knowledge was generally not associated with greater concern. The association of knowledge with concern among Democrats and Independents who trust scientists was mediated by perceptions of consensus among scientists about GW's existence and by perceptions that humans are a principal cause of GW. Moreover, additional analyses of panel survey data produced findings consistent with the notion that more knowledge yields more concern among Democrats and Independents, but not among Republicans. Thus, when studying the relation of knowledge and concern, it is important to take into account the content of the information that different types of people acquire and choose to rely upon.

Mertz, Ole, Kirsten Halsnæs, Jørgen E. Olesen, and Kjeld Rasmussen. 2009. Adaptation to climate change in developing countries. ***Environmental Management*** **43 (5): 743-752.**

Adaptation to climate change is being given increasing international attention as the confidence in climate change projections is getting higher. Developing countries have specific needs for adaptation due to high vulnerabilities, and they will in this way carry a great part of the global costs of climate change—even though the rising atmospheric greenhouse gas concentrations are mainly the responsibility of industrialized countries. This article provides a status review of climate change adaptation in developing countries. An overview of observed and projected climate change is given, and recent literature on impacts, vulnerability, and adapta-

tion are reviewed, including the emerging focus on mainstreaming of climate change and adaptation in development plans and programs. The article also serves as an introduction to the seven research articles of this special issue on climate change adaptation in developing countries. Although many useful steps have been taken in the direction of ensuring adequate adaptation in developing countries, much work still remains to fully understand the drivers of past adaptation efforts, the need for future adaptation, and how to mainstream climate into general development policies.

Meyerson, Frederick A.B., Laura A. Meyerson, and James K. Reaser. 2009. Biosecurity from the ecologist's perspective: Developing a more comprehensive approach. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 147-160.**
National planning for biological security should encompass more than just protection against biological weapons. Global forces such as the introduction and spread of invasive species (including emerging infectious diseases), in conjunction with population growth, climate change and sea level rise, also constitute threats to security. These linked biological and abiotic phenomena make the United States and other countries less secure by degrading ecosystems and ecosystem services, posting risks to human health and safety, and altering patterns of agriculture, settlement, migration, and economic opportunity. Several other countries already use a more comprehensive definition of biosecurity than the United States, one that includes biological threats to the environment, the economy, and human health and well-being. This article asserts that an expanded definition of biosecurity is necessary in a world undergoing rapid change due to altered climate, growing population and increased rates of trade, transport, and travel.

Mirfenderesk, Hamid. 2009. Flood emergency management decision support system on the Gold Coast, Australia. ***Australian Journal of Emergency Management*** **24 (2): 48-58.**
Gold Coast has long been rated as the most vulnerable area subject to flooding in Australia. In recent years there has been a growing concern worldwide about climate change impacts including sea level rise, increased frequency and severity of storms, and changes in rainfall patterns. An implication of these changes includes an increase in the risk of flooding. Future floods are more likely to overwhelm existing protection measures more frequently, exposing us to more residual risks. Addressing the issue of an increase in residual flood risk, Gold Coast City Council has been developing a flood emergency decision support system as part of a 10-year flooding and drainage plan. This system integrates the council's flood modeling capacity, properties, infrastructure, and population data into a single easy-to-use package. Using this system, emergency managers have access to valuable flood forecast information. The decision support system is designed mainly to assist in a post-disaster situation, although currently it is being used for predisaster flood emergency planning. As a postdisaster measure, it can identify vulnerable populations and assist in the evacuation of populations at risk. Its availability on the Internet allows it to be potentially used for implementation of flood emergency procedures by vulnerable places such as childcare and elderly care centers. This paper provides a description of the elements of the system that have been developed or implemented so far, provides a brief description of the elements that are planned for the future, makes recommendations on how such systems can be improved, and how these can contribute to better flood emergency management.

Nielsen-Arnbjerg, K., and H.S. Fleischer. 2009. Feasible adaptation strategies for increased risk of flooding in cities due to climate change. ***Water Science & Technology*** **60 (2): 273-281.**
Northern Europe is one of the regions where more frequent and more severe storms and storm surges are expected due to climatic changes. In order to maintain an acceptable risk of flooding, suitable adaptation strategies must be defined and implemented. Optimum solutions demand collaboration of different professionals and thus simple graphical means must be employed to illustrate the economic impacts of the change in risk of flooding. A case study indicates that urban drainage infrastructure capacity should be upgraded while there is currently no economic incentive to improve protection against sea surges.

Poston Jr., Dudley L., Li Zhang, David J. Gotcher, and Yuan Gu. 2009. The effect of climate on migration: United States, 1995–2000. ***Social Science Research*** **38 (3): 743-753.**
This paper examines the effect of climate on migration. It examines whether climate is an influential factor in internal migration. The authors assume that most persons tend to avoid exposure to bitter and cold winters, and excessively hot and humid summers, preferring climates between these extremes. When engaging in migration decision making, therefore, to the extent possible, considerations involving climate are believed to be brought into the calculus. There is a very limited demographic literature on the effects of climate on migration. This paper undertakes an aggregate-based analysis of the effect of climate on migration. It examines this relationship among the 50 states of the United States, focusing attention on the varying effects of climate on three migration measures for the 1995–2000 time period, namely, in-migration, out-migration, and net migration. It also evaluates the effect of climate on migration in the context of a broad application of human ecology. Here climate, a manifestation of the physical environment, is measured with three major independent variables. The other ecological predictors pertaining to organization, population, technology, and the social environment are used as controls. This allows the author to examine the effects of climate on migration in the context of competing ecological hypotheses.

Salick, Jan, and Anja Byg. 2009. Local perspectives on a global phenomenon: Climate change in Eastern Tibetan villages. ***Global Environmental Change*** **19 (2): 156-166.**
Tibetan villagers' perceptions of climate change and its impacts are very detailed and can give important insights into local concerns and processes of climate

change. Perceived climate changes and impacts differed significantly even within a small geographic area. Furthermore, climate change was seen as a moral and spiritual issue. These interpretations affect how people deal with climate change and its impacts and which solutions are regarded as relevant. In order to effectively address climate change impacts at the local scale and to enable the process of adaptation, it is necessary to address a combination of perceptions, local variations, moral and spiritual interpretations, and locally relevant solutions.

Sampei, Yuki Sampei, and Midori Aoyagi-Usui. 2009. Mass media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. ***Global Environmental Change*** **18 (2): 203-212.**
This article analyzes Japanese newspaper coverage of global warming from January, 1998 to July, 2007 and how public opinion during parts of that period were influenced by newspaper coverage. It shows that a dramatic increase in newspaper coverage of global warming from January, 2007 correlated with an increase in public concern for the issue. Before January, 2007, coverage of global warming had an immediate but short-term influence on public concern. With such transitory high levels of media coverage the authors suggest that for more effective communication of climate change, strategies aimed at maintaining mass media coverage of global warming are required.

Schipper, E. Lisa F. 2009. Meeting at the crossroads? Exploring the linkages between climate change adaptation and disaster risk reduction. ***Climate and Development*** **1 (1): 16-30.**
Adaptation to climate change and disaster risk reduction both focus on society-risk dynamics. However, each field does so through different actors and institutions, and with different time horizons, policy frameworks, and patterns in mind. Recently, dialogue between the adaptation and disaster risk-reduction communities has focused on creating stronger links between the two by putting greater effort into learning from each other and collaborating conceptually and practically. In part, this common interest has come from a simultaneous recognition that risk reduction requires a far more holistic approach than has previously been applied. Both adaptation and disaster risk reduction require the same underlying aims, namely, to reduce vulnerability and create sustainable and flexible long-term strategies to reduce the risk of adverse impacts. However, neither is able to address these single-handedly. In both adaptation and disaster risk reduction, there is an implicit acknowledgement that risk is part of everyday life, and thus social development plays a vital role. An outstanding question for these communities to address is whether a convergence of the two tracks is desirable. If such a convergence were to occur, what forms would it take and what outcomes could be expected?

Tadesse Deressa, Temesgen, Rashid M. Hassan, Claudial Ringler, Tekie Alemu, and Mahmud Yesuf. 2009. Determinants of farmers' choice of adaptation methods to climate change in the Nile Basin of Ethiopia. ***Global Environmental Change*** **18 (2): 248-255.**
This study identifies the major methods used by farmers to adapt to climate change in the Nile Basin of Ethiopia, the factors that affect their choice of method, and the barriers to adaptation. The methods identified include use of different crop varieties, tree planting, soil conservation, early and late planting, and irrigation. Results from the discrete choice model employed indicate that the level of education, gender, age, and wealth of the head of household; access to extension and credit; information on climate, social capital, agroecological settings, and temperature all influence farmers' choices. The main barriers include lack of information on adaptation methods and financial constraints.

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Vogel, Coleen. 2009. Business and climate change: Initial explorations in South Africa. ***Climate and Development*** **1 (1): 82-97.**
Climate change is one of a complex array of risks facing the planet and society. It is argued that adaptation to and mitigation of climate change will be required to avert or reduce adverse impacts. Governments are developing climate change adaptation (CCA) strategies. The business community is also seeing to the need to adapt to and mitigate climate change, but progress has been slow, particularly in adaptation. This paper explores emerging perceptions of the need for adaptation and initial adaptation actions within a "business as usual" economic mode of operation. It also identifies constraints to further action among a cross-section of actors in the business community in South Africa. Data from semi-structured interviews and scrutiny of reports reveals that there are a number of constraints preventing business from engaging more fully in CCA. These findings correspond with findings in other business sector and CCA studies. They include: issues of terminology (adaptation versus risk management); uncertainty over climate change projections and scenarios; and concerns about how such information can be used effectively in decision making, particularly long-term business planning. Despite these challenges, some potential synergies between policy, planning, and the business community for promoting adaptation are suggested.

Wernstedt, Kris, Patrick Roberts, and Matthew Dull. 2009. Can climate signals inform emergency management? Preliminary evidence. *Journal of Homeland Security and Emergency Management* 6 (1): ePub.
The emergency management community has widely discussed the long-term implications of global climate change for weather-related hazards such as floods, hurricanes, and droughts, but the community has paid relatively little attention to the connection between these hazards and shorter-term seasonal climate fluctuations (e.g., El Niño). This paper explores the potential for applying recent scientific and technical advances in the use of seasonal climate information to improve how emergency managers address such hazards risks and their associated disaster losses. The preliminary analysis presented here begins with a brief review of evidence from the research literature linking mid- and long-term forecasts to flood planning and management. The authors report on a small telephone survey of emergency managers involved in flood planning and management in 26 Oregon and Washington counties that experience interannual climate variation that can increase the frequency or intensity of flooding. Survey findings help illuminate the opportunities and obstacles for using climate science to inform emergency management. The authors then present results of a 2008 survey of emergency managers and educators that asks about the use of climate information for a wider range of weather-related hazards. They conclude by summarizing the opportunities for and obstacles to the use of climate information in emergency management.

Critical Infrastructure

Al-Nammari, Fatima M., and Michael K. Lindell. 2009. Earthquake recovery of historic buildings: Exploring cost and time needs. *Disasters* 33 (3): 457-481.
Disaster recovery of historic buildings has rarely been investigated even though the available literature indicates that they face special challenges. This study examines buildings' recovery time and cost to determine whether their functions (that is, their use) and their status (historic or non-historic) affect these outcomes. The study uses data from the city of San Francisco after the 1989 Loma Prieta earthquake to examine the recovery of historic buildings owned by public agencies and non-governmental organizations. The results show that recovery cost is affected by damage level, construction type, and historic status, whereas recovery time is affected by the same variables and also by building function. The study points to the importance of pre-incident recovery planning, especially for building functions that have shown delayed recovery. The study also calls attention to the importance of further investigations into the challenges facing historic building recovery.

Kajitani, Yoshio, and Shigeo Sagai. 2009. Modeling the interdependencies of critical infrastructures during natural disasters: A case of supply, communication and transportation infrastructures. *International Journal of Critical Infastructures* 5 (1/2): 38-50.
This paper introduces the methodological challenge of identifying and quantifying the interdependencies among several critical infrastructures. First, interdependency structures during a natural disaster are modeled based on past events, considering supply (electricity, water and gas), communication (Internet and telephone) and transportation infrastructures (road networks). Interdependencies are defined with respect to physical, functional and socioeconomic interrelationships. A quantification strategy is then introduced based on empirical surveys and economic models. As a case study, the developed model is applied to the 2004 Mid-Niigata Earthquake, which severely damaged infrastructure systems in the central mountainous area of Japan.

Merz, Mirjam, Michael Hiete, and Valentin Bertsch. 2009. Multicriteria decision support for business continuity planning in the event of critical infrastructure disruptions. *International Journal of Critical Infastructures* 5 (1/2): 156-174.
Industrial production sites and critical infrastructures (CIs) may be severely damaged by external events, such as manmade or natural hazards. Particularly, a disruption in the electricity supply may cause physical damages and production downtimes associated with substantial economic losses. Due to the tight interdependencies within the different CI sectors and the complex network structure of modern supply chains, these losses are, in most cases, not restricted to single companies. The resultant negative consequences may be propagated via cascading effects into far-off supply chain links. In order to reduce the negative consequences, speed up business recovery, and enhance the overall coping capacity of industrial production sites and global supply chains in the event of CI disruptions, many companies have implemented business continuity planning (BCP) programs. Within this study, we assess the negative impacts of CI disruptions on production industry and introduce a quantitative method for BCP from the field of multicriteria decision analysis to evaluate the potential BCP measures.

Sarriegi, Jose M., Fiinn O. Sveen, and Jose J. Gonzalez. 2009. Towards a research framework for critical infrastructure interdependencies. *International Journal of Emergency Management* 5 (3/4): 235-249.
Critical infrastructure (CI) interdependencies have important consequences for crisis management, particularly when the crises cross borders. However, research into CI interdependencies is still immature. The nature of large-scale, cross-border crises in these systems of systems is not easily understood. This article has identified several aspects that need to be investigated to gain a more complete understanding of the development of crisis in these systems. These aspects include the following: There is a need to understand CIs as interdependent elements of a complex system: Ever increasing interdependencies create new complexity; crises in CI are dynamically complex owing to the existence of significant time delays; there is a need for a long-term perspective; knowledge about CIs is fragmented and resides in many different stakeholders that need to be identified and brought together; there is a need for modeling techniques that can unite the fragmented CI

knowledge; there is a need to create effective training and communication tools to transfer insights to crisis managers, policy makers and the general public.

Schmitz, Walter. 2009. Simulation experiments: The emerging instruments for CIP. ***International Journal of Critical Infrastructures*** **5 (1/2): 5-23.**
Critical Infrastructures (CIs) are vital backbones of modern societies and are increasingly dependent upon Information Technology (IT) and communication networks. Due to the increasing IT penetration, CIs are more and more connected with each other, with advantages and disadvantages. Due to this interconnection, CIs can provide their services more cost effectively. On the other hand, in case of disturbances, their behavior cannot ever be mastered, as the extensive blackouts in the United States and Europe have shown. The increasing complexity and manifold conventional and emerging threats jeopardize the system of mutually dependent CIs. Critical Infrastructure Protection (CIP) attracts notice more and more from the public. Modeling and simulation expand now into the analysis and planning of processes and procedures of infrastructures. This paper gives an overview of the recent research in the field of CIP, where the EU project Integrated Risk Reduction of Information-based Infrastructure Systems is used as a role model.

Disaster & Emergency Management

Ajami, Sima, and Mahshid Fattahi. 2009. The role of earthquake information management systems (EIMSs) in reducing destruction: A comparative study of Japan, Turkey and Iran. ***Disaster Prevention and Management*** **18 (2): 150-161.**
The most important factor for a manager to be able to overcome a crisis depends on his or her readiness. The main objective of this study was to determine an earthquake information management system (EIMS) in Japan, Turkey and Iran and describe how it can reduce destruction by crisis management. The study was an analytical comparison in which data were collected by questionnaire, observation, and checklist. The subject was the EIMS in selected countries. Sources of information were staff in related organizations, scientific documentation, and the Internet. To analyze the findings, criteria rating technique, Delphi technique, and descriptive methods were used. Findings showed that the EIMSs in Japan, Turkey, and Iran are decentralized. The EIMS is called "Phoenix" in Japan, and "natural disaster management information system" or "AFAYBIS" in Turkey. In Iran there was not a useful and efficient EIMS to evaluate earthquake information. It is clear that an information system can only influence decisions if it is relevant, reliable, and available for the decision-makers in a timely fashion. Therefore, it is necessary to design a model that contains responsible organizations and their functions.

Alexander, David, Luca Bramati, and Massimo Simonetta. 2009. Emergency preparedness training and education in Lombardy Region, Italy: Survey of supply and demand. ***Natural Hazards Review*** **10 (3): 77-83.**
This paper reports on a survey of municipalities in the Italian region of Lombardy. A questionnaire was employed to ascertain the nature, objectives, and user base of emergency preparedness training courses, and also the scope of demand for additional training. It was commissioned by the Lombardy Advanced School of Civil Protection and administered by Ancitel Lombardia, the regional branch of the Italian Association of Municipal Governments. The paper describes the hazard situation in Lombardy, which is Italy's largest region and one of its most diverse and densely populated. It also delineates the organization of civil protection training and education at the regional level. The questionnaire is described and its results are presented with respect to different sectors of inquiry: emergency planning, the organization of local civil protection services, courses offered, training priorities, nature of the principal trainees, and projected role of the regional Advanced School. The results indicate strong future demand for training courses and a large number—nearly 600—of courses that are already offered. They also show a concentration on emergency response, and a secondary emphasis on emergency planning, especially as used to counter natural hazards. Student populations are largely envisaged to be municipal employees and volunteer civil protection workers. The survey reveals that the municipalities look to the regional government for support and guidance in the field of civil protection training.

Birkland, Thomas A. 2009. Disasters, catastrophes, and policy failure in the homeland security era. ***Review of Policy Research*** **26 (4): 423-438.**
The September 11, 2001, attacks triggered federal policy changes designed to influence emergency management in the United States, even though these attacks did not suggest a need for a wholesale restructuring of federal policy in emergency management. Instead, for several reasons, federal policy's emphasis on terrorism and emergency management significantly degraded the nation's ability to address natural disasters. The federal government sought to create a top-down, command and control model of emergency management that never fully accounted for, positively or normatively, the way local emergency management works in practice. The Obama administration will have to address the questions raised by the reorganization of federal emergency management responsibilities. While the context in which these changes have occurred is unique to the U.S. federal system, there are interesting implications for emergency management in nonfederal systems.

Borell, Jonas, and Kerstin Eriksson. 2009. Improving emergency response capability: An approach for strengthening learning from emergency response evaluations. International ***Journal of Emergency Management*** **5 (3/4): 324-337.**
The objectives of this study are to develop and demonstrate an approach to improve emergency response capability by strengthening individual and organizational learning from the evaluations of specific emergency responses. An approach was developed based on theories of individual and organizational learning. It was applied to evaluations of three instances of emergency response in the city of Malmö, Sweden. The findings

indicate that the approach can improve experience-based learning in organizations, improvING emergency response capability.

Brown, Christer, and Kerstin Eriksson. 2009. A plan for (certain) failure: Possibilities for and challenges of more realistic emergency plans. ***International Journal of Emergency Management*** **5 (3/4): 292-310.**
Calls for more robust societal emergency management capacities have grown shriller as the range of societal vulnerabilities widens. The development of workable plans is recognized as one means to increase capacity. However, skepticism persists that plans serve any significant function in guiding organizational emergency management. Plans nevertheless remain a de facto requirement for most organizations. Plans serve to reassure the organizations, policy makers, and the public that they are capable of managing emergencies. A more realistic approach to plan development should be considered, accounting for both the unpredictable nature of critical incidents and the possibility that organizational incapability makes it hard to manage. The authors argue that plans might serve to raise organizational and interorganizational self-awareness concerning potential vulnerabilities. If nothing else, plans serve a palliative function and, for that reason, are likely "here to stay." As long as plans require significant resources to be developed and maintained, might they not be as relevant as possible to those organizations they are intended to guide? Various ways forward in the development of more realistic plans which provide guidance in the face of critical incidents, but even partial if not complete organizational failure are suggested.

Buscher, Monika, Preben Holst Mogensen, and Margit Kristensen. 2009. When and how (not) to trust it? Supporting virtual emergency teamwork. ***International Journal of Information Systems for Crisis Response and Management*** **1 (2): 1-15.**
The authors use the formative evaluation of a prototype assembly of pervasive computing technologies to specify design implications for emergency virtual teamwork tools. The prototype assembly, called "Overview," is implemented in collaboration with police, fire, and medical emergency services as part of the real-life event management during the Tall Ships' Races 2007 in Denmark. The authors describe how the emergency teams use technologies for the collaboration between distributed colleagues to produce shared situation awareness, to manage efforts and resources, and to respond to minor emergencies. The authors show how practices of working up trust are supported by the PalCom open architecture and delineate design guidelines to enable the productive integration of pervasive computing.

Calixto, Eduardo, and Emilio Lebre La Rovere. 2009. Using network methodology to define emergency response team location: The Brazilian refinery case study. ***International Journal of Emergency Management*** **6 (1): 85-97.**
The main objective of this study is to define an emergency response team's location in a specific area based on the risk of refinery plants. The Center of Gravity and Hakini network methodologies are both used to define the team's location in a network based on index values and distance between locations. These methodologies are different with respect to one basic concept concerning the possibility of defining critical locations in the network. The two methodologies will be implemented and the results will be assessed. A sensitivity analysis will be carried out, looking at specific elements such as alternative routes and population dislocation in case of accidents. Furthermore, the real historical data and usual data used in Brazil for hazardous events will be assessed to check the influence on the final results. A third methodology, the Monte Carlo simulation, will be carried out to check the emergency team's availability, safety reliability and number of expected unwanted events to support the final decisions and verify if the best location takes some influence in emergency attendance efficiency. The refinery case study will be carried out to define emergency response team location in a Brazilian refinery.

Callan, Tony. 2009. So, you want to run an exercise? ***Australian Journal of Emergency Management*** **24 (2): 59-62.**
A substantial amount of resources and effort are committed by agencies and organizations at all levels to the design, conduct, and evaluation of emergency management exercises. Many of these exercises are heralded as great successes, while others fall open to criticism for a whole range of reasons. This article looks at the exercise management process and proposes a model for the design, conduct, and evaluation of emergency management exercises.

Cook, Alethia H. 2009. Towards an emergency response report card: Evaluating the response to the I-35W bridge collapse. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-24.**
On August 1, 2007, at about 6:05 p.m., during the height of the evening rush hour, the I-35W Bridge collapsed into the Mississippi. The collapse was unanticipated, surprising the response community and public alike, robbing them of any warning that would have allowed for the closing of the bridge. Based on the characteristics of the collapse, the response should have been an exceptionally complicated endeavor. However, in spite of the very complicated scene confronting the response community, the response activities have been praised as being very successful. This article examines the literature on emergency response to determine what characteristics are thought to be necessary for success. It then examines the emergency response to the I-35W Bridge collapse based on those criteria. It concludes with an analysis of what failed, met expectations, and really succeeded in the response.

Decker, K.C., and Keith Holtermann. 2009. The role for exercises in senior policy pandemic influenza preparedness. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-17.**
Preparedness for a pandemic of influenza is a policy issue currently attracting increased attention from international organizations, governments, and businesses.

This is due in large part to the absenteeism rates that could be caused by a virulent strain of influenza affecting all demographics in our population, and the impact that would have on society as a whole. It is also an issue whose effects cut across the private and public sectors equally, making it a critical issue for society as a whole. Either prospectively agreeing when to implement certain strategies or having a process in place for decision making during the event, is an essential element of pandemic preparedness. One of the most effective and efficient methods for insuring readiness and evaluating preparedness is through exercises where different stakeholders are brought together to dialogue on how they will react to a given set of circumstances. Exercises create awareness among senior policy makers about the critical role of exercises in societal pandemic influenza preparedness and the critical process steps. Taking the collective objective experience from designing and implementing over 100 exercises for senior policy makers, 20 of which were pan flu related, the authors have advanced the science in the field, observed phenomena, and drawn conclusions regarding appropriate exercise design, similarities to other forms of research and best practices for flu exercises and all-hazards preparedness. Employing a decision matrix using the factors policy, plan, procedure, tactics, and skills, an entity can determine the appropriate exercise typology and associated resource requirements. It was important to consistently raise specific issues in order to comprehensively address various preparedness and response issues. Despite a lack of common framework and methodology for the conduct of table top exercises (TTX), discussion based TTX have demonstrated to be an efficacious, effective, and efficient means for identifying policy gaps and fostering pandemic influenza response readiness.

Enander, Ann, Susanne Hede, and Orjan Lajksjo. 2009. One crisis after another: Municipal experiences of severe storm in the shadow of the tsunami. ***Disaster Prevention and Management*** **18 (2): 137-149.**
The purpose of this paper is to develop a theoretical understanding of experiences of crisis management among municipal leaders. It provides a theoretical model highlighting the complex evaluations underlying managers' decisions and actions in real-life situations. A total of 16 chief officers and three politicians from three different municipalities were interviewed concerning experiences of dealing with a severe storm. Data were analyzed by a grounded theory approach. Data analysis generated a model. Central to the model is an evaluation sphere, which reflects tension between everyday circumstances and crisis needs, between assessments of legislation and practices as a support or hindrance, and assessments of human vulnerability versus coping resources. Manager characteristics, the societal context within which the event occurred, and crisis characteristics all influence this evaluation sphere. Particular stressors include the fact that the leaders themselves were personally affected by the storm, the difficult decisions and assessments that had to be made, the uncertainty of the situation and the timing, soon after the tsunami. Crisis management, decisions and actions can be seen as formed from the evaluation sphere and the influencing factors. The paper has a small sample and limited representativeness so generalizability of the model should be tested in other crisis events. The model can be used as a tool to design exercises and as a guideline for authorities, in providing preparedness and crisis support.

Eriksson, Kerstin. 2009. Knowledge transfer between preparedness and emergency response: A case study. ***Disaster Prevention and Management*** **18 (2): 162-169.**
This paper looks at the transfer of knowledge between preparedness activities and emergency response at the municipal level to improve emergency response. A case study was carried out in the municipality of Ljungby, Sweden, using prewritten questions to analyze the collected empirical material. This material consisted of both municipality documents and interviews. The investigation involved municipal units that participate in emergency preparedness activities and those involved in the emergency response to the violent storm, Gudrun, that took place in 2005. Findings show that the people in charge of the immediate response to the storm did not effectively use the analytic preparations created by those responsible for planning and preparations. Indeed to a great extent they used general response patterns and functions discovered from their own earlier experiences. These findings led to the development of a preliminary draft of requirements for a well-functioning knowledge transfer from emergency preparedness work to response. The paper demonstrates a need for municipalities to develop methods to increase transfer of knowledge of preparedness plans and analyses to improve response. It also shows that there is a potential to improve the preparedness process to reduce the gap between preparedness planning and its use in emergency response. The paper suggests a preliminary proposal for developing preparedness activities (in particular risk and vulnerability analyses) more suitable for emergency response.

French, P. Edward, and Eric S. Raymond. 2009. Pandemic influenza planning: An extraordinary ethical dilemma for local government officials. ***Public Administration Review*** **69 (5): 823-830.**
The possibility of an influenza pandemic occurring within the next two decades is very real. The role of local governments in comprehensive preparation for this global threat is crucial. The federal government has provided broad guidelines for state and local officials who are ultimately responsible for emergency response and lifesaving services, vaccination, antiviral use, and the provision of other critical support. Much of this influenza pandemic preparedness has occurred under conditions of uncertainty, and these government actions may have unprecedented legal and ethical implications. This study evaluates the pandemic influenza policies of eight large U.S. cities to determine how Department of Health and Human Services recommendations with ethical and legal implications have been addressed. The authors find that several important aspects of these guidelines are vague in many plans, and input from key stakeholders is inadequate.

Ganewatta, Gaminda, and John Handmer. 2009. The value of volunteers in State Emergency Services. ***Australian Journal of Emergency Management*** **24 (2): 26-32.**
This paper presents estimates of the economic value of volunteers in the State Emergency Services (SES) of New South Wales, Victoria and South Australia. The value is based on the value of the time provided by volunteers. The estimates are based on a detailed survey conducted on volunteer time allocation, and data on the activities of SES volunteers over several years in NSW, Victoria and South Australia. The authors used two methods for valuing time: the "global substitution" method where an average wage rate is used to value all activities, and the "task specific substitution" method where each task is valued at its market wage rate. The value of volunteer time given for community services, operational response, training and unit management averaged around A$52 million, $19 million and $12 million a year in NSW, Victoria and South Australia respectively. They also extended the analysis by counting the standby time of volunteers to present a complete picture of the value of time volunteers contributed to the State Emergency Services. The addition of standby time greatly increases the value of the time provided.

Hagen, James C. 2009. Emergency management structure for use in the Alaska Native elderly population. ***International Journal of Emergency Management*** **5 (3/4): 275-283.**
Regardless of recent concerns and the horrific results of disasters on vulnerable populations in the United States, the use of standardized emergency command and control structures in long-term care (LTC) settings has not become common. It is especially true in the American Indian/Alaska Native population, a unique group in that tribes are sovereign nations. This paper examines: (1) the LTC issues in the AN population; (2) the need to address emergency preparedness and disaster management in the AN culture; and (3) culturally specific characteristics that must be addressed to allow the preparation and protection of these elders. This paper reports work in an ongoing project that will ultimately identify specific interventions to be used in the AN population as efforts continue to address the issues of vulnerable and underserved groups in our nation.

Harnesk, Dan, John Lindstrom, and Soren Samuelsson. 2009. Socio-technical design approach for crisis management information systems. ***International Journal of Information Systems for Crisis Response and Management*** **1 (3): 1-18.**
This article describes research in progress of a design approach for crisis management information systems. A qualitative study was designed to gather data from four municipalities in northern Sweden, which all have responsibility for crisis management in each local environment. The purpose with the article is to discuss broad but strongly related information issues to crisis management and from that suggest a socio-technical oriented approach for crisis management information systems design. The preliminary design approach suggests that a network of knowledge, IT management and information integration is a promising base for design in the area. Considering that responsible actors in crisis environments have great knowledge in crisis planning and operation indicates that such an environment can be understood as a network of knowledge that accounts for both the social and technical dimension during a crisis. Theories from IT management and information integration provide input to the technical dimension of the suggested design approach.

Hecker, Edward J., and Andrew J. Bruzewicz. 2009. Emergency management international: Improving national and international disaster preparedness and response. ***International Journal of Emergency Management*** **5 (3/4): 250-260.**
Since 1998, the US Army Corps of Engineers has been responsible for managing activities of the Civil Military Emergency Preparedness program, in Europe and Central Asia. CMEP supports international partner nation's national and regional strategies related to disaster preparedness and consequence management for all hazards, including the development and exercise of national and regional plans. The use of available technologies including the Internet, remote sensing and GIS, and reliable civil-military planning processes, are key program components. More than 55 seminars, workshops, and table top exercises have occurred since the program's inception. In 2005, USACE developed Emergency Management International, a program designed to provide CMEP a broader range of USACE expertise globally. This paper explains these programs and provides a review of their evolution and services offered. It examines the necessary conditions for effective disaster planning, preparedness, and response for large disasters requiring national and international coordination and cooperation, and examples of techniques used and outcomes of CMEP activities. The paper concludes with a discussion of a proposed approach to addressing all hazards responses for oil-related disasters in Africa.

Hick, John L., Joseph A. Barbera, and Gabor Kelen. 2009. Refining surge capacity: Conventional, contingency, and crisis capacity. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S59-S67.**
Healthcare facility surge capacity has received significant planning attention, but there is no commonly accepted framework for detailed, phased categorization and implementation. This article proposes a taxonomy in conventional surge capacity (implemented in major mass casualty incidents and representing care as usually provided at the institution), contingency capacity (using adaptations to medical care spaces, staffing constraints, and supply shortages without significant impact on delivered medical care), and crisis capacity (implemented in catastrophic situations with a significant impact on standard of care). Suggested measurements used to gauge a quantifiable component of surge capacity and adaptive strategies for staff and supply challenges are proposed. The use of refined definitions of surge capacity as it relates to space, staffing, and supply concerns during a mass casualty incident may aid phased implementation of surge capacity plans at health care facilities and enhance the consistency of terminology and data collection between facilities and regions.

Hurst, Jessica L., and Jessica P. George. 2009. Preparing communications: The critical integration of faith-based organizations into emergency planning and response. ***Journal of Emergency Management*** **7 (3): 11-20.**
This article discusses the paradigm shift that is taking place in emergency management planning with regard to the integration of faith-based organizations in federal, state, and local preparedness, response, and recovery efforts. It also explores potential legal issues related to government funding and support of faith-based emergency planning among faith-based organizations to fully utilize the unique knowledge these groups have of the needs of their communities.

Jennex, Murray E., and Murali Raman. 2009. Knowledge management in support of crisis response. ***International Journal of Information Systems for Crisis Response and Management*** **1 (3): 69-83.**
Most organizations face difficult challenges in managing knowledge for crisis response. But it is crucial for response effectiveness that such that such challenges be overcome. Organization members must share the knowledge needed to plan for emergencies. They also must be able to access relevant plans and communicate about their responses to it during an emergency. This article examines the role of knowledge management (and knowledge management systems therein) in support of crisis response. We discuss what knowledge management and crisis response mean. We move on to suggest why crisis response efforts within an organizational context might benefit from knowledge management initiative. Specific examples of how knowledge management efforts have supported crisis response in the past are then presented. We end by offering researchers with some suggestions for future research work in this subject.

Kapucu, Naim. 2009. Interorganizational coordination in complex environments of disasters: The evolution of intergovernmental disaster response systems. ***Journal of Homeland Security and Emergency Management*** **6 (1).**
This article evaluates the Federal Response Plan (FRP), the National Response Plan (NRP), and the National Response Framework (NRF) from the perspectives of interorganizational networks and complex adaptive systems. It uses the theoretical approach of complexity theory and dynamic network analysis to assess the relationships among organizations using the NRP/NRF as the structure that shapes their functional and organizational relationships. It also examines the applicability of concepts from complexity science for emergency and crisis management, to the evolution of NRP/NRF from the earlier FRP. The article uses the network analysis method in evaluating changes from FRP to NRF. The network analysis results demonstrate increases in complexity in the disaster and crises response and recovery plans over time.

Kemp, Chris. 2009. Event tourism: A strategic methodology for emergency management. ***Journal of Business Continuity and Emergency Planning*** **3 (3): 227-240.**
Threat and risk have both economic and environmental implications for tourism event settings. The threat of natural or man-made activity disrupting the transport, communications, or economic infrastructure of any civilization is a high priority in any cultural context. The delivery of analytical processes and assessment and management protocols related to threat and risk depends on a range of activities encompassed by intelligence and counterintelligence networks. These networks are supported by rigorous training and educational frameworks related to the staging of events, although one may argue that they are in part preceded by measures designed to aid disaster recovery and business continuity in the event of an emergency. The same aspects and parameters apply in event tourism, but are specifically focused on the context of the event as a tourism destination. Adapting an existing model, this paper combines existing best practice and supportive strategies with recent research to create a methodology based upon the three stages of an event: before, during, and after. In this manner it creates a strategic model which identifies issues and allows flexibility to support those in the tourism event industry.

Kiltz, Linda. 2009. Developing critical thinking skills in homeland security and emergency management courses. ***Journal of Homeland Security and Emergency Management*** **6.**
Since September 11, 2001, colleges and universities throughout the nation have developed and implemented new courses and degree programs in homeland security and emergency management. A valued learning outcome of these programs, like most university studies in general, is to develop critical thinking skills in students. However, this can be a challenge because the nature of critical thinking and approaches to teaching and assessing it in higher education are debatable. This paper provides a brief overview of the literature on critical thinking, and looks at the importance of developing these skills in students of homeland security programs so that they are able to adapt successfully in a rapidly changing environment. Finally, this paper discusses two teaching strategies, guided class discussions and case studies, to develop critical thinking that have been used by the teacher in undergraduate and gradate level courses in homeland security.

Krueger, Skip, Eliot Jennings, and James M. Kendra. 2009. Local emergency management funding: An evaluation of county budgets. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-23**
Local emergency management offices are shouldering an increasingly large share of the responsibility for implementing homeland security policies, in addition to traditional emergency preparedness and response functions. One of the concerns about this devolution of responsibilities is the supposed lack of available funding at the local level. City and county budgets are constrained by anti-property tax revolts and the paradoxical rising expectations of citizens for more and better services. Emergency management offices compete in this milieu for attention from policy makers and adequate funding. Despite the importance of local funding, there is little understanding of how funding decisions are

made. Utilizing a nationwide survey of county emergency management officers, this study helps provide some insights by evaluating the impact of subject threat assessments, past disaster experience, emergency management activity, community resources, and location factors affecting the variance of emergency management local funding.

Kruke, Bjorn Ivar. 2009. Distrust in emergency management: The impact of reduced information exchange. ***Journal of Emergency Management*** **7 (2): 19-37.**
Coordination of humanitarian operations in complex emergencies requires joint initiatives from mutually dependent actors, such as the host government, large UN agencies, international and national nongovernmental organizations, and the population. To master the challenges of coordination, building trust relations between these actors is essential, trust relations based on the willingness to communicate, to share information, and to cooperate. However, distrust between the displaced population and host government is often seen in complex emergencies and influences the agencies coming to the emergency area. This article concludes that distrust leads to reduced information exchange and thereby increased distrust. Although distrust in the authorities is well founded in Darfur, humanitarian operations without the authorities are not possible. The right personalities in key positions and smaller forums for information exchange increase the likelihood of trust-building between individual emergency managers from the various actors. Trust-building is necessary for reliable emergency management.

Kushma, Jane A., and Claire B. Rubin. 2009. Focal points in homeland security/emergency management research and practice. Journal of Homeland Security and Emergency Management 6 (1).
This article analyzes the content of two years of articles and reviews published in JHSEM (2006-2008).

Latiers, Melanie, and Jean-Marie Jacques. 2009. Emergency and crisis exercises: Methodology for understanding safety dimensions. ***International Journal of Emergency Management*** **6 (1): 73-84.**
A qualitative methodology developed for emergency exercises analysis is presented. The methodology is a collaborative one, involving a team of specialized observers. Each of them collects video data in one of the different sites involved (e.g. the field, the crisis centers, expert cells, etc.) or on one crisis management activity. Using a situated approach, the methodology gives us the opportunity to better understand the individual and organizational dynamics of crisis management organizations. In comparison with the a posteriori methodologies used in accident investigation, the authors' approach gives access to the complexity and granularity of interactions. The contribution of this paper is twofold. First, it describes the complementarities between the methods of accident investigation and the authors' methods. Secondly, it analyzes the way the method can be used to improve the safety and reliability of crisis management organizations.

Lettieri, Emanuele, Cristina Masella, and Giovanni Radaelli. 2009. Disaster management: Findings from a systematic review. ***Disaster Prevention and Management*** **18 (2): 117-136.**
The paper discusses a systematic review of academic journals and peer-reviewed published papers (excluding working papers and books) about disaster management within the period 1980-2006. The research protocol is based on methodology commonly used in healthcare for analyzing the literature and provides a state-of-the-art medical discipline. The paper presents both a descriptive analysis and a thematic analysis in order to provide a state-of-the-art of international literature. The research protocol is provided in order to make the review process transparent. The descriptive analysis highlights the peculiarities of the literature in terms of attention paid during the years, country of provenance, and clusters of content of the selected papers. The thematic analysis deepens the content of the papers formalizing the state of art. Through both the analyses the authors argue for scholars in disaster management to undertake specific streams for further research and for providing practitioners with a state of art of disaster management discipline.

Macintyre, Anthony G., Joseph A. Barbera, and Peter Brewster. 2009. Health care emergency management: Establishing the science of managing mass casualty and mass effect incidents. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S52-S58.**
Particularly since 2001, the health care industry has witnessed many independent and often competing efforts to address mitigation and preparedness for emergencies. Clinicians, health care administrators, engineers, safety and security personnel, and others have each developed relatively independent efforts to improve emergency response. A broader conceptual approach through the development of a health care emergency management profession should be considered to integrate these various critical initiatives. When based on long-standing emergency management principles and practices, health care emergency management provides standardized, widely accepted management principles, application concepts, and terminology. This approach could also promote health care integration into the larger community emergency response system. The case for a formally defined health care emergency management profession is presented with discussion points outlining the advantages of this approach.

Mancebo, Francois, and Imak Renda-Tanali. 2009. Towards an integrated policy of risk management: A critical analysis of Turkey and France. ***International Journal of Emergency Management*** **6 (1): 99-115.**
This paper discusses the background and issues surrounding Turkish disaster management policy. It also discusses the French experience and provides comparative analysis and direction for future policy issues concerning both countries. French hazard risk management policies have evolved as a result of European Union land use, environmental, and industrial safety directives. Consistent with Turkey's efforts to join the EU, Turkish policy makers should consider French

hazard risk management procedures and incorporate them to the degree that they apply to Turkey's complex hazard management issues. In free societies, the development of long-term strategies for creating sustainable urban environments requires political will and a buy-in from the citizens. Current and future steps that are being taken towards integrating the Turkish society with the EU should include rehabilitation of the emergency management process. The French system, as presented in this paper, is based on principles of risk management that place as much emphasis on the front end (predisaster) as on the back end (postdisaster). Turkey should adopt this philosophy. However, the French system cannot be adopted wholesale without proper analysis that addresses the underlying societal, economic, and cultural context of the Turkish system.

McEntire, David A., and Jill Souza. 2009. Responding to catastrophic disasters: Lessons from the World Trade Center terrorist attacks. ***Journal of Emergency Management*** **7 (3): 43-58.**

The following article uses the 2001 World Trade Center terrorist attacks as a case to illustrate the major challenges presented to the responders and emergency management officials. It examines not only the consequences of this disaster but also the immediate and long-term measures to deal with it. The article concludes with suggestions on how to prepare for such events in the future.

Mclennan, Jim, Adrian Birch, Sean Cowlishaw, and Peter Hayes. 2009. Maintaining volunteer firefighter numbers: Adding value to the retention coin. ***Australian Journal of Emergency Management*** **24 (2): 40-47.**

Annual resignation rates for Australian volunteer-based fire agencies range from about 6.7 percent to 8.3 percent of total volunteer firefighter memberships. This article reports two studies investigating aspects of volunteer retention. (1) Analysis of 396 exit survey returns from former volunteers found that reasons contributing to resigning were: Work/Family needs, 51 percent; moved from the area, 38 percent; age/health issues, 28 percent; dissatisfaction with the volunteer role, 25 percent. A major contributor to dissatisfaction was poor brigade leadership. (2) A survey of 514 second-year volunteers found that higher levels of volunteer satisfaction, and thus intention to remain, were associated strongly with being a member of a well-led, inclusive, and harmonious brigade. Overall, the findings indicated the need for agencies to: (a) Distinguish unavoidable reasons for resigning (moved; age/health issues) from potentially avoidable reasons (work/family needs; dissatisfaction); (b) endeavor to balance the demands on volunteers and the needs of their volunteers' work and family life; and (c) enhance the quality of brigade leadership and management.

Mian, Saima, and Suzan Bennett. 2009. The Tasman Spirit oil spill: Implications for regulatory change in Pakistan. ***Disasters*** **33 (3): 390-411.**

An oil spill in July 2003 from the tanker Tasman Spirit attracted considerable public and media attention in Pakistan. This paper focuses on the experience of a developing country such as Pakistan in dealing with a major oil spill and its impact on bringing about change in the national regulatory framework. A major outcome has been the ratification of the International Convention on Civil Liability for Oil Pollution Damage 1992, which came into force in March 2006 in Pakistan. The convention provides a compensation mechanism for victims incurring oil pollution damages from maritime casualties involving oil laden ships. Several additional changes are still required to improve the country's ability to cope with marine oil spills. These include the development of a comprehensive domestic regulatory framework, implementation of an effective contingency plan, and capacity building of all relevant agencies.

Mirfenderesk, Hamid. 2009. Flood emergency management decision support system on the Gold Coast, Australia. ***Australian Journal of Emergency Management*** **24 (2): 48-58.**

Gold Coast has long been rated as the most vulnerable area subject to flooding in Australia. In recent years there has been a growing concern worldwide about climate change impacts including sea level rise, increased frequency and severity of storms, and changes in rainfall patterns. An implication of these changes includes an increase in the risk of flooding. Future floods are more likely to overwhelm existing protection measures more frequently, exposing us to more residual risks. Addressing the issue of an increase in residual flood risk, Gold Coast City Council has been developing a flood emergency decision support system as part of a 10-year flooding and drainage plan. This system integrates the council's flood modeling capacity, properties, infrastructure, and population data into a single easy-to-use package. Using this system, emergency managers have access to valuable flood forecast information. The decision support system is designed mainly to assist in a post-disaster situation, although currently it is being used for predisaster flood emergency planning. As a postdisaster measure, it can identify vulnerable populations and assist in the evacuation of populations at risk. Its availability on the Internet allows it to be potentially used for implementation of flood emergency procedures by vulnerable places such as childcare and elderly care centers. This paper provides a description of the elements of the system that have been developed or implemented so far, provides a brief description of the elements that are planned for the future, makes recommendations on how such systems can be improved, and how these can contribute to better flood emergency management.

Moynihan, Gary P., Daniel J. Fonseca, Terry Brumback, and Huston Fernandes. 2009. Evacuation decision support system for road incident detection and characterization. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-18.**

This research effort focused on the development of an automatic road incident detection and characterization system which will lead to the reduction of nonrecurrent traffic congestion on freeways. An algorithmic methodology was developed for incorporation and enhancement of the existing South Carolina Department

of Transportation evacuation analysis system. Analysis of the existing system's input data helped determine the specific model needed. Investigation included a series of traffic analysis algorithms that consider: (1) identification of prevalent traffic flow conditions during a predetermined time window; (2) recognition of incident occurrence; (3) incident characterization; and (4) subsequent routing. The algorithmic methodology initially developed by Sheu was considerably expanded and adapted to the available SCDOT traffic data. This modified approach was then incorporated into a general system design document to establish definitions and descriptions of the proposed enhanced system. This initiative will provide traffic officials with relevant insights and expertise to detect and characterize emergency situations. It represents a significant improvement over the labor-intensive traffic monitoring systems currently used by many state DOTs, which lack automated capabilities for incident detection and characterization.

Muffet-Willet, Stacy L., and Sharon D. Kruse. 2009. Crisis leadership: Past research and future directions. ***Journal of Business Continuity and Emergency Planning*** **3 (3): 248-258.**

It is one thing to be a good leader. It is entirely another to be a good crisis leader. Crisis leaders face challenges distinctly different from normal operations. Crisis management requires leaders to employ knowledge and skills beyond those required for day-to-day work. As crisis is not a regular part of most work environments, facing crisis situations requires leaders to be well prepared for the unknown. This paper suggests that high-quality crisis leadership relies on the application of core leadership skills, targeted training for the unfamiliar, and responsiveness when a crisis occurs.

Nandala, K.D.W. 2009. Use of a hydrodynamic model to forecast floods of Kalu River in Sri Lanka. ***Journal of Flood Risk Management*** **2 (3): 151-158.**

Kalu River, the third longest river in Sri Lanka, discharges the largest amount of water into the ocean while causing floods along its route from the most upstream major town, Ratnapura, to the most downstream town, Kalutara. It has become necessary to either totally control these floods or instruct people to adjust their activities to the rhythm of the river and prepared them to live with floods with minimum damages. This paper presents a model developed to determine water levels along the river from Ratnapura to 79 kilometers downstream Kalutara using the HEC-RAS hydrodynamic model. The model was calibrated and verified for both steady and unsteady flow conditions. It provides water levels and inundation areas along the river for different discharges. A set of tables, which could be used by people with less technical knowledge, were prepared to predict flood levels at downstream locations based on observed water levels at upstream locations.

Nibedita, Ray-Bennett S. 2009. The influence of caste, class, and gender in surviving multiple disasters: A case study from Orissa, India. ***Environmental Hazards Human and Policy Dimensions*** **8 (1): 5-22.**

Sociological and anthropological studies in India reveal that caste, class, and gender in everyday life are both rigid and dynamic, but little is known about how they influence the survival mechanisms of women during "multiple disasters," nor about how women negotiate with these structural mores to meet their cultural and biological needs. This is explored through the experiences of 12 female-headed households from different social castes in Orissa, India. Multiple disasters or disasters that occur in "one specific place" (such as floods, cyclone, and drought) are regular events in coastal parts of the state of Orissa. The supercyclone of 1999, the two floods of 2001 and 2003, and the drought of 2000 and 2002 form the case study. Participant observation, in-depth interviews, and documentary evidence complement the fieldwork. The findings suggest a complex interplay of caste, class, and gender in surviving the multiple disasters, including structural mutability under the purview of social organization. Women demonstrated their individual and collective agencies in order to meet their culture and biological needs under severe crisis. This research stresses that gender and disaster studies must include a consideration of caste and class for effective disaster management and social vulnerability reduction.

Nirupama, Niru, and David Etkin. 2009. Emergency managers in Ontario: An exploratory study of their perspectives. ***Journal of Homeland Security and Emergency Management*** **6 (1): ePub.**

Creating effective disaster and emergency management programs can be an enormously challenging task because of the many difficulties and barriers that present themselves to people and institutions working in this field. The present study addresses two main concerns: (1) what barriers exist within Canadian society to effective disaster risk reduction from the perspective of the emergency management community; and (2) what barriers exist within the Canadian emergency management community to effective disaster risk reduction, both from a cultural and institutional perspective. The authors conducted interviews with emergency management professionals from the public and private sectors as well as some nongovernmental organizations in order to ascertain their opinions and perspectives with respect to these questions. The results have been analyzed and discussed in this paper.

Nja, Ove, and Elvind L. Rake. 2009. A discussion of decision making applied in incident command. ***International Journal of Emergency Management*** **6 (1): 55-72.**

Rescuers respond to unique emergency situations. Decision making on the scene of an accident is context bound, embedded in ever-changing environments. Thus, decisions in action sometimes involve huge uncertainty. This paper discusses decision making as part of incident management, as presented in the research literature. Two main theoretical perspectives on decision making in crises are compared. The "naturalistic decision making" and "contingent decision path" perspectives show the similarities and difference in on-scene crisis decision making. In the light of prevailing crisis management research the authors conclude that the researcher faces several challenges. Assumptions about experiences,

situation awareness, cognitive reasoning, and the reconstruction of on-scene behavior are not easily retrieved. There is a need to develop a better understanding of decision making in crisis settings.

Pau, L.F., and P. Simonsen. 2009. Emergency messaging to general public via public wireless networks. I*nternational Journal of Information Systems for Crisis Response and Management* 1 (3): 56-68.
Warning to the broad population in an emergency situation, irrespective of location and condition, is a public policy responsibility. Public wireless networks offer now the opportunity to deliver emergency warnings in this way with explanations, because in many countries the mobile penetration rates and coverage are higher that any other access form. The article summarizes the analysis of the selection process between Short messaging services and Cell Broadcast messaging in the context of Denmark, based on end user requirements, stakeholder roles, and case-based analysis. It demonstrates the many technical, cost-benefit, and other tradeoffs needed in supporting the population now with a dependable, widespread technology. This research is the basis for a national policy.

Rhinard, Mark, and Arjen Boin. 2009. European homeland security: Bureaucratic politics and policy making in the EU. *Journal of Homeland Security and Emergency Management* 6 (1): 1-19.
In the face of modern crises, the European Union has increased its efforts to build common crisis management capacity across the continent. As the EU seeks to both coordinate national crisis and disaster authorities and build its own supranational capacities, it is worth asking whether the EU is capable of designing an effective European homeland security apparatus that will fit member state expectations as well as its unique supranational character. This article applies a bureaucratic politics perspective to explore and assess how the EU's governance structures and policy making processes constrain and facilitate its efforts to build transnational crisis management capacity. It discusses how institutional and policy making characteristics may affect the EU's ongoing effort to enhance security and safety for the inhabitants of European states.

Rosmuller, Nils. 2009. Accident scenarios for marshalling yards in the Netherlands: Private or public firefighting. *International Journal of Emergency Management* 5 (3/4): 284-291.
Since the introduction of the Seveso and Seveso II directives (1996), many western European countries have had the opportunity to demand that installations processing hazardous materials have a private fire brigade decree. In the Netherlands, based on the Dutch company fire decree, certain companies can be compelled to have a private fire brigade. Hazardous materials are processed at about 40 marshalling yards (belonging to the infraprovider ProRail) and therefore a company fire brigade might be compulsory. In the Rotterdam harbor area, for several years, a (juridical) discussion has been going on between the Rotterdam municipality and ProRail concerning the marshalling yards in this area. In August 2007, this dispute was brought to the highest court for such affairs in the Netherlands, the Administrative Jurisdiction Division of the Council of State. To provide input for this juridical process, an analysis was made for six ProRail marshalling yards, each processing hazardous materials. The results indicate that accident scenarios involving toxic and flammable substances are possible. Based upon the type, development, and extent of the accidents, some of these credible scenarios determine the fire fighting quality and quantity—the so-called design scenarios. The Council of State related the fire brigade capacity to the credible scenarios and not to the design scenarios. The result is that ProRail might be responsible for organizing and financing private fire brigades at about 40 marshalling yards.

Rubin, Claire B. 2009. Long term recovery from disasters—The neglected component of emergency management. *Journal of Homeland Security and Emergency Management* 6 (1): ePub.
This paper stems from the author's presentation on long-term recovery given at the 2009 All-Hazards Higher Education Conference, sponsored by the Department of Homeland Security at its Emergency Management Institute, June 2-4, 2009.

Sarriegi, Jose M., Fiinn O. Sveen, and Jose J. Gonzalez. 2009. Towards a research framework for critical infrastructure interdependencies. *International Journal of Emergency Management* 5 (3/4): 235-249.
Critical infrastructure (CI) interdependencies have important consequences for crisis management, particularly when the crises cross borders. However, research into CI interdependencies is still immature. The nature of large-scale, cross-border crises in these systems of systems is not easily understood. This article has identified several aspects that need to be investigated to gain a more complete understanding of the development of crisis in these systems. These aspects include the following: There is a need to understand CIs as interdependent elements of a complex system: Ever increasing interdependencies create new complexity; crises in CI are dynamically complex owing to the existence of significant time delays; there is a need for a long-term perspective; knowledge about CIs is fragmented and resides in many different stakeholders that need to be identified and brought together; there is a need for modeling techniques that can unite the fragmented CI knowledge; there is a need to create effective training and communication tools to transfer insights to crisis managers, policy makers and the general public.

Sauer, Lauren M., Melissa L. McCarthy, Ann Knebel, and Peter Brewster. 2009. Major influences on hospital emergency management and disaster preparedness. *Disaster Medicine and Public Health Preparedness* 3 (Suppl 1): S68-S73.
The role of hospitals in the community response to disasters has received increased attention, particularly since the terrorist attacks of September 11, 2001. Hospitals must be prepared to respond to and recover from all-hazards emergencies and disasters. There have been several initiatives to guide hospitals' role

in these events and to assist hospitals in their effort to prepare for them. This article focuses on the efforts of four distinct groups: The Joint Commission, the executive branch of the U.S. government, the U.S. Congress, and the Department of Health and Human Services. Despite the different approach each group uses to assist hospitals to improve their emergency management capabilities, the initiatives reinforce one another and have resulted in increased efforts by hospitals to improve their disaster preparedness and response capabilities and community integration. The continued progress of our medical response system in all-hazard emergencies and disasters depends in large part on the future guidance and support of these four key institutions.

Segev, Aviv. 2009. Adaptive ontology use for crisis knowledge representation. ***International Journal of Information Systems for Crisis Response and Management*** **1 (2): 16-30.**

In a crisis, the problem of the lack of a shared platform or similar communication methods among the collaborators usually arises within a few hours. While a crisis requires rapid response of emergency management factors, ontology is generally represented in a static manner. Therefore, an adaptive ontology for crisis knowledge representation is needed to assist in coordinating relief efforts in different crisis situations. This article describes a method of multilingual ontology modeling that modifies the ontology in real time during a crisis according to the crisis surroundings. This article presents an example of ontology usage based on a sample Hurricane Katrina crisis.

Smith, Susan M., Linda Peoples, and Peggy Johnson. 2009. Disaster response: Community mental health service capacity in the United States. ***International Journal of Emergency Management*** **5 (3/4): 311-323.**

Following a natural disaster such as a major hurricane or flood, the ability of community mental health facilities to respond during the recovery stage with adequate resources and capacity to meet community needs is critical. Community mental health agencies have an important role to play in preparing for and responding to large-scale disasters, such as the 2005 hurricanes Katrina and Rita. The timely provision of mental health services to disaster victims has long been recognized as an important component of effective emergency management. In addition to a discussion of the findings from previous research studies conducted throughout the United States addressing the issue of mental health community response following a disaster, this paper presents the survey findings of a retrospective research study designed to assess the status of emergency disaster preparedness and client service capacity at community mental health facilities prior to and following the Katrina/Rita disaster. This discussion also provides a qualitative assessment of the responses provided by community mental health administrators one year after Katrina/Rita, when they were asked to identify the resources needed by their facilities to effectively address future disasters.

Stallings, Michael, and Whitney Faust. 2009. Drafting, revising, and updating local emergency operations plans: The National Response Framework and the Emergency Support Function Annex Model. ***Journal of Emergency Management*** **7 (2): 11-18.**

Lessons learned and public scrutiny resulting from the Gulf Coast hurricane disasters in 2005 led the Federal Emergency Management Agency to restructure its national incident response guidance. The National Response Framework (NRF) replaced the National Response Plan in early 2008. The updated Framework has focused the attention of emergency management planning to, among other things, updating Emergency Operations Plans (EOPs) on a state and local jurisdictional level, utilizing an Emergency Support Function (ESF) model. Since 2005, compliance mandates under the National Incident Management System have required local government entities to revise and update emergency operations plans to incorporate NIMS components. With the introduction of the NRF in 2008, the ESF model is now the recommended standard for local government EOPs under the NIMS compliance objectives. The ESF model provides for a coordinated response effort and mutual aid options local agencies may receive from state and federal resources in the wake of an emergency. It also works to ensure that local entities themselves have a careful accounting of all of their own resources and capabilities to avoid another slow and inadequate response that was at the heart of the hurricanes Katrina and Rita tragedies in 2005.

Stocker, Darren K., and Charles J. Kocher. 2009. Biological incidents: Revisiting past perspectives toward a 21st century problem. ***Journal of Emergency Management*** **7 (3): 76-80.**

Beginning in the 14th century, the use of biological agents as weapons created an effective methodology of killing enemy combatants and instilling fear in the populace of community and nation. Although the deployment of these agents in various forms is in opposition to the agreements set within the rules of several weapons treaties, their use and threat of development as a terrorist instrument has impacted societies in post-September 11th documented accounts. This article provides a chronological indication of the use of natural and synthetic biological agents as an intimidation factor and demonstrates the extent of how they have been consciously used in contemporary confrontations, along with how law enforcement, healthcare providers, and health organizations are engaged in the response of these biological weapons.

Swanson, David A. 2009. Hurricane Katrina: A case study of its impacts on medical service providers and their client populations. ***Open Demography*** **2: 8-17.**

There is a great deal of literature in the areas of: (1) medical demography; (2) the effect of disasters on first responders; (3) measuring the immediate demographic and social effects of a disaster; and (4) the short- and long-term economic and financial effects of disasters. However, there is very little about the demographic effects of large-scale disasters on medical providers once rescue operations have been completed and operations

move into the relief and recovery/rehabilitation phases associated with a disaster. This paper seeks to bridge this gap by providing a "recovery/ rehabilitation" case studY: estimates of the effects of Hurricane Katrina on the client populations and candidates for a specific medical procedure in the service areas associated with two medical facilities on the Mississippi gulf coast. The estimates presented here show that Katrina had a substantial demographic impact and that this translated into an adverse impact on the client base of both medical facilities. Although the results come from a single case study, they suggest that the effects of a disaster can have substantial impacts on medical care providers and their ability to continue business that goes well beyond physical damage. That is, the impact of demographic effects of a disaster on a client base can be more important than physical damage—a fact that does not appears to be widely recognized. The first step in effectively dealing with a disaster is the presence of a plan. It is typical of organizations to have both "disaster recovery" plans and "business continuation" plans. Given the long-term effects of Katrina on client populations found in this case study, it would be prudent that medical care providers include estimates of demographic impacts on their client populations in these plans, particularly in regard to the long-term "effects horizon" of a given disaster.

Taylor, Courtney E. 2009. Equal opportunity preparedness and response: Increasing preparedness and response for citizens with visual and auditory impairment. ***Journal of Emergency Management*** **7 (2): 75-79.**
During the planning process for preparedness for and response to disasters, people with visual and auditory disabilities are frequently and mistakenly left out. In October, of 2003, a television report in San Diego, California, failed to provide visual warnings to inform deaf residents during coverage of local fires. Confusion during Hurricane Katrina resulted in numerous service animals being separated from their owners. Emergency workers were unprepared to assist deaf people on the 35W bridge collapse of 2007 in Minneapolis, Minnesota. People with visual and auditory disabilities should be aware of their own needs in the event of an emergency, and their community should be aware too. Emergency managers and first responders should take certain precautions in assisting people with disabilities. The preparedness and response stages of visually impaired, auditorily impaired, and service animals are important topics for any community.

Tiefenbacher, John P., and Ronald R. Hagelman III. 2009. Emergency cooperation between the Uniteed States and Mexico in disaster management: Co-dependency and geopolitics. ***International Journal of Emergency Management*** **5 (3/4): 261-274.**
Today, the United States relies upon Mexican labor, agricultural produce, and exploitation of growing consumption in the Mexican market. Mexico, conversely, depends upon remitted wage earnings and international industry to support marginalized rural and poor urban populations. Treaties have formalized this co-dependency. Disasters, emergencies, and environmental problems, particularly in the border zone are usually shared calamities and the need for binational cooperative emergency management is obvious. What are the prospects for cooperation in light of growing tension between the two countries? This paper evaluates cooperation between the anti-documented-migrant sentiment and U.S. construction of the 700-mile (1167 km) border fence. Particular attention is placed on issues of sovereignty, trade agreements, environmental accords, and approaches to emergency management. The authors argue that geography and political-economic interactions have developed a dysfunctional, but necessary, relationship. Approaches to management of risks, hazards, and emergencies fit both their respective cultures and their political relationship. The borderlands are particularly problematic due, in part, to the marginalization of all Latinos (Americans and non-Americans alike) and the lack of understanding of the Mexican (and Mexican-American) culture.

Trnka, Jiri, and Bjorn Johansson. 2009. Collaborative command and control practice: Adaptation, self-regulation and supporting behavior. ***International Journal of Information Systems for Crisis Response and Management*** **1 (2): 47-67.**
This study documents the work practices of a team of commanders responding to an emergency and identifies areas and activities that may be enhanced by the use of command and control tools. This study was based on a "human-in-the-loop" simulation with emergency management commanders as participants. The authors use several communication analyses to assess coordination among the commanders. This article examines the most important enabler of coordination.

Tudor Silva, Kalinga. 2009. 'Tsunami third wave' and the politics of disaster management in Sri Lanka. ***Norwegian Journal of Geography*** **63 (1): 61-72.**
The paper compares the social and political consequences of two disasters that struck Sri Lanka 70 years apart, the 1934-1935 malaria epidemic that killed over 100,000 people and the tsunami of December 26, 2004. The main argument is that while the state and civil society responses to the malaria epidemic of 1930s in many ways led to the establishment and development of the Sri Lankan welfare state and the related outcomes—including rapid advances in quality of life particularly in the rural sector—the more elaborate and well-funded tsunami response driven by the international humanitarian industry failed to facilitate speedy recovery, failed to galvanize the peace process, and even added to the vulnerability of some of the affected people due to the rapid exodus of many newly arrived nongovernmental organizations before completing their humanitarian mission. While the relative failure of the tsunami response may be partly attributed to the persistent conflict between the Government of Sri Lanka and the Liberation Tigers of Tamil Eelaam, it also exposes some of the key weaknesses of humanitarian aid in the modern world. A more historically grounded and conflict-sensitive approach is necessary along with greater coordination among agencies involved.

Tuler, Seth, and Thomas Webler. 2009. Stakeholder perspectives about marine oil spill response objectives: A comparative Q study of four regions. ***Journal of Contingencies and Crisis Management*** **17 (2): 95-107.**
Marine oil spills can cause major social, economic, and ecological disruptions. Spill response managers must weigh different options and objectives when deciding what to do. We investigated the ways in which preferences for spill response objectives vary among those who are responsible for oil spill contingency planning and response in Buzzards Bay, Delaware Bay, San Francisco Bay, and Washington state regions. The authors begin this paper with a discussion of the research method used in the study: the Q method. In Buzzards Bay, Delaware Bay, and San Francisco Bay three perspectives were identified in each case. In Washington state, two perspectives were identified. An analysis of the 11 case-specific perspectives reveals that they can be described by four "composite" perspectives that describe how different stakeholders prioritize spill response objectives. These four perspectives are compared on several themes, including the emphasis they placed on mitigating economic impacts, protecting health and safety, mitigating ecological impacts, implementing a coordinated and timely response, addressing the needs and concerns of the affected public/communities, gaining public support for the response, mitigating cultural impacts, and mitigating social nuisance impacts. The implications for spill response planning and spill response evaluation are discussed.

van der Haar, Selma, Karen A. Jehn, and Mien Segers. 2009. Towards a model for team learning in multidisciplinary crisis management teams. ***International Journal of Emergency Management*** **5 (3/4): 195-208.**
Crisis management teams have the duty to perform quickly, reliably, and effectively in case of an emergency, crisis, or disaster. Teams are composed of members with diverse expertise, experience, parent organization, and familiarity. This makes these teams ad hoc multidisciplinary action teams that have to function as a team and perform in a reliable and effective way as quickly as possible. The authors' expectation is that team learning is very important for establishing this performance. This paper develops a broad model of how team learning occurs in crisis management teams, especially in the operational crisis management team. Reliable, effective performance requires connectivity about the task and team (i.e., available knowledge and opinions are shared using communication, leading to shared visions and intentions). This connectivity can be established by using team-learning behavior and face-to-face communication and developing a Transactive Memory System, a shared situational awareness, shared mental models of the task and teams, and a model for how to cooperate in this team. Can this team learning be influenced to improve performance? This is the general question underlying the project that the authors started in the summer of 2007 at Leiden University.

van der Laan, E.A. 2009. Performance measures in humanitarian supply chains. ***International Journal of Risk Assessment and Management*** **13 (1): 22-45.**
Recent humanitarian disasters, such as the Asian tsunami and Hurricane Katrina, have pointed out the importance of supply chain management in dealing with the complex emergency situations and risks that humanitarian organizations are faced with. Although performance measurement is known to be crucial for performance improvement, little insight exists in how effective performance indicators can be selected in the humanitarian context. This paper adds to this insight through the use of an extensive literature review to identify necessary conditions for an effective performance measurement system. Subsequently, we conduct a case study at the Dutch branch of Medecins Sans Frontieres to investigate whether these conditions are met or not. It appears that the biggest challenges lie in data accuracy and the fact that the current set of performance indicators is not geared towards future improvement. As MSF is known for its emergency logistics performance, it is not unthinkable that other humanitarian supply chains struggle with the same issues.

van Lakeveld, Jaap, Selma van der Haar, and Sjoerd Wartna. 2009. The professional development of planners, developers and managers of crisis team exercises. ***International Journal of Emergency Management*** **5 (3/4): 209-234.**
In order to be prepared for managing crises and disasters, a series of exercises need to be executed regularly. Municipalities and safety regions in the Netherlands, however, often do not sufficiently recognize this necessity. At the same time, they do not always have available expertise to plan for optimal exercises and other arrangements for professional development. In order to improve this situation, a professional trajectory for exercise process managers was launched in the Netherlands. This paper reports on the outline of the program and its implementation. It includes a description of the elements of the program and the way it was designed. It may be a useful case study for those who are considering upgrading emergency exercise processes in their own context.

Wernstedt, Kris, Patrick Roberts, and Matthew Dull. 2009. Can climate signals inform emergency management? Preliminary evidence. ***Journal of Homeland Security and Emergency Management*** **6 (1): ePub.**
The emergency management community has widely discussed the long-term implications of global climate change for weather-related hazards such as floods, hurricanes, and droughts, but the community has paid relatively little attention to the connection between these hazards and shorter-term seasonal climate fluctuations (e.g., El Niño). This paper explores the potential for applying recent scientific and technical advances in the use of seasonal climate information to improve how emergency managers address such hazards risks and their associated disaster losses. The preliminary analysis presented here begins with a brief review of evidence from the research literature linking mid- and long-term forecasts to flood planning and management. The authors report on a small telephone

survey of emergency managers involved in flood planning and management in 26 Oregon and Washington counties that experience interannual climate variation that can increase the frequency or intensity of flooding. Survey findings help illuminate the opportunities and obstacles for using climate science to inform emergency management. The authors then present results of a 2008 survey of emergency managers and educators that asks about the use of climate information for a wider range of weather-related hazards. They conclude by summarizing the opportunities for and obstacles to the use of climate information in emergency management.

Wester, Misse. 2009. Cause and consequences of crises: How perception can influence communication. ***Journal of Contingencies and Crisis Management*** **17 (2): 118-125.**
This article focuses on how different events that cause a crisis are perceived by communication officers. The aim of this paper is to investigate how the attribution of whatever has caused a crisis affects how the crisis is perceived and how this in turn affects communication efforts. Previous research indicates that people will respond differently to risks depending on the cause of the risk, even though the consequence is the same. If individuals react to a crisis differently depending on what caused it, is that also true for crisis professionals and if so, does this influence the planning and execution of crisis communication? This article presents the results from an empirical investigation of crisis communicators in Sweden. The results reveal that there are differences within this group of professionals when they are presented with crises due to different causes. The possible implications this might have for crisis communication are discussed.

Westfall, Andrew, Murray E. Jennex, Sondra Dickinson, and Eric Frost. 2009. Event report: Golden Phoenix 2008. ***International Journal of Information Systems for Crisis Response and Management*** **1 (2): 73-80.**
This article reports on the Golden Phoenix, an action and experimental research exercise involving the U.S. military, Customs and Border Patrol agents, FBI, local law enforcement, hospitals and clinics, academia, and civilian industries, in a simulated anthrax incident in which thousands of people were potentially exposed to the deadly agent. The exercise allowed government agencies to activate their emergency response plans and procedures in a controlled, real-time environment while incorporating support of private sector industry in an experimental capacity. The event provided the actors involved an opportunity for the military to work in an environment that partially simulated the chaotic nature of an actual emergency as well as provided private industry to learn how to interact with the military and demonstrate their capabilities to enhance the military's response and management activities.

Wickramasinghe, Vasantha, and Shin-ei Takano. 2009. Revival of tourism in Sri Lanka following the December 2004 Indian Ocean Tsunami. ***Journal of Natural Disaster Science*** **29 (2): 83-95.**
Tourism, the fourth largest contributor of Sri Lanka's foreign exchange, was soon brought to halt with the December 2004 Indian Ocean Tsunami. An estimated damage of US$250 million to tourist assets and a loss of over 27,000 livelihoods almost ruined the tourist industry of Sri Lanka. An revival process was executed in two phases—immediate relief phase and rapid recovery phase. The immediate relief phase included provision of reassuring measures for tourist victims and notifying the mass media with the up-to-the-minute tourism situation. The rapid recovery phase was incorporated with a short-term recovery process and long-term rehabilitation and reconstruction process aimed at recapturing tourist interest, and reestablishing the affected tourist communities and the tourist infrastructure respectively. The lack of an a priori disaster management framework and the prevailing security condition of the country impeded the revival process. This paper documents the impact of the December 2004 Indian Ocean Tsunami on tourism in Sri Lanka with a detailed overview of the recovery strategies adopted in the aftermath of the disaster. Furthermore, it assesses the challenges and progress providing guidance to formulate a comprehensive disaster management framework for the tourism sector through the influence of the recovery process.

Ynag, Lili, Raj Prasanna, and Malcolm King. 2009. Situation awareness oriented user interface design for fire emergency response. Journal of Emergency Management 7 (2): 65-74.
Emergency response management demands certain characteristics of the individuals involved. They need to act decisively, often on little or incomplete information within tight time schedules or, sometimes, with too much data from which it is difficult to extract key information. Procuring the right information at the right time, in the right format, and to getting it to the right people is a challenge in any emergency response management system design. Poor design can lead to response systems that are not used, are ineffective, and in some cases dangerous to the emergency personnel. This article explores how situation awareness oriented design can be used for on-site emergency response system development. The end-user requirements are identified through extensive interviews with firefighters and observations of fire emergency response training simulations. These requirements are calculated against the identified responsibilities of the core members in the first responder hierarchy. The on-site dynamic information which could be presented to emergency personnel is examined through the use of three situation awareness levels to meet the various requirements of the first response party. Finally, an interface prototype of an information system for fire and rescue services is presented to illustrate the methods proposed in the article. Although our focus was on structural fire and firefighters, the interface design for an on-site emergency response system proposed here is applicable for other emergency response situations as well, due to standard operating procedures.

Zeitz, Kathryn M., Heather M. Tan, M. Grief, P.C. Couns, and Christopher J. Zeitz. 2009. Crowd behavior at mass gatherings: A literature review. ***Prehospital and Disaster Medicine*** **24 (1): 30-31.**

Gaining an understanding of crowd behavior is important in supporting timely and appropriate crowd management principles in the planning and provision of emergency services at mass gatherings. This paper provides a review of the current understanding of the psychological factors of a crowd within the psychosocial domain as they apply to mass gatherings. We conclude there is a large theory-practice gap in relation to crowd psychology and the mass gathering setting. The literature has highlighted two important elements of crowd behavior: there must be a "seed" and people must engage. Understanding these behaviors may provide opportunities to change crowd behavior outcomes.

Zhong, Ying, and Sui Pheng Low. 2009. Managing crisis response communication in construction projects from a complexity perspective. ***Disaster Prevention and Management*** **18 (3): 270-282.**

The number of crisis incidents and their severity is rising along with the growing complexity of technology and society. There are innumerable incidents that can interrupt progress in construction projects. The crisis response phase puts the project organization's established normal communication systems and processes under enormous additional pressure. This paper is links and extends the knowledge of complexity theory on communication management in the context of the crisis response. This paper proposes a conceptual framework for understanding the underlying pattern of communication behavior and decisions of human systems in response to a crisis. It also investigates how to enhance the organization's adaptability and resilience in the event of a crisis. The paper reviews, proposes, and refines a conceptual complexity-informed framework for effective crisis response communication management. Conventional crisis response communication models and management are grounded on the linear, command-and-control principles of "scientific management." They are limited in describing flexible reactions to the changing circumstances and explaining the dynamic and complex crisis response situations. This paper proposes an alternative model for crisis response communication based on complexity theory. The conceptual model suggests that while the behavior of these complex systems cannot be predicted, all the parts nevertheless self-organize, learn, and adapt to their dynamically changing environment. In terms of this proposed conceptual framework, a flexible and adaptive management approach for the construction project manager to communicate and respond quickly and effectively in the midst of a crisis is suggested.

Disaster Relief

Agrinier, Nelly, Artus Albessard, Valerie Schwoebel, Eloi Diene, and Thierry Lang. 2009. Direct assistance to victims in rescue operations as a risk factor for post-tramatic stress disorder in police officers: The experience of the Toulouse disaster in 2001. ***Journal of Emergency Management*** **7 (3): 59-67.**

The aim of this study was to describe the prevalence of symptoms consistent with post-traumatic stress disorder (S-PTSD) in police personnel involved in rescue operations after the AZF chemical plant explosion in Toulouse, France, on September 21, 2001, and the relationship between S-PTSD and the type of rescue operations. A cross-sectional survey was performed, using a mailed questionnaire. Six hundred and thirty-five out of 1,500 rescue operations police officers participated in the study. All were involved with the explosion site after the after the event. The outcome variable was the presence of S-PTSD. The explanatory variables were the level of exposure during the rescue tasks. Logistics regression was used to calculate the adjusted odds ratios (OR). The prevalence of S-PTSD among policemen was 4.1 percent [95% CI: 2.1-6.2]. Policemen who had immediate health consequences (OR 4.6; [95% CI: 1.3-16.4]) and those who provide medical assistance to the victims (OR 5.7; [95% CI: 1.6-20.2]) had a higher prevalence of S-PTSD. Providing medical assistance to the victims was a major risk factor of S-PTSD for police officers. Training police officers to take part in medical activities at the time of the disaster might lead to a reduction of SPTSD incidence in this group.

Nakazato, Hideaki, and Osamu Murao. 2009. Study on regional differences in permanent housing reconstruction process in Sri Lanka after the 2004 Indian Ocean Tsunami. ***Journal of Natural Disaster Science*** **29 (2).**

The Sumatra Tsunami crossed the Indian Ocean on 26th of December 2004 and damaged more than 90,000 houses in Sri Lanka. Following the tsunami, the government decided to provide three types of houses for the victims—temporary shelters, transitional houses, or permanent houses—according to the stage of reconstruction. Most permanent houses were donated by nongovernmental organizations on sites supplied by the government. However, there are regional differences among the affected areas. This paper presents the results of a field survey and interviews in the damaged area in November 2005 and in March 2006 in the period when the permanent houses were under construction. It describes the reconstruction status, regional differences, and problems with regards to the reconstruction process in Sri Lanka.

Powers, John R. 2009. An alternative approach to disaster relief. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-7.**

There is an alternative to the federal role in disaster relief as specified in the Disaster Relief Act (PL 93-288 as amended). This alternative would be infinitely more effective in reducing the costs of disasters and would be much fairer to the taxpayers. As the Federal Emergency Management Agency regional director in Chicago during the 1993 Mississippi floods, the author's mitigation division director groused over the fact that many of the same people in the lines were there after the previous floods. While FEMA shouldn't tell people where to live, they shouldn't come to the agency for money when they get hit by a predictable disaster without the necessary insurance. The requirements for making this alternative

a reality are threefold: (a) Set actuarially correct premiums for individuals, municipalities and states based on the risk—an outline for how the Federal government can build a risk model is discussed; (b) have the Federal government serve as the "reinsurer" for losses that exceed those projected by its model—an approach is provided; and (c) change the legislation and insist that the Congress not bail out people who didn't get the insurance or otherwise reduce their risk by moving out of the high risk area. The point of this approach is to force individuals, municipalities and states to stop doing dumb things and accept responsibility for their decisions. The benefits to the tax payers who are subsidizing these bad decisions would be huge.

Salkowe, Richard S., and Jayajit Chakraborty. 2009. Federal disaster relief in the U.S.: The role of political partisanship and preference in presidential disaster declarations and turndowns. ***Journal of Homeland Security and Emergency Management*** **6 (1): ePub.**
Federal disaster declarations are authorized by the president under the provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988. Previous studies pertaining to presidential disaster declarations have found varying levels of political influence associated with the declaration process. Factors including electoral votes, reelection years, congressional committee appointments, geographic location, and party favoritism have been implicated in the selective approval capacity the president exercises in issuing federal disaster declarations. This article provides a comparative analysis of emergency and major disaster declaration requests under the Stafford Act between 1989 and 2005 with attention to political partisanship, biased vote-seeking, and the potential for a state to be overwhelmed by a disaster event. The study reveals a higher success rate in acquiring major disaster declarations for states with lower total taxable resources and during presidential reelection years. The same findings were not evident in the analysis of emergency disaster declarations where statistically significant observations were limited to events in which recent multiple disasters had occurred and/or senatorial and presidential party similarity existed. There was no statistical evidence to suggest that gubernatorial and presidential party similarity, U.S. House of Representatives and presidential party similarity, FEMA congressional oversight committee membership, electoral votes, or FEMA regional office location influenced success in securing emergency or major disaster declarations. Several aspects of the results differ from prior studies and provide new findings regarding the role of political influence in the disaster declaration process.

Tatham, Peter. 2009. An investigation into the suitability of the use of unmanned aerial vehicle systems (UAVS) to support the initial needs assessment process in rapid onset humanitarian disasters. ***International Journal of Risk Assessment and Management*** **13 (1): 60-78.**
In the aftermath of any disaster situation, achieving an accurate and timely needs assessment is the key to the efficiency and effectiveness of the subsequent logistic response. However, in the light of the inevitable disruption to both the physical and information infrastructure of the affected area, this paper presents the results of an initial theoretical investigation into the use of an unmanned aerial vehicle system (UAVS) as a means of complementing existing satellite, unmanned aircraft, and pedestrian data-gathering techniques. Using a case study based on the 2005 Pakistan earthquake, the paper investigates how UAVS might be employed, the information that could be obtained, and the consequential benefits. It concludes that UAVS has the potential to support the overall needs assessment process, and a first estimate of the required conditions for success is offered, together with recommendations for the further practical research that it is considered necessary in order to operationalize the concept.

van der Laan, E.A. 2009. Performance measures in humanitarian supply chains. ***International Journal of Risk Assessment and Management*** **13 (1): 22-45.**
Recent humanitarian disasters, such as the Asian tsunami and Hurricane Katrina, have pointed out the importance of supply chain management in dealing with the complex emergency situations and risks that humanitarian organizations are faced with. Although performance measurement is known to be crucial for performance improvement, little insight exists in how effective performance indicators can be selected in the humanitarian context. This paper adds to this insight through the use of an extensive literature review to identify necessary conditions for an effective performance measurement system. Subsequently, we conduct a case study at the Dutch branch of Medecins Sans Frontieres to investigate whether these conditions are met or not. It appears that the biggest challenges lie in data accuracy and the fact that the current set of performance indicators is not geared towards future improvement. As MSF is known for its emergency logistics performance, it is not unthinkable that other humanitarian supply chains struggle with the same issues.

Earthquakes

Ajami, Sima, and Mahshid Fattahi. 2009. The role of earthquake information management systems (EIMSs) in reducing destruction: A comparative study of Japan, Turkey and Iran. ***Disaster Prevention and Management*** **18 (2): 150-161.**
The most important factor for a manager to be able to overcome a crisis depends on his or her readiness. The main objective of this study was to determine an earthquake information management system (EIMS) in Japan, Turkey and Iran and describe how it can reduce destruction by crisis management. The study was an analytical comparison in which data were collected by questionnaire, observation, and checklist. The subject was the EIMS in selected countries. Sources of information were staff in related organizations, scientific documentation, and the Internet. To analyze the findings, criteria rating technique, Delphi technique, and descriptive methods were used. Findings showed that the EIMSs in Japan, Turkey, and Iran are decentralized. The EIMS is called "Phoenix" in Japan, and "natural disaster management information system" or "AFAYBIS" in Turkey. In Iran

there was not a useful and efficient EIMS to evaluate earthquake information. It is clear that an information system can only influence decisions if it is relevant, reliable, and available for the decision-makers in a timely fashion. Therefore, it is necessary to design a model that contains responsible organizations and their functions.

Al-Nammari, Fatima M., and Michael K. Lindell. 2009. Earthquake recovery of historic buildings: Exploring cost and time needs. *Disasters* 33 (3): 457-481.
Disaster recovery of historic buildings has rarely been investigated even though the available literature indicates that they face special challenges. This study examines buildings' recovery time and cost to determine whether their functions (that is, their use) and their status (historic or non-historic) affect these outcomes. The study uses data from the city of San Francisco after the 1989 Loma Prieta earthquake to examine the recovery of historic buildings owned by public agencies and non-governmental organizations. The results show that recovery cost is affected by damage level, construction type, and historic status, whereas recovery time is affected by the same variables and also by building function. The study points to the importance of pre-incident recovery planning, especially for building functions that have shown delayed recovery. The study also calls attention to the importance of further investigations into the challenges facing historic building recovery.

Eisenman, David P., Deborah Glik, Richard Maranon, Lupe Gonzales, and Steven Asch. 2009. Developing a disaster preparedness campaign targeting low-income Latino immigrants: Focus group results for Project PREP. *Journal of Health Care for the Poor and Underserved* 20 (2): 330-345.
Low-income immigrant Latinos are particularly vulnerable to disasters because they are both ill-prepared and disproportionately affected. Disaster preparedness programs that are culturally appropriate must be developed and tested. To develop such a program, the authors conducted 12 focus groups with low-income immigrant Latinos to understand their perceptions and understanding of disaster preparedness, and facilitators and obstacles to it. Participants were concerned about remaining calm during an earthquake. Obstacles to storage of disaster supplies in a kit and developing a family communication plan were mentioned frequently. Misunderstandings were voiced about the proper quantity of water to store and about communication plans. Several focus groups spontaneously suggested small group discussions (platicas) as a way to learn about disaster preparedness. They wanted specific help with building their family communication plans. They rated promotoras de salud highly as potential teachers. Results will guide the development of a disaster preparedness program tailored to the needs of low-income Latino immigrants.

Ghafory-Ashtiany, Mohsen. 2009. View of Islam on earthquakes, human vitality and disaster. *Disaster Prevention and Management* 18 (3): 218-232.
The purpose of this paper is to increase public participation in reducing growing disaster risk in developing countries by making optimum benefit from the richness of Islamic teaching toward developing an effective and scientifically sound risk communication and education plan that blends with historical traditions, religious beliefs, and indigenous knowledge. The paper presents the correlation between the guiding principle of earthquake risk reduction and the views of Islam on disaster, earthquake, God's bounty, the earth, good deeds, human behavior, safety, and vitality in order to clear existing misconceptions. It shows the issues of environment protection, risk management, safety, and human life in terms of religious teaching. The dissemination of this type of knowledge has helped to clear the misconceptions and increase people's understanding of and knowledge about disaster-related issues as a necessary step in the process of disaster risk reduction and improving safety and development, all of which can be viewed as demonstrations of God's love for humankind. It is the first time that this correlation between religion and risk reduction has been explained in a paper, and it is expected to open the road for research and discussion on this topic.

Kajitani, Yoshio, and Shigeo Sagai. 2009. Modeling the interdependencies of critical infrastructures during natural disasters: A case of supply, communication and transportation infrastructures. *International Journal of Critical Infastructures* 5 (1/2): 38-50.
This paper introduces the methodological challenge of identifying and quantifying the interdependencies among several critical infrastructures. First, interdependency structures during a natural disaster are modeled based on past events, considering supply (electricity, water and gas), communication (Internet and telephone) and transportation infrastructures (road networks). Interdependencies are defined with respect to physical, functional and socioeconomic interrelationships. A quantification strategy is then introduced based on empirical surveys and economic models. As a case study, the developed model is applied to the 2004 Mid-Niigata Earthquake, which severely damaged infrastructure systems in the central mountainous area of Japan.

Lai Hang Hui, Dennis. 2009. Politics of Sichuan earthquake, 2008. *Journal of Contingencies and Crisis Management* 17 (2): 137-140.
This research note gives an overview of the Chinese government's political response to the May 2008 deadly earthquake in Sichuan province. The specific focus lies in the political success of the Chinese government in managing the crisis in the context of a drastic socio-economic transition. The way in which the Chinese government on the one hand publicly shifted its traditional reliance on authority by incorporating transparency and responsibility and on the other hand was able to rely on an unprecedented spirit of voluntarism shared among the Chinese population at large, facilitated a fast, efficient, and appropriate response to this crisis.

Lindell, Michael K., Sudha Arlikatti, and Carla S. Prater. 2009. Why people do what they do to protect against earthquake risk: Perceptions of hazard adjustment

attributes. ***Risk Analysis*** **29 (8): 1072-1088.**
This study examined respondents' self-reported adoption of 16 hazard adjustments (preimpact actions to reduce danger to persons and property), their perceptions of those adjustments' attributes, and the correlations of those perceived attributes with respondents' demographic characteristics. The sample comprised 561 randomly selected residents from three cities in Southern California prone to high seismic risk and three cities from Western Washington prone to moderate seismic risks. The results show that the hazard adjustment perceptions were defined by hazard-related attributes and resource-related attributes. More significantly, the respondents had a significant degree of consensus in their ratings of those attributes and used them to differentiate among the hazard adjustments, as indicated by statistically significant differences among the hazard adjustment profiles. Finally, there were many significant correlations between respondents' demographic characteristics and the perceived characteristics of hazard adjustments, but there were few consistent patterns among these correlations.

Malish, Richard, David E. Oliver, Robert M. Rush Jr., Esmeraldo Zarzabal, and Michael J. Burkle Jr. Sigmon, Frederick M. 2009. Potential roles of military-specific response to natural disasters: Analysis of the rapid deployment of a mobile surgical team to the 2007 Peruvian earthquake. ***Prehospital and Disaster Medicine*** **24 (1): 3-8.**
The August 2007 earthquake in Peru resulted in the loss of critical health infrastructure and resource capacity. A regionally located United States Military Mobile Surgical Team was deployed and operational within 48 hours. However, a post-mission analysis confirmed a low yield from the military surgical resource. The experience of the team suggests that nonsurgical medical, transportation, and logistical resources filled essential gaps in health assessment, evacuation, and primary care in an otherwise resource poor surge response capability. Due to an absence of outcomes data, the true effect of the mission on population health remains unknown. The military should focus their disaster response efforts on employment of logistics, primary medical care, and transportation and evacuation. Future response strategies should be evidence-based and incorporate a means of quantifying outcomes.

McCarthy, Melissa L., Peter Brewster, Edbert B. Hsu, Anthony G. Macintyre, and Gabor D Kelen. 2009. Consensus and tools needed to measure health care emergency management capabilities. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S45-S51.**
There is no widely accepted, validated framework of health care emergency management capabilities (HEMCs) that can be used by facilities to guide their disaster preparedness and response efforts. We reviewed the HEMCs and the evaluation methods used by the Veterans Health Administration, The Joint Commission, the Institute of Medicine Metropolitan Medical Response System committee, the Department of Homeland Security, and the Department of Health and Human Services to determine whether a core set of HEMCs and evaluative methods could be identified. Despite differences in the conceptualization of health care emergency management, there is considerable overlap among the agencies regarding major capabilities and capability-specific elements. Of the five agencies, four identified occupant safety and continuity of operations as major capabilities. An additional five capabilities were identified as major by three agencies. Most often the differences were related to whether a capability should be a major one versus a capability-specific element (e.g., decontamination, management of resources). All of the agencies rely on multiple indicators and data sources to evaluate HEMCs. Few performance-based tools have been developed and none have been fully tested for their reliability and validity. Consensus on a framework and tools to measure HEMCs is needed.

McClure, John, Jo White, and Chris G. Sibley. 2009. Framing effects on preparation intentions: Distinguishing actions and outcomes. ***Disaster Prevention and Management*** **18 (2): 187-199.**
This paper shows whether positive or negative framing of preparation messages lead to higher intentions to prepare for earthquakes, and whether the more important component of the message is framing of the preparation action or framing of the outcome of not preparing. Four message conditions were created by crossing the framing of preparation actions (taking or not taking action) and the framing of outcomes (experiencing harm and avoiding harm in an earthquake). They were presented to citizens (n=240) in Wellington, New Zealand, who judged the general importance of preparation and specific preparation steps. The study finds that intentions to undertake both general and specific preparation were higher with negatively framed outcomes than positive outcomes. With specific actions, negative outcomes led to higher intentions to prepare when the action frame was positive (i.e., being well prepared). This research shows that negative framing should apply to outcome preparation and not to the action of preparing and that clarifying negative framing of outcomes is likely to increase preventive actions in relation to natural hazards.

Rautela, Piyoosh, and Girish Chandra Joshi. 2009. Earthquake safety elements in traditional Koti Banal architecture of Uttarakhand, India. ***Disaster Prevention and Management*** **18 (3): 299-316.**
Despite being located in earthquake sensitive region and often experiencing seismic tremors, the State of Uttarakhand in the Indian Himalayas exhibits an elaborate tradition of constructing multistory houses. Both local dialects in the state (Kumaoni and Garhwali) have unique words for identifying four different floors of a building. This is suggestive of a common occurrence of multistory structures in the region. This paper attempts to establish that the people inhabiting this rugged earthquake prone terrain have evolved the art of constructing earthquake safe structures well before the evolution of the structural engineering principles governing such a construction. Detailed investigations were undertaken in the area to establish the antiquity of the traditional structures, as were also earthquake safety provisions

incorporated traditionally in these. Radiocarbon dating of the wood used in the structures established the time of the construction of these structures. Investigations suggest that the region has evolved a distinct, elaborate, and magnificent earthquake-safe construction style. This construction style, designated Koti Banal architecture, attained its zenith around 880 years ago. This architectural style exhibits the existence of elaborate procedures for site selection, preparing the platform for raising the multistory structure, and for the detail of the entire structure, constructed on principles somewhat akin to that of framed structures of modern times. The representative structures of this architecture are observed to be deteriorating fast due to lack of patronage, resources, and awareness. This article brings forth awareness regarding the heritage value of these structures, enabling organized efforts for their conservation and upkeep.

Takahashi, Makoto, Shigeyoshi Tanaka, Reo Kimura, Masatomo Umitsu, Rokuro Tabuchi, Tatsuaki Kuroda, Mastaka Ando, and Fumiaki Kimata. 2009. Restoration after the Sumatra Earthquake Tsunami in Banda Aceh: Based on the results of interdisciplinary research by Nagoya *University. Journal of Natural Disaster Science* 29 (2): 53-61.

This paper is based on the results of research by the Sumatra Earthquake Interdisciplinary or Integrated Research Team, Graduate School of Environmental Studies, Nagoya University. This research shows: (1) the Sumatra Earthquake tsunami disaster damage in Banda Aceh can be divided into four areas; (2) the tsunami action was directed left and right by the Banda Aceh topography; (3) within which District I saw total destruction of housing, a high death rate, and the collapse of families; (4) with the high death rate due to a lack of earthquake-tsunami association; (5) that even in the core of housing reconstruction, the pace is slow; (6) there are four main obstacles to housing reconstruction; (7) the slow pace of the reconstruction is a function of social causes related to the size of the tsunami, the lack of established adjustment mechanisms for aid groups, the slow pace of the reconstruction in society overall, and the failure of market functions; (8) that in the case of large scale disasters, with the loss of life and home, as well as infrastructure, the collapse of society as an entity occurs as well.

Tatham, Peter. 2009. An investigation into the suitability of the use of unmanned aerial vehicle systems (UAVS) to support the initial needs assessment process in rapid onset humanitarian disasters. *International Journal of Risk Assessment and Management* 13 (1): 60-78.

In the aftermath of any disaster situation, achieving an accurate and timely needs assessment is the key to the efficiency and effectiveness of the subsequent logistic response. However, in the light of the inevitable disruption to both the physical and information infrastructure of the affected area, this paper presents the results of an initial theoretical investigation into the use of an unmanned aerial vehicle system (UAVS) as a means of complementing existing satellite, unmanned aircraft, and pedestrian data-gathering techniques. Using a case study based on the 2005 Pakistan earthquake, the paper investigates how UAVS might be employed, the information that could be obtained, and the consequential benefits. It concludes that UAVS has the potential to support the overall needs assessment process, and a first estimate of the required conditions for success is offered, together with recommendations for the further practical research that it is considered necessary in order to operationalize the concept.

Utkucu, Murat, Zakir Kanbur, Omer Alptekin, and Fatih Sunbu. 2009. Seismic behaviour of the North Anatolian Fault beneath the Sea of Marmara (NW Turkey): Implications for earthquake recurrence times and future seismic hazard. *Natural Hazards* 50 (1): 45-71.

Possible long-term seismic behavior of the northern strand of the North Anatolian Fault Zone, between the western extreme of the 1999 Izmit rupture and the Aegean Sea after 400 A.D. is studied by examining the historical seismicity, the submarine fault mapping, and the paleo-seismological studies of the recent scientific efforts. The long-term seismic behavior is discussed through two possible seismicity models devised from MS C 7.0 historical earthquakes. The estimated return period of years of the fault segments for M1 and M2 seismic models along with their standard deviations are as follows: F4 segment 255±60 and 258±12; F5 segment 258±60 and 258±53; F6 segment 258±60 and 258±53; F7 segment 286±103 and 286±90; F8 segment 286±90 and 286±36. As the latest ruptures on the submarine segments have been reported to be during the 1754-1766 earthquake sequence, and the 1912 main shock rupture has been evidenced to extend almost all over the western part of the Sea of Marmara, our results imply imminent seismic hazard and, considering the mean recurrence time, a large earthquake to strike the eastern part of the Sea of Marmara in the next two decades.

Vranes, Kevin, and Roger Pielke Jr. 2009. Normalized earthquake damage and fatalities in the United States: 1900-2005. *Natural Hazards Review* 10 (3): 84-101.

Damage estimates from 80 U.S. earthquakes since 1900 are "normalized" to 2005 dollars by adjusting for inflation, increases in wealth, and changes in population. Factors accounting for mitigation at one and two percent loss reduction per year are also considered. The earthquake damage record is incomplete, perhaps by up to 25 percent of total events that cause damage, but all of the most damaging events are accounted for. For events with damage estimates, cumulative normalized losses since 1900 total $453 billion, or $235 billion and $143 billion when one percent and two percent mitigation is factored, respectively. The 1906 San Francisco earthquake and fire adjusts to $39 billion–$328 billion depending on assumptions and mitigation factors used, likely the most costly natural disaster in U.S. history in nor-

malized 2005 values. Since 1900, 13 events would have caused $1 billion or more in losses had they occurred in 2005; five events adjust to more than $10 billion in damages. Annual average losses range from $1.3 billion to $5.7 billion with an average across data sets and calculation methods of $2.5 billion, below catastrophe model estimates and estimates of average annual losses from hurricanes. Fatalities are adjusted for population increase and mitigation, with five events causing over 100 fatalities when mitigation is not considered, four (three) events when one percent (2%) mitigation is considered. Fatalities in the 1906 San Francisco event adjusts from 3,000 to over 24,000, or 8,900 (3,300) if one percent (2%) mitigation is considered. Implications for comparisons of normalized results with catastrophe model output and with normalized damage profiles of other hazards are considered.

Walton, Darren, and Steven Lamb. 2009. An experimental investigation of post-earthquake travel behaviors: The effects of severity and initial location. ***International Journal of Emergency Management*** **6 (1): 14-32.**
A computer-aided personal interviewing survey containing 63 items examining post-earthquake travel behaviors was administered to 802 members of the general public. Earthquake simulation videos modeled a moderate and severe event (6.8 and 7.5 respectively, on the Richter scale) in an office and home setting. Travel movements were recorded over a simulated 48-hour period following the earthquake. GIS software was used to obtain trip origins and destinations the routes taken and trip distances. The results indicate that an event which induces significant travel produces trips that are for a variety of purposes, not just to return home. While individually rational, this behavior is a form of collective social disorder. Mode choice varies with event severity and distance (walking was preferred up to 3.25 km, then vehicles were preferred). Well-prepared emergency plans reduce the need to travel. The motivation to travel was affected by available information and is discussed as a form of information seeking.

Wechsler, Neta, Oded Katz, Yehoshua Dray, Ilana Gonen, and Shmuel Marco. 2009. Estimating location and size of historical earthquake by combining archaeology and geology in Umm-El-Qanatir, Dead Sea Transform. ***Natural Hazards*** **50 (1): 27-43.**
This article looks at the Byzantine-to-Ummayad (6th-8th century) archaeological site of Umm-El-Qanatir, located 10 kilometers east of the Dead Sea Transform (DST) in northern Israel. The site was damaged by an earthquake-induced landslide, and in this work the authors use slope stability analysis to constrain the historical seismic acceleration that occurred along the northern segment of the DST. Umm-El-Qanatir archaeological site is located on a slope of a canyon and contains evidence for earthquake-related damage, including fallen columns and walls, horizontal shift of heavy masonry blocks, and complete burial of ceramic pots and farming tools beneath fallen ceilings. A water pool that collected spring water is displaced nearly one meter by the landslide. The artifacts from the village and the spring area indicate that people inhabited the site until the middle of the 8th century. They argue that the destruction, which forced the abandonment of Umm-El-Qanatir together with nearby settlements, was associated with the earthquake of January 18, 749 CE. In order to evaluate the ground acceleration related to the above earthquake, the authors back-analyze the stability of a failed slope, which cut and displaced the water-pool, using slope stability software (Slope/W). The results show that the slope is statically stable and that high values of horizontal seismic acceleration (>0.3 g) are required to induce slope failure. Subsequently, they use the Newmark displacement method to calculate the earthquake magnitude needed to cause the slope failure as a function of distance from the site. The results (attributed to the 749 CE earthquake) show that a MW>7.0 earthquake up to 25 km from the site could have induced the studied landslide.

Wyss, Max, and Marine Zibzibadze. 2009. Delay times of worldwide global earthquake alerts. ***Natural Hazards*** **50 (1): 279-387.**
Quantitative estimates of earthquake losses are needed as soon as possible after an event. A majority of earthquake-prone countries lack the necessary dense seismograph networks, modern communication, and—in some places—the experts to assess losses immediately, so the earliest possible warnings must come from global information and international experts. Earthquakes of interest to us are in most areas of the world M6 or greater. In this article, the authors have analyzed the response time for distributing source parameter estimates from: National Earthquake Information Center of the US Geological Survey, the European Mediterranean Seismological Center, and Geophysical Institute-Russian Academy of Science, Obninsk. In terms of earthquake consequences, the Pacific Tsunami Warning Center issues assessments of the likelihood of tsunamis, the Joint Research Laboratory in Ispra, Italy issues alerts listing sociological aspects of the affected region, and we distribute loss estimates. Recently the USGS has started posting impact assessment information on their PAGER web page. Two years ago, the USGS reduced its median delay of distributing earthquake source parameters by a factor of two to the currently observed 26 minutes, and they distribute information for 99 percent of the events of interest to us. The median delay of EMSC is 41 minutes, with 30 percent of our target events reported. RAS reports after 81 minutes and 30 percent of the target events. The first tsunami assessments by TWC reached us in 18 minutes (median) after large earthquakes in the Pacific area. The median delay of alerts by the JRC is 44 minutes (36 minutes recently). The World Agency for Planetary Monitoring and Earthquake Risk Reduction distributes detailed loss estimates in 41 minutes (median). Moment tensor solutions of the USGS, which can be helpful for refining loss estimates, reach us in 78 minutes (median) for 58 percent of the earthquakes of interest.

Ying Yang Chan, Emily. 2009. Why are older peoples' health needs forgotten post-natural disaster relief in developing countries? A healthcare provider survey of 2005 Kashmir, Pakistan earthquake. ***American Journal of***

Disaster Medicine **4 (2): 107-112.**
Although older people may be recognized as a vulnerable group after natural disasters, their particular needs are rarely met by the providers of emergency services. Studies about older people's health needs postdisaster in the South East Asian Tsunami, Kashmir, Pakistan, China and the United States have revealed the lack of concern for older people's health needs. Recent study of older people's health needs after the Kashmir Pakistan earthquake (2005) found their health needs were masked within the general population. This survey examines the provider's perceptions of older people's vulnerabilities after the Kashmir earthquake. It aims to understand the awareness of geriatric issues and issues related to current service provision and planning for older people's health needs after disasters, specifically comparing service delivery patterns among different relief agencies. Cross-sectional, structured stakeholder interviews were conducted within a two-week period in February, 2006, four months after the earthquake in Pakistan-administered Kashmir. Three types of health and medical relief agencies—international nongovernmental organizations, national organizations, and local/community groups—were solicited to participate in the study. A descriptive analysis was conducted. Important issues identified include the need to sensitize relief and health workers about older people's health needs postdisaster, the development of relevant clinical guidelines for chronic disease management postdisaster in developing countries, and the advocacy of building in geriatric-related components in natural disaster medical relief programs. To address the vulnerability of older people, it is important for governments, relief agencies, and local partners to include and address these issues during their relief operations and policy planning.

Floods

Abbasov, R.K., and Mahmudov. R.N. 2009. Analysis of non-climatic origins of floods in the downstream part of the Kura River, Azerbaijan. *Natural Hazards* **50 (1): 235-248.**
Over the past century, there has been an increased contribution of non-climatic factors to the flood formation processes in the Kura River. "Non-climatic factors of floods" refer to factors that are related to reductions in channel capacity and result in floods. More recently, there are numerous non-climatic factors occurring in and around the Kura River basin that have increased the frequency of floods. Sediment accumulation in the riverbed over a long period of time has led to the reduction of channel capacity and has raised the elevation of the riverbed above the surrounding territory. It is shown that construction of dikes and levees do not actually prevent flooding, where hydrologic connections between groundwater and surface water are high, since infiltrated waters from the channel results in raising of ground waters, causing an effect of "underground flood.'' Since underground floods occur when water going from channels raises the level of ground waters, there is an urgent need to carefully investigate the groundwater-surface water connections. With the purpose of predicting floods, the authors suggest defining maximal acceptable flows rather than channel capacities. Results show that high rates of hydraulic conductivity of soils will decrease MAF rates. MAF computations before high-water season allow for further regulation of outlets further downstream in order to prevent flooding and enable flood forecasting. While the study focuses on a specific region, the overall approach suggested is generic and may be applied elsewhere.

Abuaku, B.K., J. Zhou, Li Xinhua, S. Li, Xingli Li, A. Lui, T. Yang, and H. Tan. 2009. Morbidity and mortality among populations suffering floods in Hunan, China: The role of socioeconomic status. *Journal of Flood Risk Management* **2 (3): 222-228.**
A cross-sectional survey in randomly selected eight counties affected by the 1998 floods in Hunan, China, was conducted in 2000 using a structured questionnaire. Data obtained included demographic and housing characteristics of subjects; family income; morbidity and mortality during and after the floods; and type and severity of flood suffered. Gender, age group, source of drinking water, type of flood suffered, and severity of flood suffered played highly significant roles in morbidity while gender, age group, educational level, family size, and type of flood suffered played highly significant roles in mortality among populations suffering floods. Intervention strategies in such populations must take into account these characteristics to reduce the health impact of floods.

Adeola, Francis O. 2009. Katrina cataclysm: Does duration of residency and prior experience affect impacts, evacuation, and adaptation behavior among survivors? *Environment and Behavior* **41 (4): 459-489.**
This study explores the extent to which people's prior experience of a natural disaster influenced subsequent behavior concerning the threats of a hydrometeorological disaster and if duration of residency in a disaster-prone landscape affects the extent of preparedness for an impending disaster. Mixed methods research strategies involving survey, field observation, and participant observations at several locations including rescue and evacuation centers in New Orleans, Louisiana, Austin, Texas, and Lawrenceville, Georgia, were used, during the immediate impact phase, emergency shelter phase, and post-impact and recovery phase of Hurricane Katrina. For the survey, a sample of 598 subjects completed a 15-page, 54-item questionnaire addressing various aspects of the Katrina flood in the New Orleans Metropolitan Area. The qualitative aspect consists of field observations of the event, interviews, and direct comments by the victims dispersed across the South. In the regression analysis performed, prior experience was found to be less important than friends' and family members' influence in determining evacuation behavior. However, duration of residency and prior experience were found to be slightly significant in predicting the odds of evacuation.

Anquetin , Sandrine, V. Ducrocq, I. Braud, and J.-D. Creutin. 2009. Hydrometeorological modeling for flash flood areas: The case of the 2002 Gard event in France. ***Journal of Flood Risk Management*** **2 (2): 101-110.**
In the context of flash flood forecasting, this paper proposes a few advances in our understanding of the hydrometeorological processes and their associated modeling requirements that may be useful to introduce within an operational forecasting chain. The study is focused on the September 2002 storm that produced more than 600 mm of rainfall in 24 hours and triggered a series of flash floods in the southern France. This catastrophic event took 23 human lives in 16 distinct subcatchments. This paper proposes a combined detailed analysis of the meteorological event and hydrological simulations of the response of four small, ungauged catchments. The meteorological analyses are based on observations and results of simulation of rain fields obtained with the MesoNH model. These analyses explained the steadiness of the storms that led to a locally intense precipitation: the role of the orography and favorable synoptic conditions. The hydrological model is set up without any calibration and the soil parameter specification is based on an existing soil database. Radar rainfall estimations are used. Simulated specific peak discharges are found to be in agreement with estimations from a post-event in situ investigation. Based on the model results, a cartography of the dominant process is proposed for the four selected catchments.

Aparicio, J., P.F. Martínez-Austria, A. Güitrón, and A.I. Ramírez. 2009. Floods in Tabasco, Mexico: A diagnosis and proposal for courses of action. ***Journal of Flood Risk Management*** **2 (2): 132-138.**
From October 28 to October 30, 2007, exceptional rainfall fell in the Grijalva River Basin, in Chiapas and Tabasco, Mexico, producing huge runoff and flooding in about 70 percent of the Tabasco flatlands. More than one million people were affected, mostly in the city of Villahermosa. In southeastern Mexico, flooding damages have increased in the last decades, due to population growth and human settlements developing in areas prone to flooding. A preliminary analysis is made of the causes of the disaster and of the possible courses of action that could be taken to prevent similar situations in the future. The hydrometeorological occurrence of the phenomenon is reviewed, and the operation and management of dams and other flood control system components, including forecast and alert procedures, are assessed. Recommendations are made on integrated flood management, joint operational policies of infrastructure, a territorial ordinance plan, forecast needs, social participation, training, and information dissemination among the population and stakeholders.

Armas, Iuliana, and Avram Eugen. 2009. Perception of flood risk in Danube Delta, Romania. ***Natural Hazards*** **50 (1): 269-287.**
For exposed and vulnerable communities, the perception of natural risk is an essential link in the analysis of human-environment coping relationships. It is also an important parameter in the quantification of complex vulnerability as a central predictive variable in the risk equation. This study reveals the conscious and unconscious attitudes towards the flood risk for the inhabitants of the Danube Delta in Romania. These attitudes, defined by different degrees of psychological vulnerability, represent the background for a series of psycho-behavioral patterns that generate certain adjustment mechanisms and strategies. Application of a specially designed questionnaire and the statistical analysis of the results revealed two psychological factors as essential in establishing the psychosocial vulnerability degree of the interviewed subjects: (i) an internal control factor; and (ii) an external control factor. The persons characterized by inner control have a significantly reduced general anxiety level in comparison to individuals with the control factor placed externally. As confidence diminishes, it increases the tendency of the individual to rely on the external factors for support and security. The lack of resources (indicating lower resilience) and mistrust in the support given emphasizes non-adaptive behaviors.

Ayers, Jessica M., and Saleemul Huq. 2009. Development and climate change: A mainstreaming approach for assessing economic, social, and environmental impacts of adaptation measures. ***Environmental Management*** **43 (5): 765-778.**
The paper introduces the so-called climate change mainstreaming approach, where vulnerability and adaptation measures are assessed in the context of general development policy objectives. The approach is based on the application of a limited set of indicators. These indicators are selected as representatives of focal development policy objectives, and a stepwise approach for addressing climate change impacts, development linkages, and the economic, social, and environmental dimensions related to vulnerability and adaptation are introduced. Within this context it is illustrated how development policy indicators in practice can be used to assess climate change impacts and adaptation measures based on three case studies: a road project in flood prone areas of Mozambique; rainwater harvesting in the agricultural sector in Tanzania; and malaria protection in Tanzania. The paper concludes that climate risks can be reduced at relatively low cost, but uncertainty remains about some of the wider development impacts of implementing climate change adaptation measures.

Bakker, Marloes. 2009. Transboundary river floods: Examining countries, international river basins, and continents. ***Water Policy*** **11 (3): 269-288.**
The objectives of this study were: (1) to quantify river floods shared by more than one country, that is, transboundary river floods; and (2) to grasp more fully the degree of vulnerability of people to such events on a global, international river basin (IRB), and country level. To these ends, publicly available data were combined to identify such events and the resultant losses of life. Flood-related affected individuals and financial damage statistics were related to national levels of development. It was determined that in the period 1985-2005, some 175 of the 1,760 river floods were transboundary, but globally accounted for 32 percent of all casualties and almost

60 percent of all affected individuals, illustrating the massive impact of shared floods. This database of transboundary floods was then merged with socio-economic and biophysical data, enabling analyses that revealed the degree of vulnerability of people to transboundary floods from a global to a country level. Selecting one country, continent, or IRB most vulnerable to transboundary floods proved to be infeasible since the answer depended heavily upon the specific definition of vulnerability, illustrating the complexity of this phenomenon. However, together the results significantly increased our current knowledge of shared floods which could aid policy makers in identifying and evaluating potential vulnerability to transboundary river floods.

Bales, J.D., and C.R. Wagner. 2009. Sources of uncertainty in flood inundation maps. *Journal of Flood Risk Management* 2 (2): 139-147.
Flood inundation maps typically have been used to depict inundated areas for floods having specific exceedance levels. The uncertainty associated with the inundation boundaries is seldom quantified, in part, because all of the sources of uncertainty are not recognized and because data available to quantify uncertainty seldom are available. Sources of uncertainty discussed in this paper include hydrologic data used for hydraulic model development and validation, topographic data, and the hydraulic model. The assumption of steady flow, which typically is made to produce inundation maps, has less of an effect on predicted inundation at lower flows than for higher flows because more time typically is required to inundate areas at high flows than at low flows. Difficulties with establishing reasonable cross sections that do not intersect and that represent water surface slopes in tributaries contribute additional uncertainties in the hydraulic modeling. As a result, uncertainty in the flood inundation polygons simulated with a one-dimensional model increases with distance from the main channel.

Beresford, Anthony, and Stephen Pettit. 2009. Emergency logistics and risk mitigation in Thailand following the Asian tsunami. *International Journal of Risk Assessment and Management* 13 (1): 7-21.
A series of recent natural disasters (earthquakes, floods, droughts) and man-made crises (civil unrest, war, political disturbances) have highlighted the vulnerability of communities to unstable conditions. Reaching displaced people in crisis conditions is heavily dependent on the effectiveness of the supply chain and its management systems. Disaster responses have been modeled into, for example, three stages: preparedness, response, and recovery. In the case of the Asian tsunami, one of the principal weaknesses was the absence of such events from existing government response plans. There was therefore no top-down strategy and no implementation mechanisms on the ground. Whatever communications networks were in place were quickly overwhelmed. They became the subject of a major review in the months following the disaster. This paper highlights the fact that disaster preparedness in the manner suggested by W.N. Carter is shown to be less appropriate than the "soft approach" taken by the Thai government post-tsunami, whereby emphasis is on well-organized local communication networks, early warning systems, and danger mitigation rather than accumulation and management of large scale emergency stocks of, for example, food, tents, and equipment.

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* 29 (6): 912-929.
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 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. The authors track 18 different mitigation activities organized into four series of activities under FEMA's Community Rating System (CRS) for every local jurisdiction in Florida participating in the FEMA program on a yearly time step. They then identify 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, they isolate the effects of several variables categorized into the following groups: hydrologic conditions, flood disaster history, 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.

Cobby, D., S. Morris, A. Parkes, and V. Robinson 2009. Groundwater flood risk management: Advances towards meeting the requirements of the EU floods directive. *Journal of Flood Risk Management* 2 (2): 111-119.
Identifying areas that may be susceptible to groundwater flooding through both hazard and risk maps is a requirement of the EU Floods Directive. For groundwater flooding, hazard maps could show flood extent and depth or water level (velocity would not generally be appropriate) with risk maps additionally showing the potential adverse consequences. The EU Floods Directive allows member states to limit groundwater flood maps to floods with a low probability, or extreme events. This paper focuses on feasible techniques, available data and current limitations for producing groundwater flood maps that could meet the requirements of the Floods Directive. In addition, to set mapping in the wider context

of groundwater flood risk management, advances in data collection and flood warning are also reviewed. Specifically, determining the likelihood and the likely depth of groundwater flooding will be particular challenges where further work will have to build on the advances already made.

Cook, Timothy. 2009. Cleaning up New Orleans: The Impact of a missing population on disaster debris removal. ***Journal of Emergency Management*** **7 (3): 21-31.**
Public participation in the disaster debris removal process is an important component to any large-scale rebuilding effort. How, then, does such an effort progress when nearly two-thirds of the affected community's population does not come back to participate? New Orleans faced just such a situation after Hurricane Katrina and the catastrophic flooding that followed. The debris removal task is the largest in U.S. history, but very few residents returned to participate in the cleanup. This article provides a further understanding of the impact that New Orleans' missing population had on the cleanup process. Without the city's residents (or first filters), the enormous debris removal effort in New Orleans was further slowed and complicated. The first two sections provide background and context, identifying the size and scope of the disaster, the low residential return rate, and the role of public participation in previous large-scale debris removal efforts. The next three sections focus on the disaster debris itself, identifying specific ways in which the missing population further complicated New Orleans' cleanup efforts with regard to (a) the duration of the debris removal process, (b) the volume of debris, and (c) the contamination of debris. The final section considers various measures that emergency planners and managers can take to facilitate "participatory repopulation," thus mitigating the complications of a missing population.

Falconer, R.H., D. Cobby, P. Smyth, G. Astle, J. Dent, and B. Golding. 2009. Pluvial flooding: New approaches in flood warning, mapping and risk management. ***Journal of Flood Risk Management*** **2 (3): 198-208.**
In response to Defra's First Government Response to the Making Space for Water consultation, the feasibility study into expanding flood warning to cover other flood risks has investigated the technical feasibility of providing warning services for sources of flooding other than from rivers and the sea. Following a review of all nonfluvial and noncoastal sources of flooding perceived as significant, it was concluded that it is currently technically feasible to consider providing some form of warning service for pluvial and three forms of groundwater flooding. Although a warning service for pluvial flooding is considered less advanced than that for groundwater, a trigger rainfall forecast and a method for identifying locations most susceptible to pluvial flooding has been proposed. This form of service could provide responding organizations with more warning of possible flooding than is currently available.

Fuchs, Sven, Karl Spachinger, Wolfgang Dorner, Juliette Rochman, and Kamal Serrhini. 2009. Evaluating cartographic design in flood risk mapping. ***Environmental Hazards Human and Policy Dimensions*** **8 (1): 52-70.**
In order to mitigate flood hazards and to minimize associated losses, technical protection measures have been supplemented by non-technical mitigation, i.e. land use planning activities. This is commonly done by creating maps which indicate areas by different cartographic symbols, such as color, size, shape and typography. Hazard and risk mapping is the accepted procedure when dealing with natural hazards and is therefore required in the European Member States in order to meet demands of the European Flood Risk Directive. However, available information is sparse concerning the impact of such maps on different stakeholders, i.e. specialists in flood risk management, politicians, and affected citizens. The lack of information stems from a traditional approach to map production which does not take into account specific end-user mechanisms originating from different perception patterns. Different sets of small of small-scale as well as large-scale risk maps were tested with different groups of subjects in order to: (1) study reading behavior as well as understanding; and (2) deduce the most attractive components that are essential for target-oriented communication of cartographic information. Eye tracking was applied using a video-oculography technique. This resulted in a map template which fulfills the requirement to serve as an efficient communication tool for specialist and practitioners in hazard and risk mapping as well as for laypersons. Taking the results of this study will enable public authorities who are responsible for flood mitigation to: (1) improve their flood risk maps; (2) enhance flood risk awareness; and (3) create more disaster-resilient communities.

Harvey, G.L., C.R. Thome, X. Cheng, Evans E.P., S Han, J.D. Simm, and Y. Wang. 2009. Qualitative analysis of future flood risk in the Taihu Basin, China. ***Journal of Flood Risk Management*** **2 (2): 85-100.**
This paper presents the results of a qualitative analysis of future flood risk in the Taihu Basin, China, performed using an adaptation of the UK Foresight Future Flooding approach. Drivers of increased flood risk were identified and ranked according to their importance in contributing to future flooding by experts and stakeholders working within an inclusive, participatory framework. Management responses to increasing flood risk were also identified and assessed in terms, first, of their potential to reduce flood risks and, second, their sustainability. This analysis provides the foundation for quantitative flood risk modeling to be performed in the next phase of the project. It has also added value to flood risk management in the Taihu Basin by bringing stakeholders together to develop a shared understanding of the flooding system and the relative importance of multiple flood risk drivers and responses. Together, the qualitative and quantitative analyses will provide a comprehensive vision of possible future flood risk to inform policy development and decision making.

Hung, Hung-Chih. 2009. The attitudes towards flood insurance purchase when respondents' preferences are uncertain: A fuzzy approach. ***Journal of Risk Research*** **12 (2): 239-258.**
Individuals may have difficulty in determining whether or not to buy insurance against low-probability, high-loss events. This ambivalence would cause preference uncertainty and decrease homeowners' interest in voluntarily buying insurance. This paper incorporated fuzzy set theory into contingent valuation analysis to examine the determinants of attitude towards buying flood insurance under preference uncertainty. The results show that the perceived levels of flood risk, experience with flood, disposable income, as well as house conditions, are influential factors in the decision-making process for insurance purchase. However, both the estimated price and income elasticities are low for flood insurance purchase. It is worth noting that governments' artificial structures provide a disincentive for buying insurance, although respondents perceived or/and are exposed to a high level of flood risk. The findings also show that the spread of fuzzy willingness to pay regions is wide, resulting from respondents' high uncertainty on their value judgment of insurance. This indicates that preference uncertainty and conservatism rule are the key factors that cause respondents to tend to reject buying insurance.

Johnstone, W.M., and B.J. Lence. 2009. Assessing the value of mitigation strategies in reducing the impacts of rapid onset, catastrophic floods. ***Journal of Flood Risk Management*** **2 (3): 209-221.**
Communities worldwide face dangers from floods induced by natural events or technical failures. These vulnerabilities are increasing because of continued settlement along coastlines and in floodplains They may be further exacerbated by future climate change. Flood losses can be mitigated via structural and nonstructural (or community based) means. Risk analysis can be undertaken on behalf of different stakeholders including: policy makers or regulatory bodies; asset owners; the local community; and individuals who live, work, or recreate in the hazard impact zones. While methods exist for assessing the risks associated with water impoundment and control structures, less effort has been devoted to developing methods that can assess the merits of community-based preparation and response activities such as evacuation and sheltering in place. There is a need to identify the best approaches for undertaking assessments of proposed plans, and to explore opportunities for adapting existing models to provide these capabilities. This paper posits the challenge of assessing nonstructural approaches in the context of existing risk analysis methods, proposes a possible direction for developing new methods of analysis, and then demonstrates the application of the proposed methods in support of planning for near-field tsunami hazards along the Pacific coast of North America.

Katuk, Norliza, Ku Ruhana Ku-Mahamud, Norita Norwawi, and Safaai Deris. 2009. Web-based support system for flood response operation in Malaysia. ***Disaster Prevention and Management*** **18 (3):327-337.**
This paper presents the utilization of a Web-based support system for flood response operation in Malaysia. The system is intentionally designed to improve process and data management towards providing prompt and effective response to victims. The research adopted the knowledge acquisition method for implementing expert systems in organizations. The methodology consists of four phases of activities which are planning for knowledge acquisition, knowledge extraction, knowledge analysis, and knowledge verification. The findings include the architecture of the Web-based support system for flood response operation which is presented in the form of conceptual and software models. The architecture of Web-based support systems for flood response operation can assist the flood management related agencies in managing and maintaining data related to floods. It also allows them to monitor the current situation of flood-related matters. Web-based support systems for flood response operation is expected to improve the overall aspect of flood response operation by providing electronic features which facilitate the flood response process and data management. In the future, expert systems for flood response operations wil be an enhancement to the current architecture. The proposed architecture is beneficial for the flood management related agencies in order to plan further improvements in the current procedure for flood response.

Keys, C., and M. Cawood. 2009. Identifying and reducing inadequacies in flood warning processes: An Australian perspective. ***Journal of Flood Risk Management*** **2 (3): 190-197.**
Floods are a serious threat to life, property, and infrastructure in Australia. Accordingly there has been a strong focus on the development of flood warning services. These are provided by the Australian Government Bureau of Meteorology in conjunction with emergency management agencies and councils of local government. Often there are performance shortfalls in the provision of warnings of impending floods. Community criticism is common. This paper argues that most of the weaknesses in Australian flood warning practice are "cultural" (that is, pertaining to the ways in which agencies operate) rather than "technical" (resulting from deficiencies in data management or analysis). The paper makes a number of suggestions designed to overcome these deficiencies.

Leo, James D., Desiree Thomas, and Ginger Alhadeff. 2009. A unique hospital physician disaster response system for a nonemployed medical staff. ***American Journal of Disaster Medicine*** **4 (2): 95-100.**
Private hospitals with nonemployed, volunteer medical staffs face a special challenge in meeting the patient-care needs posed by a mass casualty incident (MCI). Although most disaster response

systems focus on emergency department and trauma management, such systems often do not provide for the need to triage existing inpatients to create room for incoming casualties, for continuity of physician care for those patients, as well as for MCI victims in case of major disaster. Such systems must also provide a mechanism for ethical and appropriate rationing of limited resources during a MCI. Community hospitals without 24/7 in-house physicians must provide a mechanism for physician care for patients in situations in which access to the hospital may be limited by the disaster (e.g., major earthquake or flood). This article describes a system established at Long Beach Memorial Medical Center, a 740-bed, not-for-profit hospital with a volunteer medical staff to ensure continuity of physician care in a major disaster. To the authors knowledge, this is the first published report of such a system.

Li Li, Yang, Hong Jiahu, Robert F. Adler, Frederick S. Policelli, Shahid Habib, Daniel Irvin, Tesfaye Korme, and Lawrence Okello. 2009. Evaluation of the real-time TRMM-based multi-satellite precipitation analysis for an operational flood prediction system in Nzoia Basin, Lake Victoria, Africa. ***Natural Hazards*** **50 (1): 109-123.**
Many researchers seek to take advantage of the recently available and virtually uninterrupted supply of satellite-based rainfall information as an alternative to and supplement for ground-based observations in order to implement a cost-effective flood prediction in many under-gauged regions around the world. Recently, the National Aeronautics and Space Administration's Applied Science Program has partnered with U.S. AID and African-RCMRD to implement an operational water hazard warning system, SERVIR-Africa. The ultimate goal of the project is to build up disaster management capacity in East Africa by providing local governmental officials and international aid organizations a practical decision support tool to better assess emerging flood impacts, to quantify spatial extent of flood risk, and to respond to flood emergencies more expediently. This article evaluates the applicability of integrating NASA's standard satellite precipitation product with a flood prediction model for disaster management in Nzoia, a sub-basin of Lake Victoria, Africa. This research first evaluated the TMPA real-time rainfall data against gauged rainfall data from the year 2002 through 2006. Then, the gridded Xinanjiang Model was calibrated to Nzoia Basin for 1985-2006. Benchmark streamflow simulations were produced with the calibrated hydrological model using the rain gauge and observed streamflow data. Afterward, continuous discharge predictions forced by TMPA 3B42RT real-time data from 2002 through 2006 were simulated, and acceptable results were obtained in comparison with the benchmark performance according to the designated statistic indices such as bias ratio (20%) and NSCE (0.67). Moreover, it is identified that the flood prediction results were improved with systematically bias-corrected TMPA rainfall data with less bias (3.6%) and higher NSCE (0.71). Although the results suggest to us that TMPA real-time data can be acceptably used to drive hydrological models for flood prediction purposes in Nzoia Basin, continuous progress in space-borne rainfall estimation technology toward higher accuracy and higher spatial resolution is highly appreciated. Finally, it is also highly recommended that to increase flood forecasting lead time, more reliable and more accurate short- or medium-range quantitative precipitation forecasts are essential.

Marchand, M., J. Buurman, A. Pribadi, and J. Kurniawan. 2009. Damage and casualties modeling as part of a vulnerability assessment for tsunami hazards: A case study from Aceh, Indonesia. ***Journal of Flood Risk Management*** **2 (2): 111-119.**
Vulnerability reduction to tsunamis has become a major issue after the December 2004 Indian Ocean tsunami disaster. An ex ante (before the event) evaluation of possible disaster reduction measures requires insight into the potential risks. As part of a study focusing on sea defense measures for Aceh and Nias provinces in Indonesia, the authors developed a model that is capable of quantifying potential damages and casualties for tsunami-prone coastal areas. The model was able to reproduce the damage of 2004 sustained in Banda Aceh quite accurately. Because it is GIS based, the model also shows the spatial distribution of damage. Maps can be prepared that show high- and low-impact areas for various tsunami event scenarios. This information is very useful for cost-benefit analyses of mitigation measures, such as sea defense measures, spatial planning, and evacuation procedures.

Mirfenderesk, Hamid. 2009. Flood emergency management decision support system on the Gold Coast, Australia. ***Australian Journal of Emergency Management*** **24 (2): 48-58.**
Gold Coast has long been rated as the most vulnerable area subject to flooding in Australia. There has been growing concern worldwide about climate change impacts including sea level rise, increased frequency and severity of storms, and changes in rainfall patterns. Implications of these changes includes an increase in the risk of flooding. Future floods are more likely to overwhelm existing protection measures more frequently, exposing us to more residual risks. Addressing this issue, Gold Coast City Council has been developing a flood emergency decision support system as part of a 10-year flooding and drainage plan. This system integrates the council's flood modeling capacity, properties, infrastructure, and population data into a single easy-to-use package. Using this system, emergency managers have access to valuable flood forecast information. The decision support system is designed to assist in a post-disaster situation, although currently it is being used for predisaster flood emergency planning. As a postdisaster measure, it can identify vulnerable populations and assist in the evacuation of populations at risk. Its availability on the Internet allows it to be potentially used for implementation of flood emergency procedures by vulnerable places such as childcare and elderly care centers. This paper provides a description of the elements of the system that have been developed or implemented so far, provides a brief description of the elements that are planned for the future, makes recommendations on how such systems can be improved, and how these can contribute to better flood emergency management.

Nandala, K.D.W. 2009. Use of a hydrodynamic model to forecast floods of Kalu River in Sri Lanka. ***Journal of Flood Risk Management*** **2 (3): 151-158.**
Kalu River, the third longest river in Sri Lanka, discharges the largest amount of water into the ocean while causing floods along its route from the most upstream major town, Ratnapura, to the most downstream town, Kalutara. It has become necessary to either totally control these floods or instruct people to adjust their activities to the rhythm of the river and prepared them to live with floods with minimum damages. This paper presents a model developed to determine water levels along the river from Ratnapura to 79 kilometers downstream Kalutara using the HEC-RAS hydrodynamic model. The model was calibrated and verified for both steady and unsteady flow conditions. It provides water levels and inundation areas along the river for different discharges. A set of tables, which could be used by people with less technical knowledge, were prepared to predict flood levels at downstream locations based on observed water levels at upstream locations.

Nibedita, Ray-Bennett S. 2009. The influence of caste, class, and gender in surviving multiple disasters: A case study from Orissa, India. ***Environmental Hazards Human and Policy Dimensions*** **8 (1): 5-22.**
Sociological and anthropological studies in India reveal that caste, class, and gender in everyday life are both rigid and dynamic, but little is known about how they influence the survival mechanisms of women during "multiple disasters," nor about how women negotiate with these structural mores to meet their cultural and biological needs. This is explored through the experiences of 12 female-headed households from different social castes in Orissa, India. Multiple disasters or disasters that occur in "one specific place" (such as floods, cyclone, and drought) are regular events in coastal parts of the state of Orissa. The supercyclone of 1999, the two floods of 2001 and 2003, and the drought of 2000 and 2002 form the case study. Participant observation, in-depth interviews, and documentary evidence complement the fieldwork. The findings suggest a complex interplay of caste, class, and gender in surviving the multiple disasters, including structural mutability under the purview of social organization. Women demonstrated their individual and collective agencies in order to meet their culture and biological needs under severe crisis. This research stresses that gender and disaster studies must include a consideration of caste and class for effective disaster management and social vulnerability reduction.

Nielsen-Arnbjerg, K., and H.S. Fleischer. 2009. Feasible adaptation strategies for increased risk of flooding in cities due to climate change. ***Water Science & Technology*** **60 (2): 273-281.**
Northern Europe is one of the regions where more frequent and more severe storms and storm surges are expected due to climatic changes. In order to maintain an acceptable risk of flooding, suitable adaptation strategies must be defined and implemented. Optimum solutions demand collaboration of different professionals and thus simple graphical means must be employed to illustrate the economic impacts of the change in risk of flooding. A case study indicates that urban drainage infrastructure capacity should be upgraded while there is currently no economic incentive to improve protection against sea surges.

Perucca, Laura P., and M. Yanina Esper Angillieri. 2009. Evolution of a debris-rock slide causing a natural dam: The flash flood of Rýo Santa Cruz, Province of San Juan-November 12, 2005. ***Natural Hazards*** **50 (2): 305-320.**
Between 2001 and 2005, a large debris rock slide occurred on the western slope of the Cordillera de Santa Cruz in the southeast Andean corner of the Province of San Juan in Argentina. The landslide material accumulated in a downstream gorge as a natural dam of the Santa Cruz river, forming a large-volume lake. In November 2005, probably as a result of the increasing pressure of the water volume, this natural dam breached off with a violent and unexpected flash flood. In addition to threatening the lives of people downstream, this flood caused great economic loss to main localities of the Department of Calingasta, as well as considerable damage to one of the most relevant projects of the Province, the Caracoles Hydropower Project dam on the San Juan River. Considering the high costs of any physical remediation for a natural dam located in this high, remote, and inaccessible mountain area with no reliable road access, the main protective measures left are the installation of a flash flood early warning system connected to downstream localities, along with a program of hydrological monitoring at the dam-forming area and annual satellite monitoring to verify the evolution of accumulated mass movements.

Posthumus, H., J. Morris, T.M. Hess, D. Neville, E. Phillips, and A. Baylis. 2009. Impacts of the summer 2007 floods on agriculture in England. ***Journal of Flood Risk Management*** **2 (3): 182-189.**
Exceptional rainfall during the summer of 2007 caused widespread flooding in parts of England. While the focus of attention has been correctly placed on the impact on densely populated urban areas, large tracts of rural land were seriously affected. Summer flooding is particularly damaging to farming. This paper presents the results from an evaluation of the impacts of the summer 2007 flood events on agriculture. High financial losses were incurred in the horticultural sector. Arable farmers incurred direct losses in the form of crop loss or yield reduction due to flooding and associated waterlogging of fields. Livestock farmers incurred indirect losses in the form of additional housing and feeding costs for livestock. Although total costs to agriculture were small compared with urban flood costs, they were typically large at the individual farm scale. Such impacts should be properly acknowledged in future strategies for flood risk management.

Powers, John R. 2009. An alternative approach to disaster relief. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-7.**

There is an alternative to the federal role in disaster relief as specified in the Disaster Relief Act (PL 93-288 as amended). This alternative would be infinitely more effective in reducing the costs of disasters and would be much fairer to the taxpayers. As the Federal Emergency Management Agency regional director in Chicago during the 1993 Mississippi floods, the author's mitigation division director groused over the fact that many of the same people in the lines were there after the previous floods. While FEMA shouldn't tell people where to live, they shouldn't come to the agency for money when they get hit by a predictable disaster without the necessary insurance. The requirements for making this alternative a reality are threefold: (a) Set actuarially correct premiums for individuals, municipalities and states based on the risk—an outline for how the Federal government can build a risk model is discussed; (b) have the Federal government serve as the "reinsurer" for losses that exceed those projected by its model—an approach is provided; and (c) change the legislation and insist that the Congress not bail out people who didn't get the insurance or otherwise reduce their risk by moving out of the high risk area. The point of this approach is to force individuals, municipalities and states to stop doing dumb things and accept responsibility for their decisions. The benefits to the tax payers who are subsidizing these bad decisions would be huge.

Seiler, Ralf, Jana Schmidt, Ousmane Diallo, and Elmar Csaplovics. 2009. Flood monitoring in a semi-arid environment using spatially high resolution radar and optical data. ***Journal of Environmental Management*** **90 (7): 2121-2129.**

Smith, Susan M., Linda Peoples, and Peggy Johnson. 2009. Disaster response: Community mental health service capacity in the United States. ***International Journal of Emergency Management*** **5 (3/4): 311-323.**

Following a natural disaster such as a major hurricane or flood, the ability of community mental health facilities to respond during the recovery stage with adequate resources and capacity to meet community needs is critical. Community mental health agencies have an important role to play in preparing for and responding to large-scale disasters, such as the 2005 hurricanes Katrina and Rita. The timely provision of mental health services to disaster victims has long been recognized as an important component of effective emergency management. In addition to a discussion of the findings from previous research studies conducted throughout the United States addressing the issue of mental health community response following a disaster, this paper presents the survey findings of a retrospective research study designed to assess the status of emergency disaster preparedness and client service capacity at community mental health facilities prior to and following the Katrina/Rita disaster. This discussion also provides a qualitative assessment of the responses provided by community mental health administrators one year after Katrina/Rita, when they were asked to identify the resources needed by their facilities to effectively address future disasters.

Terpstra, Teun, Michael K. Lindell, and Jan M. Gutteling. 2009. Does communicating (flood) risk affect (flood) risk perceptions? Results of a quasi-experimental study. ***Risk Analysis*** **29 (8): 1141-1155.**

People's risk perceptions are generally regarded as an important determinant of their decisions to adjust to natural hazards. However, few studies have evaluated how risk communication programs affect these risk perceptions. This study evaluates the effects of a small-scale flood risk communication program in the Netherlands, consisting of workshops and focus group discussions. The effects on the workshop participants' (n=24) and focus group participants' (n=16) flood risk perceptions were evaluated in a pretest-posttest control group (n=40) design that focused on two mechanisms of attitude change, direct personal experience, and attitude polarization. We expected that (H1) workshop participants would show greater shifts in their flood risk perceptions compared with control group participants and that (H2) focus groups would rather produce the conditions for attitude polarization (shifts toward more extreme attitudinal positions after group discussion). However, the results provide only modest support for these hypotheses, perhaps because of a mismatch between the sessions' contents and the risk perception measures. An important contribution of this study is that it examined risk perception data by both conventional tests of the mean differences and tests for attitude polarization. Moreover, the possibility that attitude polarization could cause people to confirm their preexisting (hazard) beliefs could have important implications for risk communication.

Tinker, Tim L., and Gerald E. Galloway. 2009. How to communicate flood risks effectively. ***Journal of Business Continuity and Emergency Planning*** **3 (3): 193-200.**

Communicating flood risk is a complex endeavor with multiple perspectives, approaches, and components. Each flood risk situation is unique, with numerous variables—the geographic proximity of involved parties, the type and extent of exposure, potential risks, possible actions and others. While business continuity and emergency response teams understand their technical and operational role in responding to flood hazards, many continue to struggle with their risk communication capabilities. This situation risks leaving key audiences in a precarious environment when better understanding of this communication effort could prevent ineffective and potentially damaging media and public responses. There is therefore a need, as well as an opportunity, to communicate about flood risk in a way that informs without frightening, educates without provoking alarm, and moves people to act. The seven principles described in this paper offer some first steps in ensuring that communication strategies are proven, evidence-based, and can motivate policy action and change on a public and private level. Their application will result in an informed, involved and collaborative public.

Tunstall, S., S. McCarthy, and H. Faulkner. 2009. Flood risk management and planning policy in a time of policy transition: The case of the Wapshott Road Planning Inquiry, Surrey, England. ***Journal of Flood Risk Management*** **2 (3): 159-160.**

This paper focuses on an English case study example of decision making on development and flood risk. It was carried out through qualitative document analysis and 13 in-depth interviews with flood risk professionals and others in the Lower Thames Valley. It illustrates the recent shift in policy in England from flood defense to a flood risk management approach with an increased emphasis on spatial planning and development control. It shows that decision makers take time to come to terms with new government policy. Despite the more prescriptive government guidance on development and flood risk in Planning Policy Guidance 25 and later documents, there remains scope for disagreements, for example, over what constitutes "safe" development in flood risk areas. Other sustainability objectives can still weigh heavily against flood risk in local decision making. The potential contributions of modeling, and new visualization techniques in the flood risk management and planning context are considered.

van de Lindt, John W., and Mason Taggar. 2009. Fragility analysis methodology for performance-based analysis of wood-frame buildings for flood. ***Natural Hazards Review*** **10 (3): 113-123.**

This paper resulted from a Structural Engineering Institute of the American Society of Civil Engineers Special Project entitled "The Next Step for ASCE 16: Performance-Based Design of Wood Structures." In 2005, Hurricane Katrina demonstrated how damaging flood waters can be to residential structures. While life safety of the occupants is the most critical issue for residential buildings, the financial property loss due to water damage is often extensive and can result in personal financial ruin. This paper presents the methodology—including several illustrative examples—for the design of wood-frame residential structures for flood. The methodology is based on probabilistic flood hazard as defined by the Federal Emergency Management Agency and provides a probabilistic measure of annualized loss or loss over the anticipated/expected lifetime of the building. The primary purpose of this information is to aid in the decision making process during planning, construction, or the retrofit process. The approach is based on known properties of wood and housing products or, when not available, reasonable interpretations/assumptions were used based on expert opinions of those in the wood and/or housing industry.

Wernstedt, Kris, Patrick Roberts, and Matthew Dull. 2009. Can climate signals inform emergency management? Preliminary evidence. ***Journal of Homeland Security and Emergency Management*** **6 (1): ePub.**

The emergency management community has widely discussed the long-term implications of global climate change for weather-related hazards such as floods, hurricanes, and droughts, but the community has paid relatively little attention to the connection between these hazards and shorter-term seasonal climate fluctuations (e.g., El Niño). This paper explores the potential for applying recent scientific and technical advances in the use of seasonal climate information to improve how emergency managers address such hazards risks and their associated disaster losses. The preliminary analysis presented here begins with a brief review of evidence from the research literature linking mid- and long-term forecasts to flood planning and management. The authors report on a small telephone survey of emergency managers involved in flood planning and management in 26 Oregon and Washington counties that experience interannual climate variation that can increase the frequency or intensity of flooding. Survey findings help illuminate the opportunities and obstacles for using climate science to inform emergency management. The authors then present results of a 2008 survey of emergency managers and educators that asks about the use of climate information for a wider range of weather-related hazards. They conclude by summarizing the opportunities for and obstacles to the use of climate information in emergency management.

Gender & Vulnerable Populations

Bakker, Marloes. 2009. Transboundary river floods: Examining countries, international river basins, and continents. ***Water Policy*** **11 (3): 269-288.**

The objectives of this study were: (1) to quantify river floods shared by more than one country, that is, transboundary river floods; and (2) to grasp more fully the degree of vulnerability of people to such events on a global, international river basin (IRB), and country level. To these ends, publicly available data were combined to identify such events and the resultant losses of life. Flood-related affected individuals and financial damage statistics were related to national levels of development. It was determined that in the period 1985-2005, some 175 of the 1,760 river floods were transboundary, but globally accounted for 32 percent of all casualties and almost 60 percent of all affected individuals, illustrating the massive impact of shared floods. This database of transboundary floods was then merged with socioeconomic and biophysical data, enabling analyses that revealed the degree of vulnerability of people to transboundary floods from a global to a country level. Selecting one country, continent, or IRB most vulnerable to transboundary floods proved to be infeasible since the answer depended heavily upon the specific definition of vulnerability, illustrating the complexity of this phenomenon. However, together the results significantly increased our current knowledge of shared floods which could aid policy makers in identifying and evaluating potential vulnerability to transboundary river floods.

Burke, Jennifer A., Patric R. Spence, Kenneth A. Lachlan, and Matthew W. Seeger. 2009. Sex and age differences in use and perceptions of emergency messages during Katrina. ***Louisiana Journal of Communication*** **10: 19-33.**

This study investigated the relationship between gender, age, media use, and the perceived adequacy of mediated messages associated with Hurricane Katrina. Surveys were collected from evacuated residents of the

New Orleans metropolitan area. Results indicated that men had a better understanding of mediated instructions than women. Differences for age were also found for importance of television and radio messages. As age increased so did the importance of television and radio as a desired medium. These findngs are discussed, along with limitations of the study and suggestions for future research.

Cherntob, Claude M., Yoko Nomura, Louis Josephson, Richard E. Adams, and Lloyd Sederer. 2009. Substance use and functional impairment among adolescents directly exposed to the 2001 World Trade Center attacks. *Disasters* 33 (3): 337-352.
The relationship between exposure to the World Trade Center attacks, increased substance use, functional impairment, and mental health service use—controlling for depression and post-traumatic stress disorder—was assessed through an in-school survey of directly exposed students (N=1040) attending the five middle and five high schools nearest the WTC. The survey was conducted 18 months after the attacks. Students with one WTC exposure risk factor had a five-fold increase in substance use, while those with three or more exposure risks had a nearly 19-fold increase. Increased substance use was associated with impaired school work, school behaviour, and grades. Students reporting increased substance use were nearly twice as likely to want help but were no more likely than asymptomatic students to receive services. Adolescents reporting increased substance use, without co-morbidity, were less likely to receive psychological services than others. Attention to the needs of substance-using adolescents exposed to disaster is needed.

de Oliveira Mendes, Jose Manuel. 2009. Social vulnerability indexes as planning tools: Beyond the preparedness paradigm. *Journal of Risk Research* 12 (1): 43-58.
This article draws from the experience of the ongoing drafting of the Regional Plan of the Centre Region of Portugal, and the empirical application of the Social Vulnerability Index proposed by Susan Cutter. It consists in the construction of an index of social vulnerability to natural and technological hazards and to social risks for all the municipalities of the region. Methodologically, it extends the vulnerability analysis to technological hazards and social risks, as a more encompassing view is necessary for the elaboration of prevention and civil protection policies. The results confirm the interactive nature of social vulnerability, and they also reflect the diffuse urbanization and industrialization patterns that characterize Portugal. The scattered nature of social facilities and security and health infrastructures pose specific challenges to planners concerning risk prevention and mitigation, and the elaboration of effective risk communication strategies adapted to specific hazards and risks in the studied municipalities. The article concludes with some reflections on the need to revise established paradigms of disaster analysis and emphasize the importance of pre-event planning and the social cartography of vulnerable populations for effective prevention and security policies that take into account social inequalities and citizenship rights.

Doulton, Hugh, and Katrina Brown. 2009. Ten years to prevent catastrophe?: Discourses of climate change and international development in the UK press. *Global Environmental Change* 19 (2): 191-202.
The science of climate change is full of uncertainty, but the greater vulnerability of poor countries to the impacts of climate change is one aspect that is widely acknowledged. This paper adapts Dryzek's "components" approach to discourse analysis to explore the media construction of climate change and development in UK "quality" newspapers between 1997 and 2007. Eight discourses are identified from more than 150 articles, based on the entities recognized, assumptions about natural relationships, agents and their motives, rhetorical devices and normative judgments. They show a wide range of opinions regarding the impacts of climate change on development and the appropriate action to be taken. Discourses concerned with likely severe impacts have dominated coverage in the Guardian and the Independent since 1997, and in all four papers since 2006. Previously discourses proposing that climate change was a low development priority had formed the coverage in the Times and the Telegraph. The classification of different discourses allows an inductive, nuanced analysis of the factors influencing representation of climate change and development issues; an analysis which highlights the role of key elements, individual actors, newspaper ideology and wider social and political factors. Overall the findings demonstrate media perceptions of a rising sense of an impending catastrophe for the developing world that is defenseless without the help of the West, perpetuating to an extent views of the poor as victims.

Eisenman, David P., Deborah Glik, Richard Maranon, Lupe Gonzales, and Steven Asch. 2009. Developing a disaster preparedness campaign targeting low-income Latino immigrants: Focus group results for Project PREP. *Journal of Health Care for the Poor and Underserved* 20 (2): 330-345.
Low-income immigrant Latinos are particularly vulnerable to disasters because they are both ill-prepared and disproportionately affected. Disaster preparedness programs that are culturally appropriate must be developed and tested. To develop such a program, the authors conducted 12 focus groups with low-income immigrant Latinos to understand their perceptions and understanding of disaster preparedness, and facilitators and obstacles to it. Participants were concerned about remaining calm during an earthquake. Obstacles to storage of disaster supplies in a kit and developing a family communication plan were mentioned frequently. Misunderstandings were voiced about the proper quantity of water to store and about communication plans. Several focus groups spontaneously suggested small group discussions (platicas) as a way to learn about disaster preparedness. They wanted specific help with building their family communication plans. They rated promotoras de salud highly as potential teachers. Results will guide the development of a disaster preparedness program tailored to the needs of low-income Latino immigrants.

Fertel, Baruch S., Stephan A. Kohlhoff, Patricia M. Roblin, and Bonnie Arquilla. 2009. Lessons from the "Clean Baby 2007" pediatric decontamination drill. ***American Journal of Disaster Medicine*** **4 (2): 77-85.**

Children have unique needs and are at risk of being exposed to hazardous materials necessitating decontamination. A drill was conducted to identify problems that arise in the decontamination of children and to develop recommendations for effective, age-appropriate decontamination. In a prospective, observational, multi-center, simulation exercise, the authors assessed the management of patients ages 0.25 to 15 years and their adult guardians, who self-presented for treatment at two hospital emergency departments (a tertiary care university hospital and an urban, municipal, level 1 trauma center) after a radiation exposure. The drill and responses of the participants were evaluated by trained observers using standardized forms and focus group interviews. Twenty children (aged 0 to 15 years, mean 10.7, median 12.0) and five adults presented to two emergency rooms. Eighty-five percent of the children were successfully decontaminated in showers. Reasons for non-completion included medical (respiratory distress n=1) and behavioral (n=2) limitations. Sixty-five percent of children shivered and none were provided with appropriate sized covering immediately after showering. Forty percent were reluctant to undress and all children (<5 years (n=4)) needed assistance undressing and showering. Eighty-four percent received post-decontamination radiation screening and all had their contaminated belongings secured. Moods were described as: happy, 25 percent; cooperative, 80 percent; consolable, 35 percent; fearful, 15 percent; and crying, 10 percent. There was an association between children younger than 12 years of age and fearful mood or crying (<0.05). This drill identified several key areas of concern, including the need to maintain children's warmth by using heaters and sufficient body coverings, and to increase staffing to better focus on age-specific requirements such as psychosocial needs that included anxiety, modesty, and keeping families together. These needs may compromise effective decontamination. Pediatric decontamination protocols and interventions addressing all these concerns should be further studied and implemented.

Hagen, James C. 2009. Emergency management structure for use in the Alaska Native elderly population. ***International Journal of Emergency Management*** **5 (3/4): 275-283.**

Regardless of recent concerns and the horrific results of disasters on vulnerable populations in the United States, the use of standardized emergency command and control structures in long-term care (LTC) settings has not become common. It is especially true in the American Indian/Alaska Native population, a unique group in that tribes are sovereign nations. This paper examines: (1) the LTC issues in the AN population; (2) the need to address emergency preparedness and disaster management in the AN culture; and (3) culturally specific characteristics that must be addressed to allow the preparation and protection of these elders. This paper reports work in an ongoing project that will ultimately identify specific interventions to be used in the AN population as efforts continue to address the issues of vulnerable and underserved groups in our nation.

Jenkins, Jennifer Lee, Melissa McCarthy, Gabor Kelen, Lauren Sauer, and Thomas Kirsch. 2009. Changes needed in the care of sheltered persons: A multistate analysis from Hurricane Katrina. ***American Journal of Disaster Medicine*** **4 (2): 101-106.**

Following Hurricane Katrina, nearly 1,400 evacuation shelters were opened in 27 states across the nation to accommodate the more than 450,000 evacuees from the gulf region. The levee breaks in New Orleans and storm surge in Mississippi brought about significant morbidity and mortality, ultimately killing more than 1,300 people. This study summarizes the health needs of approximately 30,000 displaced persons who resided in shelters in eight states, including prescription medical needs, disbursement of durable medical equipment, and referrals for further care. The first available 31,272 medical encounter forms were utilized as a convenience sample of displaced persons in Louisiana, Mississippi, Texas, Alabama, Georgia, Tennessee, Missouri, and Florida. This medical encounter form was completed by volunteer nurses, was standardized across all shelters, and included demographic information, need for acute or preventive care, pre-existing medical conditions, disposition referrals, need for prescription medication, and frequency of volunteer providers who were providing care outside of their first-aid scope. Sheltered persons who received only acute care numbered 11,306 (36.2%), and those who received only preventive/chronic care numbered 10,403 (33.3%). A similar number 9,563 (30.6%) persons, received both acute and preventive/chronic care. There were 3,356 (10.7%) sheltered persons who received some form of durable medical equipment. Glasses were given to 2,124 people (6.8% of the total visits receiving them) and were the most commonly dispensed item. This was followed by dental devices (495, 1.6%) and glucose meters (339, 1.1%). Prescriptions were given to 8,154 (29.0%) sheltered persons. Referrals were made to 13,815 (44.2%) of sheltered persons who presented for medical care. The pharmacy was the most common location for referrals for 5,785 (18.5%) of all sheltered persons seeking medical care and were referred to the emergency department or hospital for further care. Hurricane Katrina illustrated the need to strengthen health-care planning and response in regard to sheltered persons with a particular focus on primary and preventive care services. This study has reemphasized the need for primary medical care and pharmaceuticals in sheltered persons and shown new data regarding the disbursement of durable medical equipment and the frequent need for health care beyond the shelter setting as evidenced by referrals.

Laditka, Sarah L., James N. Laditka, Carol B. Cornman, Courtney B. Davis, and Jane V.E. Richter. 2009. Resilience and challenges among staff of Gulf Coast nursing homes sheltering frail evacuees following Hurricane Katrina, 2005: Implications for planning and training. ***Prehospital and Disaster Medicine*** **24 (1): 54-62.**

The purpose of this study was to: (1) explore experiences and responses of staff in caring for sheltered, frail, Hurricane Katrina evacuees; and (2) identify how planning and training can be enhanced for staff who may care for frail older populations during and after disasters. Individual, in-person, semi-structured interviews were conducted with 38 staff members in four nursing homes in Mississippi, sheltering 109 evacuees in November 2005, nine weeks after Hurricane Katrina. Twenty-four were direct care staff, including certified nursing assistants, licensed nurses, dietary aides, and social workers; 14 were support staff, including maintenance and business managers. The number interviewed in each nursing home averaged 9.5 (range 6-15). Using a discussion guide and focusing on their experiences caring for nursing home evacuees, staff were asked to describe: (1) experiences; (2) problems; (3) what helped; and (4) what was learned. Data were processed using grounded theory and thematic analysis. Responses of direct care staff differed in emphasis from those of support staff in several areas. Responses from these groups were analyzed separately and together. Three of the researchers identified recurring themes; two organized themes conceptually. Staff emphasized providing emotional reassurance to evacuees as well as physical care. Many described caring for evacuees as "a blessing," saying the experience helped them bond with residents, evacuees, and other staff. However, caring for evacuees was difficult because staff members were extremely anxious and in poor physical condition after an arduous evacuation. Challenges included communicating with evacuees' families, preventing dehydration, lack of personal hygiene supplies, staff exhaustion, and emotional needs of residents, evacuees, and staff. Teamwork, community help, and having a well-organized disaster plan, extra supplies, and dependable staff helped personnel cope with the situation. Conclusions: Staff of nursing homes that sheltered Katrina evacuees demonstrated resilience in the disaster's aftermath. Many placed the well-being of residents as their first priority. Results underscore the importance of planning, teamwork, and adequate supplies and staffing. Training for long-term care staff should emphasize providing emotional support as well as physical care for residents and evacuees during and following disasters. Nurses, social workers, and other staff members responsible for promoting emotional well-being for nursing home residents should be prepared to respond to disasters.

McQueen, Kelly K.A., William Magee, Thomas Crabtree, Christopher Romano, and Frederick M. Burkle Jr. 2009. Application of outcome measures in international humanitarian aid: Comparing indices through retrospective analysis of corrective surgical care cases. ***Prehospital and Disaster Medicine*** **24 (1): 39-46.**

It is common for international organizations to provide surgical corrective care to vulnerable populations in developing countries. However, a current worsening of the overall surgical burden of disease in developing countries reflects an increasing lack of sufficient numbers of trained health care personnel, and renders outside volunteer assistance more desirable and crucial than ever. Unfortunately, program evaluation and monitoring, including outcome indices and measures of effectiveness, is not measured commonly. In 2005, Operation Smile International implemented an electronic medical record system that helps monitor a number of critical indices during surgical missions that are essential for quality assurance reviews. This record system also provided an opportunity to retrospectively evaluate cases from previous missions. Review of data sets from more than 8,000 cases in 2005 and 2006 has provided crucial information regarding the priority of surgery, perioperative and operative complications, and surgical program development. The most common procedure provided was unilateral cleft lip repair, followed closely by cleft palate. A majority of these interventions occurred for patients who were older than routinely provided for in the western world. The average child treated had an age-weight ratio at or below the U.S. Centers for Disease Control and Prevention 50th percentile, with a small percentage falling below the CDC 20th percentile. A majority of children had acceptable levels of hemoglobin, but the relative decreased age-weight ratio nonetheless can reflect mild malnutrition. Complications requiring medical intervention were seen in 1.2 percent of cases in 2005 and one percent in 2006. Thirty percent were reported as anesthesia complications, and 61 percent reported as surgical complications. One death was reported, but it occurred after discharge outside the perioperative period. Complication rates are similar to rates reported in the United States and United Kingdom, emphasizing the importance of standardization with uniform indices to compare quality performance and equity of care. This study offers an important example of the importance of collecting, analyzing, and reporting measures of effectiveness in all surgical settings.

Nibedita, Ray-Bennett S. 2009. The influence of caste, class, and gender in surviving multiple disasters: A case study from Orissa, India. ***Environmental Hazards Human and Policy Dimensions*** **8 (1): 5-22.**

Sociological and anthropological studies in India reveal that caste, class, and gender in everyday life are both rigid and dynamic, but little is known about how they influence the survival mechanisms of women during "multiple disasters," nor about how women negotiate with these structural mores to meet their cultural and biological needs. This is explored through the experiences of 12 female-headed households from different social castes in Orissa, India. Multiple disasters or disasters that occur in "one specific place" (such as floods, cyclone, and drought) are regular events in coastal parts of the state of Orissa. The supercyclone of 1999, the two floods of 2001 and 2003, and the drought of 2000 and 2002 form the case study. Participant observation, in-depth interviews, and documentary evidence complement the fieldwork. The findings suggest a complex

interplay of caste, class, and gender in surviving the multiple disasters, including structural mutability under the purview of social organization. Women demonstrated their individual and collective agencies in order to meet their culture and biological needs under severe crisis. This research stresses that gender and disaster studies must include a consideration of caste and class for effective disaster management and social vulnerability reduction.

Onouha, Freedom C. 2009. Why the poor pay with their lives: Oil pipeline vandalisation, fires, and human security in Nigeria. ***Disasters*** **33 (3): 369-389.**
Since its discovery in Nigeria in 1956, crude oil has been a mixed blessing to the country. It is believed to have generated enormous wealth, but it has also claimed a great many lives. Scholarly attention on the impact of oil on security in Nigeria has largely focused on internal conflicts rather than on how disasters associated with oil pipeline vandalism have caused bodily injuries and death, destroying livelihoods and fracturing families. This paper examines how pipeline vandalism affects human security in these ways. It identifies women and children as those who are hardest hit and questions why the poor are the most vulnerable in oil pipeline disasters in this country. It recommends the adoption of a comprehensive and integrated framework of disaster management that will ensure prompt response to key early warning signs, risk reduction, and appropriate mitigation and management strategies.

Rateau, Margaret R. 2009. Differences in emotional well-being of hurricane survivors: A secondary analysis of the ABC News Hurricane Katrina Anniversary Poll. ***Archives of Psychiatric Nursing*** **23 (3): 269-271.**
Literature suggests that survivors of catastrophic loss may suffer long-term emotional damage. This paper presents a secondary data analysis from the ABC News Hurricane Katrina Poll conducted in August, 2006. Following analyses, a significantly higher percentage of women (44%) and those who experienced residential damage (66.7%) reported long-term negative impact on emotional well-being. Overall, 70.3 percent of Katrina survivors reported a strengthening in fellow man following the disaster. These results may serve as beginning evidence for appropriate identification and implementation of mental health support for those most in need following disaster.

Shenk, Dena, Blanca Ramos, Karel Joyce Kalaw, and Ismail Tufan. 2009. History, memory, and disasters among older adults: A life course perspective. ***Traumatology 15*** **(2): 20-30.**
This article is based on a review of the growing literature that examines disasters as experienced globally by older adults. The authors utilize a life course perspective that allows them to view the impact of experiencing a disaster for individuals within the context of their life experiences, memories, values, and views. The authors urge consideration of how individual and social history and memory affect the experience, coping strategies, and effects of disasters on older adults. The analysis is organized by the following four themes derived from the literature: (a) physical impact; (b) psychological impact; (c) social support issues; and (d) predictors of mental health distress. The authors highlight the challenges and issues of disasters, specifically for the aging population, including age, gender, and coping styles.

Smith, Susan M., Mary Jane Tremethick, Peggy Johnson, and June Gorski. 2009. Disaster planning and response: Considering the needs of the frail elderly. ***International Journal of Emergency Management*** **6 (1): 1-13.**
The world's population is expanding with more individuals living beyond their sixth decade. These changing demographics present a challenge for emergency management professionals. While there is diversity among older adults worldwide, unique common factors influence the ability of the frail elderly to maintain their health and well-being when faced with disaster. Numerous factors must be considered when planning for emergency preparedness and the response needs of the frail elderly. This paper will identify some of the common challenges that emergency management professionals face. The strategies employed to minimize the impact of a disaster on this vulnerable group will also be discussed.

Spence, Patric R., Kenneth A. Lachlan, and David Westerman. 2009. Presence, sex, and bad news: Exploring the responses of men and women to tragic news stories in varying media. ***Journal of Applied Communication Research*** **37 (3): 239-256.**
This study explores the interplay of sex, presence, and enjoyment of nonfictional tragic news content. An experiment was conducted in which participants viewed a news story about Hurricane Katrina's devastation to the Gulf Coast on a standard definition television, high definition television, or a video iPod. The results indicate that women reported more sadness regardless of condition, though they seemed especially moved in the iPod condition. Women also reported more information seeking, and reported highest levels of presence in the iPod condition. The results are discussed both in terms of implications for crisis message practitioners, and in terms of what the results may mean for our understanding of the enjoyment of tragedy.

Stallings, Michael, and Whitney Faust. 2009. Drafting, revising, and updating local emergency operations plans: The National Response Framework and the Emergency Support Function Annex Model. ***Journal of Emergency Management*** **7 (2): 11-18.**
Lessons learned and public scrutiny resulting from the Gulf Coast hurricane disasters in 2005 led the Federal Emergency Management Agency to restructure its national incident response guidance. The National Response Framework (NRF) replaced the National Response Plan in early 2008. The updated Framework has focused the attention of emergency management planning to, among other things, updating Emergency Operations Plans (EOPs) on a state and local jurisdictional level, utilizing an Emergency Support Function (ESF) model. Since 2005, compliance mandates under the National Incident Management System have required

local government entities to revise and update emergency operations plans to incorporate NIMS components. With the introduction of the NRF in 2008, the ESF model is now the recommended standard for local government EOPs under the NIMS compliance objectives. The ESF model provides for a coordinated response effort and mutual aid options local agencies may receive from state and federal resources in the wake of an emergency. It also works to ensure that local entities themselves have a careful accounting of all of their own resources and capabilities to avoid another slow and inadequate response that was at the heart of the hurricanes Katrina and Rita tragedies in 2005.

Taylor, Courtney E. 2009. Equal opportunity preparedness and response: Increasing preparedness and response for citizens with visual and auditory impairment. J*ournal of Emergency Management* 7 (2): 75-79.
During the planning process for preparedness for and response to disasters, people with visual and auditory disabilities are frequently and mistakenly left out. In October, of 2003, a television report in San Diego, California, failed to provide visual warnings to inform deaf residents during coverage of local fires. Confusion during Hurricane Katrina resulted in numerous service animals being separated from their owners. Emergency workers were unprepared to assist deaf people on the 35W bridge collapse of 2007 in Minneapolis, Minnesota. People with visual and auditory disabilities should be aware of their own needs in the event of an emergency, and their community should be aware too. Emergency managers and first responders should take certain precautions in assisting people with disabilities. The preparedness and response stages of visually impaired, auditorily impaired, and service animals are important topics for any community.

Ying Yang Chan, Emily. 2009. Why are older peoples' health needs forgotten post-natural disaster relief in developing countries? A healthcare provider survey of 2005 Kashmir, Pakistan earthquake. *American Journal of Disaster Medicine* 4 (2): 107-112.
Although older people may be recognized as a vulnerable group after natural disasters, their particular needs are rarely met by the providers of emergency services. Studies about older people's health needs postdisaster in the South East Asian Tsunami, Kashmir, Pakistan, China and the United States have revealed the lack of concern for older people's health needs. Recent study of older people's health needs after the Kashmir Pakistan earthquake (2005) found their health needs were masked within the general population. This survey examines the provider's perceptions of older people's vulnerabilities after the Kashmir earthquake. It aims to understand the awareness of geriatric issues and issues related to current service provision and planning for older people's health needs after disasters, specifically comparing service delivery patterns among different relief agencies. Cross-sectional, structured stakeholder interviews were conducted within a two-week period in February, 2006, four months after the earthquake in Pakistan-administered Kashmir. Three types of health and medical relief agencies—international nongovernmental organizations, national organizations, and local/community groups—were solicited to participate in the study. A descriptive analysis was conducted. Important issues identified include the need to sensitize relief and health workers about older people's health needs postdisaster, the development of relevant clinical guidelines for chronic disease management postdisaster in developing countries, and the advocacy of building in geriatric-related components in natural disaster medical relief programs. To address the vulnerability of older people, it is important for governments, relief agencies, and local partners to include and address these issues during their relief operations and policy planning.

Homeland Security & Terrorism

Al-Damkhi, Ali Mohamed, Sabah Ahmed Abdul-Wahab, and Nabeel Mohamed Al-Khulaifi. 2009. Kuwait's 1991 environmental tragedy: Lessons learned. *Disaster Prevention and Management* 18 (3): 233-248.
Iraq's invasion of Kuwait on August 2, 1990 precipitated an ecological tragedy in the Arabian Gulf region. During the course of the invasion Kuwait suffered severe damage to both its oil industry and its ecology. The scale was enormous, ranging from oil fires and spills to the economic deterioration of Kuwait's oil industry. This paper focuses on the lessons learned from Kuwait's oil well catastrophe in hope of preventing, or at least minimizing, future such human-caused disasters. The paper reviews and analyzes Kuwait's oil well tragedy in terms of its scope, logistical services provided to cope with the disaster, the techniques used in firefighting operations, and related political issues. The paper also discusses the need to review existing environmental laws and the concept of environmental crime in light of this catastrophe. There are many important lessons that can be drawn from this disaster, the most important of which is to ensure that dictators in the future never believe they can destroy the environment without severe repercussions from the international community. The conflagrations in Kuwait demonstrate the dangerous consequences of large-scale modern combat in an environmentally fragile area. All oil-producing nations, especially the Gulf countries, are vulnerable to this type of environmental and economic disaster. Kuwait's tragedy highlights the need for immediate consideration of possible similar disasters in the future and how the global community will deal with them. The high cost of environmental degradation only gets more expensive when left unattended. The price is paid not only in hard currency but in damage to the public's health and in other environmental problems. This paper shows that sustainable development is impossible in the presence of wars and terrorist activities.

Atlas, Ronald M., Richard D. Clover, and W. Paul McKinney. 2009. Enhancing biosecurity through early recognition and reporting of public health risks: Meeting the challenges of the revised international health regulations. *International Journal of Risk Assessment and Management* 12 (2/3/4): 280-289.
The revised international health regulations recognize

the importance of shortening the time from a disease outbreak to its detection and notification to the international public health community so that effective responses that enhance global security can be taken. The new international health regulations aim at requiring countries to issue alerts early enough that responses can be initiated in a timely manner. But these regulations represent a real challenge for achieving early detection and translating notification into effective public health actions that reduce the risks of mass casualties from emerging infectious disease and bioterrorism. Coordinated early warning mechanisms to facilitate rapid recognition of a disease outbreak are needed so that an effective response within the medical and public health communities can be initiated. Effective training is essential for early recognition of rare biothreat diseases. Such training must be realistic to achieve an effective response. Responder and system capabilities should be verified periodically through the use of full-scale exercises or virtual drills. Such training and skills are critical for achieving biosecurity.

Balunis Jr., Timothy, and William Hemphill. 2009. Escaping the entanglement: Reversing jurisdictional fragmentation over the Department of Homeland Security. *Journal of Homeland Security and Emergency Management* 6 (1): 1-20.

The Department of Homeland Security was born in the aftermath of the 9/11 attacks, and represents one of the largest ever reorganizations of the U.S. government. Although the department's creation precipitated a complex conglomeration of 22 diverse agencies and offices, the institutional response in the U.S. Congress has been similarly complex. Ambiguities in the jurisdictions of congressional committees, exacerbated by the emergence of new homeland security issues, have led to a highly fragmented oversight of the six-year-old department. In the 110th Congress, for example, 86 committees and subcommittees asserted some form of jurisdiction over the DHS. After considering the effects of fragmentation on the DHS, this paper considers the experience of three other, relatively young departments. In doing so, it becomes evident that the DHS' experience is anomalous among executive departments. Analysis of hearing data from 2007-2008 reveals a number of key fault lines in committee jurisdictions over the department. After probing those areas of contention between committees, this paper makes recommendations about what jurisdictional changes can be made to reverse the fragmentation trend in Congress. Lastly, success in consolidating congressional jurisdiction over the DHS must be politically realistic, acknowledging likely institutional resistance. While the ideal strategy would be immediate statutory reforms to committee jurisdictions in the 111th Congress, a more incremental campaign to streamline oversight of the DHS may be necessary in the long run. Through the implementation of these proposals, the debilitating effects of fragmentation on senior department leadership and mission execution can be minimized.

Birkland, Thomas A. 2009. Disasters, catastrophes, and policy failure in the homeland security era. *Review of Policy Research* 26 (4): 423-438.

The September 11, 2001, attacks triggered federal policy changes designed to influence emergency management in the United States, even though these attacks did not suggest a need for a wholesale restructuring of federal policy in emergency management. Instead, for several reasons, federal policy's emphasis on terrorism and emergency management significantly degraded the nation's ability to address natural disasters. The federal government sought to create a top-down, command and control model of emergency management that never fully accounted for, positively or normatively, the way local emergency management works in practice. The Obama administration will have to address the questions raised by the reorganization of federal emergency management responsibilities. While the context in which these changes have occurred is unique to the U.S. federal system, there are interesting implications for emergency management in nonfederal systems.

Brigantic, Robert T., John D. Malone, George A. Muller, Russell Lee, Jim Kulesz, William Woody Delp, and Benjamin H. McMahon. 2009. Simulation to assess the efficacy of US airport entry screening of passengers for pandemic influenza. *International Journal of Risk Assessment and Management* 12 (2/3/4): 290-310.

The article presents a methodology and stochastic discrete-event simulation developed to model the screening of passengers for pandemic influenza at U.S. port-of-entry airports. The model combines epidemiology modeling, evolving infected states and conditions of passengers over time, and operational considerations of screening in a single simulation. The simulation begins with international aircraft arrivals in the United States. Passengers are then randomly assigned to one of three states—not infected, infected with pandemic influenza, and infected with other respiratory illness. Passengers then pass through various screening layers (i.e. departure screening, en route screening, primary screening, and secondary screening) and ultimately exit the system. Each passenger's status is tracked over time, with a special emphasis on false negatives (i.e. passengers infected with pandemic influenza, but are not identified as such) as these passengers pose a significant threat since they could unknowingly spread the pandemic influenza virus throughout the nation.

Campbell, James. 2009. The future of biosecurity. International *Journal of Risk Assessment and Management* 12 (2/3/4): 248-261.

The future of biosecurity will be determined by international scientific and political responses to rapid worldwide expansion of genetic engineering technologies in infectious disease research, and by implementation of cooperative global surveillance and public health response policies to control the emergence of strains of natural disease organisms. Effective responses will depend on better understanding of the forces driving molecular evolution of pathogens, as well as integrated understanding of advanced biothreat agent design, potential applications and effects of the agent,

exposure techniques or methods of deployment, and concealment techniques, including dual use strategies.

Caponecchia, Carlo. 2009. Strategies to improve the communication of probability information in risk analysis. *International Journal of Risk Assessment and Management* 12 (2/3/4): 380-419.
Difficulties in interpreting probabilities can impede the progress of risk analyses and impair the communication of risk information to stakeholders. This review examines how people have problems in interpreting probability information, leading to several strategies for improved understanding. The inconsistent translation of probability terms to numerical expressions, and the biases that influence their interpretation, highlight the need to improve the communication of probabilities wherever possible. Current probability communication strategies from medicine and behavioral science, such as natural frequencies and systematic ovals, are reviewed. Practical complications presented by large-scale risk analysis may be solved by conveying key probabilities graphically, providing recurrent guide material throughout documentation, or using stakeholder workshops. While various disciplines can guide the development of improved communication tools for probabilities, research specific to their use in risk management applications needs to be conducted.

Caudle, Sharon R. 2009. National security strategies: Security from what, for whom, and by what means. *Journal of Homeland Security and Emergency Management* 6: 1-28.
This article argues that a fundamental change is taking place in how countries view, approach, and implement strategies to protect their national security. In the past, strategies underlying national security narrowly focused on threats that could be addressed by military and/or diplomatic means. Now, however, national security is viewed in a much broader context, with the focus on preserving that which makes a country unique, and that includes the intangibles of its culture as well as what physically lies within its borders. The result is that countries are revising existing national security strategies (including those covering homeland security or domestic security) or crafting entirely new ones to address this much broader view of that which is to be protected. Drawing on recent literature and documents addressing diverse national security strategies, this article discusses the following areas: (1) the definition of national security, (2) the purpose of a national security strategy, (3) how a national security strategy is evaluated, and (4) implications for The National Security Strategy of the United States and The National Strategy for Homeland Security as a new administration governs.

Chen, Yi-Ming, Dachrahn Wu, and Cheng-Kuang Wu. 2009. A game theory approach for evaluating terrorist threats and deploying response agents in urban environments. *Journal of Homeland Security and Emergency Management* 6 (1): 27.
The Homeland Security Advisory System lacks specific measures for rational decision making. Mathematical modeling has not been applied to capture the interaction between defender and attacker in terrorist attacks. An efficient emergency response system must determine how and when to alert and advise the critical and appropriate response agents to the danger of terrorist attacks, particularly when available resources are limited in an urban environment. This article proposes a framework for HSAS that incorporates two game theory models designed to advise response agents when raising the threat advisory level. In the first step, the interactive behaviors between the elements or participants of the multi-emergency event and the district response agent are modeled and analyzed as a noncooperative game, after which the terrorist threat value (TTV) is derived from the mixed strategy Nash equilibrium. In the second step, the TTV is used to compute the Shapley value of all district response agents for five different threat levels; a fair allocation of response agents based on the Shapley value creates a minimum set of resource deployment costs. Simulation results show that the emergency manager can use this framework to quantitatively evaluate the terrorist threat to each response agent and easily discover where response agents are most at risk within the five threat levels.

Cherntob, Claude M., Yoko Nomura, Louis Josephson, Richard E. Adams, and Lloyd Sederer. 2009. Substance use and functional impairment among adolescents directly exposed to the 2001 World Trade Center attacks. *Disasters* 33 (3): 337-352.
The relationship between exposure to the World Trade Center attacks, increased substance use, functional impairment, and mental health service use—controlling for depression and post-traumatic stress disorder—was assessed through an in-school survey of directly exposed students (N=1040) attending the five middle and five high schools nearest the WTC. The survey was conducted 18 months after the attacks. Students with one WTC exposure risk factor had a five-fold increase in substance use, while those with three or more exposure risks had a nearly 19-fold increase. Increased substance use was associated with impaired school work, school behaviour, and grades. Students reporting increased substance use were nearly twice as likely to want help but were no more likely than asymptomatic students to receive services. Adolescents reporting increased substance use, without co-morbidity, were less likely to receive psychological services than others. Attention to the needs of substance-using adolescents exposed to disaster is needed.

Chu, Alvin F., Steven M. Marcus, and Bruce Ruck. 2009. Poison Control Centers' role in glow product-related outbreak detection: Implications for comprehensive surveillance system. *Prehospital and Disaster Medicine* 24 (1): 68-72.
The development of syndromic surveillance systems to detect bioterrorist attacks and emerging infectious diseases has become an important and challenging goal to many governmental agencies and health care authorities. This study utilized the sharp increase of glow product-related calls to demonstrate the utility of poison control data for early detection of potential outbreaks during the week of Halloween in 2007. A review was conducted of the electronic records of exposures reported to the New Jersey Poison Information and Education

System Poison Control Hotline from 2002 through 2007 with generic code number 0201027 (glow products) set by the American Association of Poison Control Centers. Key information such as age, gender, time of the call, exposure reason, clinical effects, and medical outcomes along with telephone number, zip code, and county location were used in the analysis to determine the extent of the outbreak. Analyses included a total of 139 glow product-related calls during the week of Halloween in 2007 with a single-day high of 59 calls on Halloween Day. More than 90 percent of the glow product exposures were in children one-to-10 years of age. The glow product-related calls on Halloween Day increased from 14 calls in 2002 to 59 calls in 2007, a 321 percent increase over a six-year period. Poison control centers in the United States are equipped with a unique and uniform input data collection system—the National Poison Data System—that provides an important data source in the development of a comprehensive surveillance system for early outbreak detection.

Considine, Julie, and Belinda Mitchell. 2009. Chemical, biological and radiological incidents: Preparedness and perceptions of emergency nurses. *Disasters* 33 (3): 482-497.

Despite their important role in chemical, biological, and radiological (CBR) incident response, little is known about emergency nurses' perceptions of these events. The study explores emergency nurses' perceptions of CBR incidents and factors that may influence their capacity to respond. Sixty-four nurses from a metropolitan emergency department took part. The majority were willing to participate in CBR incidents and there was a positive association between willingness to participate and postgraduate qualification in emergency nursing. Willingness decreased, however, with unknown chemical and biological agents. One third of participants reported limitations to using personal protective equipment. Few participants had experience with CBR incidents although 70.3 percent of participants had undergone CBR training. There were significant differences in perceptions of choice to participate and adequacy of training between chemical, biological, and radiological incidents. The study results suggest that emergency nurses are keen to meet the challenge of CBR incident response.

Cox, Jr., Louis Anthony. 2009. Improving risk-based decision making for terrorism applications. *Risk Analysis* 29 (3): 344-354.

The article takes a novel approach to analyzing hazardous materials transportation risk. Previous studies analyzed this risk from an operations research or quantitative risk assessment perspective by minimizing or calculating risk along a transport route. Even though the majority of incidents occur when containers are unloaded, the research has not focused on transportation-related activities, including container loading and unloading. In this work, a decision model of a hazardous materials release during unloading was developed using actual data and an exploratory data modeling approach. Previous studies have had a theoretical perspective in terms of identifying and advancing the key variables related to this risk. There hasn't been a focus on probability- and statistics-based approaches for doing this. This decision model empirically identifies the critical variables using an exploratory methodology for a large, highly categorical database involving latent class analysis, log-linear modeling, and Bayesian networking. The model identified the most influential variables and countermeasures for two consequences of a hazmat incident, dollar loss, and release quantity. It is one of the first models to do this. The most influential variables were found to be related to failure of the container. In addition to analyzing hazmat risk, this methodology can be used to develop data-driven models for strategic decision making in other domains involving risk.

Decker, K.C., and Keith Holtermann. 2009. The role for exercises in senior policy pandemic influenza preparedness. *Journal of Homeland Security and Emergency Management* 6 (1):1-17.

Preparedness for a pandemic of influenza is a policy issue currently attracting increased attention from international organizations, governments, and businesses. This is due in large part to the absenteeism rates that could be caused by a virulent strain of influenza affecting all demographics in our population, and the impact that would have on society as a whole. It is also an issue whose effects cut across the private and public sectors equally, making it a critical issue for society as a whole. Either prospectively agreeing when to implement certain strategies or having a process in place for decision making during the event, is an essential element of pandemic preparedness. One of the most effective and efficient methods for insuring readiness and evaluating preparedness is through exercises where different stakeholders are brought together to dialogue on how they will react to a given set of circumstances. Exercises create awareness among senior policy makers about the critical role of exercises in societal pandemic influenza preparedness and the critical process steps. Taking the collective objective experience from designing and implementing over 100 exercises for senior policy makers, 20 of which were pan flu related, the authors have advanced the science in the field, observed phenomena, and drawn conclusions regarding appropriate exercise design, similarities to other forms of research and best practices for flu exercises and all-hazards preparedness. Employing a decision matrix using the factors policy, plan, procedure, tactics, and skills, an entity can determine the appropriate exercise typology and associated resource requirements. It was important to consistently raise specific issues in order to comprehensively address various preparedness and response issues. Despite a lack of common framework and methodology for the conduct of table top exercises (TTX), discussion based TTX have demonstrated to be an efficacious, effective, and efficient means for identifying policy gaps and fostering pandemic influenza response readiness.

Endress, Lee H. 2009. Terrorism, biosecurity and endogenous risk. *International Journal of Risk Assessment and Management* 12 (2/3/4): 161-185.

Bioterrorism and infectious disease are biosecurity threats that can be modeled as biological invasions (like alien species) incorporating the concept of endogenous risk from the environmental economics literature, i.e., that human behavior may alter, deliberately or unintentionally, the likelihood and severity of these threats. Application of this modeling approach to investment strategy in pre-event, biosecurity readiness yields efficiency conditions for optimum allocation to expenditure between prevention and preparation for emergency response to bioterrorism and to infectious disease, which may occur individually or jointly. Model results provide a unified framework for interpreting empirical studies and deriving broad policy implications, such as the optimal investment in prevention vs. preparedness strategies. The threat of biological attack can also be analyzed within the broader context of transnational terrorism. A model of compound lotteries helps illuminate the trade-off between investment in preemptive counterterrorism activities and investment in defensive anti-terrorism programs, especially when terrorists can make strategic substitutions among targets and modes of attack, including use of biological agents. In combination, the endogenous risk and terrorism lottery models support a biosecurity investment strategy that favors enhancing public health capacity in prevention (e.g., medical surveillance) and strengthening pre-emptive counterterrorism capability.

Farrow, Scott, and Stuart Shapiro. 2009. The benefit-cost analysis of security focused regulations. *Journal of Homeland Security and Emergency Management* 6 (1).

Security focused regulations have been largely exempt from the benefit-cost analysis required for major Federal regulations and done routinely in areas such as transportation, environment, and safety. Among the reasons offered for the exemption are the analytical difficulties of security issues involving complex or poorly understood probabilities and consequences. This paper investigates the magnitude of security focused regulations, a framework for developing an expected cost analysis of regulations, and the current "break-even" analysis used by the Department of Homeland Security. Key assumptions implicit in the current analysis are identified and suggestions are made for the difficult evolution of security regulations toward a more explicit benefit-cost analysis.

Fertel, Baruch S., Stephan A. Kohlhoff, Patricia M. Roblin, and Bonnie Arquilla. 2009. Lessons from the "Clean Baby 2007" pediatric decontamination drill. *American Journal of Disaster Medicine* 4 (2): 77-85.

Children have unique needs and are at risk of being exposed to hazardous materials necessitating decontamination. A drill was conducted to identify problems that arise in the decontamination of children and to develop recommendations for effective, age-appropriate decontamination. In a prospective, observational, multi-center, simulation exercise, the authors assessed the management of patients ages 0.25 to 15 years and their adult guardians, who self-presented for treatment at two hospital emergency departments (a tertiary care university hospital and an urban, municipal, level 1 trauma center) after a radiation exposure. The drill and responses of the participants were evaluated by trained observers using standardized forms and focus group interviews. Twenty children (aged 0 to 15 years, mean 10.7, median 12.0) and five adults presented to two emergency rooms. Eighty-five percent of the children were successfully decontaminated in showers. Reasons for non-completion included medical (respiratory distress n=1) and behavioral (n=2) limitations. Sixty-five percent of children shivered and none were provided with appropriate sized covering immediately after showering. Forty percent were reluctant to undress and all children (<5 years (n=4)) needed assistance undressing and showering. Eighty-four percent received post-decontamination radiation screening and all had their contaminated belongings secured. Moods were described as: happy, 25 percent; cooperative, 80 percent; consolable, 35 percent; fearful, 15 percent; and crying, 10 percent. There was an association between children younger than 12 years of age and fearful mood or crying (<0.05). This drill identified several key areas of concern, including the need to maintain children's warmth by using heaters and sufficient body coverings, and to increase staffing to better focus on age-specific requirements such as psychosocial needs that included anxiety, modesty, and keeping families together. These needs may compromise effective decontamination. Pediatric decontamination protocols and interventions addressing all these concerns should be further studied and implemented.

Harris, Mark, and John Powell. 2009. Societal stability, public health, and primary care as three pillars of defense in biosecurity. *International Journal of Risk Assessment and Management* 12 (2/3/4): 262-279.

Infectious diseases have threatened humanity since the beginning of time, causing more death and illness than all wars of mankind combined. This historical review describes some outbreaks and endemic diseases, examining risk factors and individual organizational and governmental responses. History teaches us that the most effective response to mitigating biological disaster requires coordination at all levels, from the individual to the state. The past also clearly demonstrates that basic factors such as societal and institutional stability, public health, and primary care form the most important pillars of defense against infectious disease.

Hartwig, Kari A., David Burich Burich, Christopher Cannon, Louis Massari, Lloyd Mueller, and Louise-Marie Dembry. 2009. Critical challenges ahead in bioterrorism preparedness training for clinicians. *Prehospital and Disaster Medicine* 24 (1): 47-53.

A survey was distributed to determine physicians' confidence levels in recognizing potential Category-A bioterrorism disease threats (e.g., smallpox, anthrax), preferred means of obtaining continuing medical education (CME) credits, and their knowledge of the Connecticut Department of Public Health's isease reporting requirements. Surveys were mailed to all physicians

in the three-hospital Yale New Haven Health System (2,174) from January to March 2004; there were 820 respondents for a 37.7 percent response rate. A total of 71 percent of physicians indicated that they were "not confident" that they could recognize five of the infectious agents named; they had higher confidence rates for smallpox (48.8%). Infectious diseases and emergency medicine physicians had the highest rates of confidence. Seventy-eight percent of physicians indicated conferences and lectures as their preferred CME learning modality. Nearly 72 percent of physicians reported a low familiarity with the DPH reporting requirements. The results highlighted the breadth of perceived weaknesses among clinicians from disease recognition to reporting incidents, which signifies the need for greater training in these areas. As clinicians themselves emphasized their lack of skills and knowledge in this area, there should be a rapid development and dissemination of problem-based learning CME courses in bioterrorism preparedness.

Hopmeier, Michael, Catherine Y. Lee, and Jeffrey A. Lowell. 2009. The bug and the bomb: Medical readiness as a national strategic priority. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 222-247.**
Throughout the 20th and 21st centuries, numerous threats have developed, matured, and grown into what would be considered "strategic" in nature. Few, however, have had as much impact on our government and to efforts at preparedness as the scourges of terrorism, nuclear war, and conventional conflict. The economic costs for preparation and response to these threats have been great. Among other things, we have developed highly institutionalized and formalized processes for ensuring that these threats are identified, assessed, analyzed, and reanalyzed within a highly complex, robust, and redundant system to ensure that no single factor is missed and no possibility for preparation is overlooked. There remains a preeminent threat to this nation, in that during this same period of time it has cost the United States almost 4.5 times as many lives (3.2 million) and nearly seven times the expense ($4.7 trillion) as the terror, nuclear and conventional threats combined. This threat is infectious disease. This article discusses infectious diseases in comparison with other strategic threats. It also discusses the process of creating a strategic plan which is both vital and well within our understanding and existing current processes to develop, similar to concepts applied in preparation for more conventional threats.

Howie, Luke. 2009. A role for business in the war on terror. ***Disaster Prevention and Management*** **18 (2): 100-107.**
This paper presents research findings that improve our understanding of the role for business in the "War on Terror." It should assist managers in preparing their response to terrorism and the threat it poses to their business. It is not about examining counter-terrorism commodities or products. Rather, it examines management attitudes and techniques for creating images of security that work to reduce the risk of terrorism. Since research on terrorism and business is rare and often underdeveloped, this study contributes to our understanding of how businesses must confront and respond to terrorism. A brief exploration of the literature informs the research that was carried out in Melbourne, Australia, in 2005 with managers in organizations located in Melbourne's central business district. It comprised in-depth interviews of 40-60 minutes in length. In total, 12 managers were interviewed. Two key respondents emerged and their views are presented in this paper. The author argues that managers are compelled to engage in counterterrorism in order to protect customers, clients, and the public. Yet counter-terrorism security is often not what it seems. When businesses are engaged in countering terrorism they are engaged in creating images of security.

Johnson, Yvette J., John A. Herrmann, Richard L. Wallace, Harry F. Troutt, and Maung S. Myint. 2009. Development and implementation of a functional exercise to assess public health agency response to food-borne bioterrorism. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-14.**
Agroterrorism and food terrorism are important homeland security issues in the public health, government, and food industry sectors of the United States. Intentional contamination of food has already occurred abroad and in North America. Outbreak investigation and control measures in response to intentional contamination differ from those employed in cases of naturally occurring contamination. Operations-based exercises specific to bioterrorism events are essential to train public health personnel and first responders to consider the possibility of deliberate contamination during an outbreak investigation. A recent search of the Rand Corporation's Public Health Preparedness database identified no operations-based (functional or full-scale) exercises involving food-borne contamination with a biological or chemical agent. This manuscript describes a functional exercise developed and conducted by the University of Illinois College of Veterinary Medicine Section of Community Health and Preventive Medicine. The functional exercise simulated a food-borne terrorism event and was designed to evaluate the efficacy of the Food Emergency Response Plan of the Illinois Department of Public Health, Division of Food, Drugs and Dairies. The exercise was held November 18-19, 2008 at the College of Veterinary Medicine, University of Illinois, Urbana. Based on this and previous exercises and training programs, it is apparent that the more exercise designers, evaluators, public health, and support agency participants move away from discussion-based exercises and towards operations-based exercises, the more strengths and deficiencies in preparation and response of participating agencies are revealed. Although public health agencies have begun training personnel and partner agencies to consider intentional contamination of food during an outbreak investigation, the relative lack of widespread operations-based exercises to assess preparedness in response to an intentional incident of food-borne contamination seems to be an important deficiency in homeland security. Additional funding to create opportunities for public health and first responder personnel to participate in operations-based bioterrorism response exercises is needed.

Kalish, Brian T., Charlotte A. Gaydos, Yu-Hsiang Hsieh, Bryan E. Christensen, Karen C. Carroll, Andy Cannons, Jacqueline A. Cattani, and Richard E. Rothman. 2009. National survey of Laboratory Response Network sentinel laboratory preparedness. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S17-S23.**

The Laboratory Response Network is the United States' laboratory system for detecting, confirming, and reporting potential bioterrorism agents. The first tier—sentinel laboratories—is composed principally of hospital-based laboratories and is tasked with ruling out potential biological threat agents in clinical specimens or the identification of suspicious specimens for further testing in higher tiers of the LRN system. The aim of the present study was to broadly describe preparedness of the sentinel laboratories, with a specific focus on training, personnel, and communications. A semi-structured cross-sectional survey of U.S. sentinel laboratories was designed and conducted. Hospitals with greater than 250 beds and an emergency department were considered eligible for inclusion. A geographically weighted sample of 201 hospitals was selected. The survey was administered by telephone to the microbiology managers (or designees) at the selected hospitals. The survey contained questions related to drill frequency, proficiency survey participation, personnel training, personnel responsibilities, procedures for biological threat response, and overall confidence in preparedness. Overall, 179 hospitals (89.1%) identified themselves as sentinel laboratories and participated in the survey; 11.7 percent reported that they had had an emergency alert within the last two years. Although rates of internal drills were low (20.7%), participation in some form of bioterrorism proficiency evaluation was high (79.9%). In all, 83.8 percent of laboratories reported that they had personnel designated to coordinate response to acts of bioterrorism. More than 73 percent of respondents indicated that they had sufficient personnel, equipment, and training to respond to a biological terrorism event. By multivariate analysis, sentinel laboratories were 3.4 times more likely to feel confident that they had sufficient personnel, equipment, and training to respond to a biological terrorism event if they had designated personnel for bioterrorism roles. This pilot study of sentinel laboratory bioterrorism preparedness demonstrated that hospital laboratory personnel, training, and communication preparedness were not universal, despite designation as sentinel laboratories. A need for unified monitoring of sentinel laboratories exists. Efforts should be made to develop standardized metrics for sentinel laboratory preparedness.

Khan, Sinan, and Anke Richter. 2009. Using decision analysis to select alternate modes of dispensing: An example from Los Angeles County Public Health. ***Journal of Emergency Management*** **7 (2): 39-51.**

To comply with the Center for Disease Control's mass prophylaxis mandates, many public health jurisdictions must supplement their existing Point of Dispensing-based system. Because of limited budgets and personnel availability, only one or two alternatives out of the many potential options can be implemented. Multicriteria decision analysis is a powerful tool that allows public health officials to assess the relative effectiveness of alternate modes of dispensing while incorporating the opinions of their multidisciplinary emergency response planning teams.This process was used to analyze the effectiveness of alternate modes of dispensing that could supplement the existing POD system within the Los Angeles County Department of Public Health. The top two options for were prepositioning for civil service, and partnership with a major health maintenance organization. These choices were stable under a variety of sensitivity analyses, and the differences in opinion between the agencies and other stakeholders do not change them. The transparency of the model and analysis may allow decision makers and planners in the DPH to garner support for their alternate modes of dispensing plans. By making the decision criteria clear and demonstrating the robustness of the results in the sensitivity analyses, public health partners gain a deeper understanding of the issues and their potential roles. The process can be repeated by any jurisdiction, but definition of "best" will rely on the issues and gaps that are identified with the jurisdiction's POD plan for mass prophylaxis.

Kiltz, Linda. 2009. Developing critical thinking skills in homeland security and emergency management courses. ***Journal of Homeland Security and Emergency Management*** **6.**

Since September 11, 2001, colleges and universities throughout the nation have developed and implemented new courses and degree programs in homeland security and emergency management. A valued learning outcome of these programs, like most university studies in general, is to develop critical thinking skills in students. However, this can be a challenge because the nature of critical thinking and approaches to teaching and assessing it in higher education are debatable. This paper provides a brief overview of the literature on critical thinking, and looks at the importance of developing these skills in students of homeland security programs so that they are able to adapt successfully in a rapidly changing environment. Finally, this paper discusses two teaching strategies, guided class discussions and case studies, to develop critical thinking that have been used by the teacher in undergraduate and gradate level courses in homeland security.

Kushma, Jane A., and Claire B. Rubin. 2009. Focal points in homeland security/emergency management research and practice. ***Journal of Homeland Security and Emergency Management*** **6 (1).**

This article analyzes the content of two years of articles and reviews published in JHSEM (2006-2008).

Lee, Eva K., Hannah K. Smalley, Yang Zhang, Ferdinand Pietz, and Bernard Benecke. 2009. Facility location and multi-modality mass dispensing strategies and emergency response for biodefense and infectious disease outbreaks. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 311-351.**

Mass dispensing for medical prophylaxis and treatment of the general population requires rapid establishment of a network of dispensing sites and health facilities that are flexible, scalable, and sustainable. This article

describes a systems approach to analyze mass dispensing of countermeasures, and presents a set of powerful modeling and computational tools to assist in strategic and operational planning. Facility location models are used to determine the number of dispensing sites required. The models account for variable population densities, the maximum distance individuals should have to travel, the types of private and public facilities available and the availability of critical staff to man the point-of-dispensing facilities (PODs). Large-scale simulation is employed to model the stochastic service and dynamic flow behavior within PODs. Optimization is interwoven to determine appropriate staffing levels for efficient operations logistics. A cost effective mass dispensing network for anthrax prophylaxis involving a metropolitan area with over five million people is presented. The study reveals: (1) the sharing of labor resources across counties and districts is important; (2) the most cost-effective dispensing plan across a region involves a multi-modality strategy, consisting of a combination of drive-through, walk-through and closed PODs, each operating at the availability of critical public health personnel; (3) the optimal combination of POD modalities changes according to various facility capacity restrictions, as well as the availability of critical public health personnel; (4) an increase in the number of PODs in operation does not necessarily increase the total number of core public health personnel needed; (5) optimal staffing is non-linear with respect to throughput—the optimal staffing and throughput cannot simply be estimated using an average estimate; (6) there exists an optimal capacity for each POD location, depending on the population, that provides the most effective staffing needs. The study also reveals that such computationally sophisticated decision support tools are invaluable to emergency managers. The tools provide flexibility to quickly analyze design strategies and decisions, and can generate a feasible regional dispensing plan based on the best estimates and analysis available, and then allow for reconfiguration of various PODs as the event unfolds. They type of disaster being confronted (e.g. biological attack, infectious disease outbreak or natural disaster) also dictates different design considerations with respect to the dispensing clinic, facility locations, dispensing and backup strategies, and level of security protection.

Lee, Jennifer E. C., and Louise Lemyre. 2009. A social-cognitive perspective of terrorism risk perception and individual response in Canada. *Risk Analysis* 29 (9): 1265-1280.
The volume of research on terrorism has increased since the events of September 11, 2001. However, efforts to develop a contextualized model incorporating cognitive, social context, and affective factors as predictors of individual responses to this threat have been limited. Therefore, the aim of this study was to evaluate hypotheses drawn from such a model that was generated from a series of interviews with members of the Canadian public. Data of a national survey on perceived chemical, biological, radiological, nuclear, and explosives terrorism threat and preparedness were analyzed. Results demonstrated that worry and behavioral responses to terrorism, such as individual preparedness, information seeking, and avoidance behaviors, were each a function of cognitive and social-contextual factors. As an affective response, worry about terrorism independently contributed to the prediction of behavioral responses above and beyond cognitive and social-contextual factors, and partially mediated the relationships of some of these factors with behavioral responses. Perceived coping efficacy emerged as the cognitive factor associated with the most favorable response to terrorism. Hence, findings highlight the importance of fostering a sense of coping efficacy to the effectiveness of strategies aimed at improving individual preparedness for terrorism.

Li, Hua, George E. Apostolakis, Joseph Gifun, William VanSchalkwyk, Susan Leite, and David Barber. 2009. Ranking the risks from multiple hazards in a small community. *Risk Analysis* 29 (3): 438-456.
Natural hazards, human-induced accidents, and malicious acts have caused great losses and disruptions to society. After September 11, 2001, critical infrastructure protection has become a national focus in the United States and is likely to remain one for the foreseeable future. Damage to the infrastructures and assets could be mitigated through pre-disaster planning and actions. A systematic methodology was developed to assess and rank the risks from these multiple hazards in a community of 20,000 people. It is an interdisciplinary study that includes probabilistic risk assessment, decision analysis, and expert judgment. Scenarios are constructed to show how the initiating events evolve into undesirable consequences. A value tree, based on multi-attribute utility theory, is used to capture the decision maker's preferences about the impacts on the infrastructures and other assets. The risks from random failures are ranked according to their expected performance index, which is the product of frequency, probabilities, and consequences of a scenario. Risks from malicious acts are ranked according to their PI, since the frequency of attack is not available. A deliberative process is used to capture the factors that could not be addressed in the analysis and to scrutinize the results. This methodology provides a framework for the development of a risk-informed decision strategy. Although this study uses the Massachusetts Institute of Technology campus as a case study, it is a general methodology that could be used by other similar communities and municipalities.

May, Peter J., Joshua Sapotichne, and Samuel Workman. 2009. Widespread policy disruption: Terrorism, public risks, and homeland security. *The Policy Studies Journal* 37 (2): 171-194.
This article addresses theoretical and empirical aspects of policy disruptions that affect multiple areas of policy making. Their theorizing leads the authors to consider the effects of widespread disruptions in gaining the attention of elected officials, in affecting policy making, and in reshaping the involvement of federal agencies. Their empirical analyses concern the threat of terrorism in the United States and its implications for public risk subsystems over the past 25 years. The authors' analyses of the attention of policy makers and resultant policy making volatility show selective patterns of subsystem disruption related to the threat of terrorism. They show

that capturing the attention of policy makers in multiple subsystems is insufficient to motivate heightened levels of policy making across the board. In addition, the authors find more muted impacts for federal agency involvement than might have been expected from the massive reorganization that created the Department of Homeland Security. More generally, the disjunctions they observe show the powerful influence of policy subsystems in buffering against widespread policy disruptions.

McEntire, David A., and Jill Souza. 2009. Responding to catastrophic disasters: Lessons from the World Trade Center terrorist attacks. ***Journal of Emergency Management*** **7 (3): 43-58.**
The following article uses the 2001 World Trade Center terrorist attacks as a case to illustrate the major challenges presented to the responders and emergency management officials. It examines not only the consequences of this disaster but also the immediate and long-term measures to deal with it. The article concludes with suggestions on how to prepare for such events in the future.

Meyerson, Frederick A.B., Laura A. Meyerson, and James K. Reaser. 2009. Biosecurity from the ecologist's perspective: Developing a more comprehensive approach. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 147-160.**
National planning for biological security should encompass more than just protection against biological weapons. Global forces such as the introduction and spread of invasive species (including emerging infectious diseases), in conjunction with population growth, climate change and sea level rise, also constitute threats to security. These linked biological and abiotic phenomena make the United States and other countries less secure by degrading ecosystems and ecosystem services, posting risks to human health and safety, and altering patterns of agriculture, settlement, migration, and economic opportunity. Several other countries already use a more comprehensive definition of biosecurity than the United States, one that includes biological threats to the environment, the economy, and human health and well-being. This article asserts that an expanded definition of biosecurity is necessary in a world undergoing rapid change due to altered climate, growing population and increased rates of trade, transport, and travel.

Mohtadi, Hamid, and Antu Panini Murshid. 2009. Risk analysis of chemical, biological, or readionuclear threats: Implications for food security. ***Risk Analysis*** **29 (9): 1317-1335.**
If the food sector is attacked, the likely agents will be chemical, biological, or radionuclear (CBRN). The authors compiled a database of international terrorist or criminal activity involving such agents. Based on these data, they calculated the likelihood of a catastrophic event using extreme value methods. At the present, the probability of an event leading to 5,000 casualties (fatalities and injuries) is between 0.1 and 0.3. However, pronounced, nonstationary patterns within their data suggest that the "reoccurrence period" for such attacks is decreasing every year. Similarly, disturbing trends are evident in a broader data set, which is nonspecific as to the methods or means of attack. While at the present the likelihood of CBRN events is quite low, given an attack, the probability that it involves CBRN agents increases with the number of casualties. This is consistent with evidence of "heavy tails" in the distribution of casualties arising from CBRN events.

Rhinard, Mark, and Arjen Boin. 2009. European homeland security: Bureaucratic politics and policy making in the EU. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-19.**
In the face of modern crises, the European Union has increased its efforts to build common crisis management capacity across the continent. As the EU seeks to both coordinate national crisis and disaster authorities and build its own supranational capacities, it is worth asking whether the EU is capable of designing an effective European homeland security apparatus that will fit member state expectations as well as its unique supranational character. This article applies a bureaucratic politics perspective to explore and assess how the EU's governance structures and policy making processes constrain and facilitate its efforts to build transnational crisis management capacity. It discusses how institutional and policy making characteristics may affect the EU's ongoing effort to enhance security and safety for the inhabitants of European states.

Rose, Adam Z. 2009. A framework for analyzing the total economic impacts of terrorist attacks and natural disasters. ***Journal of Homeland Security and Emergency Management*** **6 (1).**
Policies to mitigate natural hazards and terrorism are facing increasing scrutiny, such as the benefit-cost test. The benefits are the losses that can be avoided by the mitigation actions. For sound policy making, it is necessary that the various types of losses and major factors affecting them be identified and that metrics be established for their measurement in accordance with economic principles. This paper presents a comprehensive framework for the analysis and measurement of ordinary economic impacts and two categories of impacts that have recently gained the attention of analysts and policy makers, but for which operational definitions are lacking. The first is resilience, which refers to how the economy manages to keep functioning and how quickly it recovers. The second major extension of loss estimation pertains to behavioral and systems linkages. These refer to considerations unique to disasters that cause indirect impacts to be orders of magnitude greater than ordinary indirect effects in cases where risks are amplified, systems are overwhelmed, and resilience is eroded. The framework combines a checklist of types of impacts, consistent definitions, metrics, and strategies for estimation. The framework is serving as a template for loss estimation and benefit-cost analysis by several offices of the U.S. Department of Homeland Security.

Smith, Diane L., Stephen J. Notaro, and Stephanie A. Smith. 2009. Bioterrorism and the college campus: Student

perceptions of emergency preparedness. ***Journal of Emergency Management*** **7 (2): 53-64.**
This study determined the perceptions of college students in regard to the emergency management of bioterrorism. University students enrolled in community health courses were recruited to participate in paper or online surveys to determine their perceptions regarding likelihood of a bioterrorist attack, preparedness of the university, and preparedness of the students. Of the 309 students recruited, 265 (85.9 percent) participated in the survey. Data from the surveys were entered into an SPSS dataset for analysis. Students perceived a low likelihood of a bioterrorist attack at the university. Only 17.6 percent of the students felt that the university was prepared for a large-scale emergency and only 24.1 percent felt that the students were prepared. One-third of the students did not know that the university had policies in place for a bioterrorist attack and 88.3 percent did not know where to go for information in the event of a bioterrorist attack. Only 9.2 percent had visited the campus emergency planning Web site. Effort must be made by universities to determine the appropriate amount of education to the students regarding emergency preparedness based on the cost-benefit to the university and the student body. Suggestions from students included a mandatory workshop for incoming freshman, involvement of campus emergency planning with student organizations, and increased marketing of the campus emergency Web site.

Stocker, Darren K., and Charles J. Kocher. 2009. Biological incidents: Revisiting past perspectives toward a 21st century problem. ***Journal of Emergency Management*** **7 (3): 76-80.**
Beginning in the 14th century, the use of biological agents as weapons created an effective methodology of killing enemy combatants and instilling fear in the populace of community and nation. Although the deployment of these agents in various forms is in opposition to the agreements set within the rules of several weapons treaties, their use and threat of development as a terrorist instrument has impacted societies in post-September 11th documented accounts. This article provides a chronological indication of the use of natural and synthetic biological agents as an intimidation factor and demonstrates the extent of how they have been consciously used in contemporary confrontations, along with how law enforcement, healthcare providers, and health organizations are engaged in the response of these biological weapons.

Talas, Risto, and David A. Menachof. 2009. The efficient trade-off between security and cost for sea ports: A conceptual model. ***International Journal of Risk Assessment and Management*** **13 (1): 46-59.**

Wattana, Monica, and Tareg Bey. 2009. Mustard gas or sulfur mustard: An old chemical agent as a new terrorist threat. ***Prehospital and Disaster Medicine*** **24 (1): 19-29.**
Sulfur mustard is a member of the vesicant class of chemical warfare agents that causes blistering to the skin and mucous membranes. There is no specific antidote, and treatment consists of systematically alleviating symptoms. Historically, sulfur mustard was used extensively in inter-governmental conflicts within the trenches of Belgium and France during World War I and during the Iran-Iraq conflict. Longitudinal studies of exposed victims show that sulfur mustard causes long-term effects leading to high morbidity. Given that only a small amount of sulfur mustard is necessary to potentially cause an enormous number of casualties, disaster planning protocol necessitates the education and training of first-line health care responders in the recognition, decontamination, triage, and treatment of sulfur mustard-exposed victims in a large-scale scenario.

Yanhong, H.Jin, Bruce A. McCarl, and Levan Elbakidze. 2009. Risk assessment and mangement of animal disease-related biosecurity. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 186-203.**
Animal agriculture is vulnerable to both intentional and unintentional biological threats. Outbreaks, especially intentional attacks, could cause enormous consequences extending well beyond agriculture. Nations, including the United States, are consolidating and coordinating efforts to protect against these biological threats. The efforts employed largely fall into the categories of ex ante prevention/preparedness and ex post response/recovery. The optimal mix across these strategies depends on the event probability, expected economic consequences, costs and effectiveness of strategies, and disease spread rates along with other factors. This article reviews the literature discussing vulnerability and mitigation strategies and issues of relevance to agricultural analyses. These recommendations address: (1) what categories of mitigation strategies are likely to be most effective; (2) what implementation obstacles exist and how these implementation challenges could be managed or overcome; and (3) what leverages can be done on technology, scientific advancement, and education.

Hurricane and Coastal Hazards

Adeola, Francis O. 2009. Katrina cataclysm: Does duration of residency and prior experience affect impacts, evacuation, and adaptation behavior among survivors? ***Environment and Behavior*** **41 (4): 459-489.**
This study explores the extent to which people's prior experience of a natural disaster influenced subsequent behavior concerning the threats of a hydrometeorological disaster and if duration of residency in a disaster-prone landscape affects the extent of preparedness for an impending disaster. Mixed methods research strategies involving survey, field observation, and participant observations at several locations including rescue and evacuation centers in New Orleans, Louisiana, Austin, Texas, and Lawrenceville, Georgia, were used, during the immediate impact phase, emergency shelter phase, and post-impact and recovery phase of the Katrina catastrophe. For the survey, a sample of 598 subjects completed a 15-page, 54-item questionnaire addressing various aspects of the Katrina flood in the New Orleans Metropolitan Area. The qualitative aspect consists of field observations of the event, interviews, and direct comments by the victims dispersed across the South. In the regression analysis performed, prior

experience was found to be less important than friends' and family members' influence in determining evacuation behavior. However, duration of residency and prior experience were found to be slightly significant in predicting the odds of evacuation.

Baker, Justin, W. Douglass Shaw, David Bell, Sam Brody, Mary Riddel, Richard T. Woodward, and William Neilson. 2009. Explaining subjective risks of hurricanes and the role of risks in intended moving and location choice models. ***Natural Hazards Review*** **10 (3): 102-112.**
Using stated choice survey data, we report on subjects' perceptions of the risks of hurricanes and intended relocation decisions when faced with such risks. All of the subjects were displaced by either Hurricane Katrina or Rita, in New Orleans and other Gulf Coast areas in 2005. Results here suggest that subjective perceptions of risk are quite high as compared to scientific estimates of risk, and relocation decisions revealed from a discrete choice experiment are significantly determined by levels of hurricane strike risks.

Baker, Justin, W. Douglass Shaw, Mary Riddel, and Richard T. Woodward. 2009. Changes in subjective risks of hurricanes as time passes: Analysis of a sample of Katrina evacuees. ***Journal of Risk Research*** **12 (1): 59-74.**
Using a quasi-field experiment, this article reports on subjects' perceptions of the risks of hurricanes. All experimental subjects were displaced by either Hurricane Katrina or Rita, in New Orleans and other Gulf Coast areas, except for a small control group consisting of people who live in central Texas. The authors examined their perceptions of risks just after the hurricanes occurred, and over one year later to evaluate the change in subjective risk perceptions over time. A latent risk model is estimated in which subjective probabilities of hurricane strike risk are represented as a function of respondents' demographic characteristics and experiences following the storms.

Burke, Jennifer A., Patric R. Spence, Kenneth A. Lachlan, and Matthew W. Seeger. 2009. Sex and age differences in use and perceptions of emergency messages during Katrina. ***Louisiana Journal of Communication*** **10: 19-33.**
This study investigated the relationship between gender, age, media use, and the perceived adequacy of mediated messages associated with Hurricane Katrina. Surveys were collected from evacuated residents of the New Orleans metropolitan area. Results indicated that men had a better understanding of mediated instructions than women. Differences for age were also found for importance of television and radio messages. As age increased so did the importance of television and radio as a desired medium. These findngs are discussed, along with limitations of the study and suggestions for future research.

Carden, William. 2009. Sound and fury: Rhetoric and rebound after Katrina. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-14.**
Free markets in capital and labor are essential to rapid recovery from natural disaster. Political and rhetorical responses to Hurricane Katrina included denunciation of "price gougers" in the market for gasoline. The arbitrariness associated with anti-price gouging legislation may create uncertainty that reduces the attractiveness of the investment climate.

Carney, Frederick P. Buttell and Michelle Mohr. 2009. Examining the impact of Hurricane Katrina on police responses to domestic violence. ***Traumatology*** **15 (2): 6-9.**
The purpose of this study was to investigate the New Orleans Police Department's responses to domestic violence both pre– and post–Hurricane Katrina. This study employed a secondary analysis of data collected by the NOPD in New Orleans, Louisiana, from 2002 through 2006. Analysis indicated that the NOPD actively responded to domestic violence calls following Hurricane Katrina and that domestic violence did not get relegated to secondary status as a consequence of rising demand for police intervention in the city following the crisis precipitated by the hurricane. This article concludes with a discussion of the NOPD's response to the community need for more intensive policing following the storm, particularly to the increase in domestic violence calls, and of the rate of domestic violence occurring in New Orleans following the hurricane.

Changnon, Stanley A., and David Changnon. 2009. Assessment of a method used to time adjust past storm losses. ***Natural Hazards*** **50 (1): 5-12.**
A widely used method for adjusting past annual storm losses to present day values, needed to address the ever-changing socio-economic conditions, was assessed. The property insurance industry developed a comprehensive method for adjusting losses in past years to current year loss values. Characteristics of hurricanes occurring 50 or more years ago and those in the recent years were examined to find similar early and recent pairs of storms for a comparative evaluation of their property losses. One pair found was hurricanes Hazel (1954) and Hugo (1989), and another pair with similar features was Hhurricanes Carol (1954) and Bob (1991). The insurance-based adjusted property loss values for these two pairs of storms were compared to determine if the early year values were comparable to the recent year values. The adjusted losses of the two pairs of hurricanes were found to have small differences of 7.8 percent and 8.1 percent. These differences were due to somewhat different storm paths and slightly higher wind speeds in the two storms with higher losses. The adjustment method appears to adequately capture time differences in storm losses due to changes in population, wealth, inflation, structural density, and insurance coverage.

Cook, Timothy. 2009. Cleaning up New Orleans: The Impact of a missing population on disaster debris removal. ***Journal of Emergency Management*** **7 (3): 21-31.**
Public participation in the disaster debris removal process is an important component to any large-scale rebuilding effort. How, then, does such an effort progress when nearly two-thirds of the affected community's population does not come back to participate? New Orleans faced just such a situation after Hurricane

Katrina and the catastrophic flooding that followed. The debris removal task is the largest in U.S. history, but very few residents returned to participate in the cleanup. This article provides a further understanding of the impact that New Orleans' missing population had on the cleanup process. Without the city's residents (or first filters), the enormous debris removal effort in New Orleans was further slowed and complicated. The first two sections provide background and context, identifying the size and scope of the disaster, the low residential return rate, and the role of public participation in previous large-scale debris removal efforts. The next three sections focus on the disaster debris itself, identifying specific ways in which the missing population further complicated New Orleans' cleanup efforts with regard to (a) the duration of the debris removal process, (b) the volume of debris, and (c) the contamination of debris. The final section considers various measures that emergency planners and managers can take to facilitate "participatory repopulation," thus mitigating the complications of a missing population.

Dabral, Apoorv, and Ewing Bradley. 2009. Analysis of wind-induced economic losses resulting from roof damage to a metal building. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-20**

Metal roofs are highly susceptible to hurricane wind damage. Roof damage is a particularly important element in the estimation of economic losses as even minor roof damage can augment the total loss due to entrance of rain and subsequent interior and content loss. Dabral developed a probabilistic damage model to predict the physical damage in a metal roof due to wind. This study estimates economic losses associated with high wind, hurricane events that cause roof damage to metal buildings using Hurricane Katrina data and a hurricane simulation data set. A cost benefit study is also performed to establish the cost effectiveness of mitigation.

Denhart, Hazel. 2009. Deconstructing disaster: Psycho-social impact of building deconstruction in Post-Katrina New Orleans. ***Cities*** **26 (4): 195-201.**

This phenomenological study inquired into the psychosocial impact of building deconstruction in disaster response. Nine building owners participating in a Mercy Corps' sponsored building deconstruction program in Post-Katrina New Orleans (2005-2008) engaged in extensive interviews about their experience. The core phenomenon they shared was empowerment arising from a synthesis of positive social interaction and material discovery. Dedicated, local, Mercy Corps trained contractors brought immediate relief to these distressed participants by facilitating "a dignified end" to their buildings and by proxy to the lives they held before the catastrophe. Deconstruction allowed participants to reclaim wealth that would have been scrapped for landfill waste by federal mandate. Participants reported a sudden psychological shift from despair to enthusiasm as they regained control of their property and then discovered value out of the ruined buildings. Data indicated that merely possessing reclaimed material did not explain the psychological transformation. Four of nine informants (including impoverished individuals) experienced psychological transformation by giving all of their reclaimed material away. The sharing of material was described as akin to "donating organs" giving life to their critically injured community. Data indicated the program also promoted more environmentally sustainable behavior. Previously, deconstruction has only been addressed in terms of technical, mechanical, economic, or environmental outcomes. This study adds a new component by seeing the human side of that technical process. This report is a companion study to another— "Deconstructing Disaster; Economic and Environmental Impacts of Deconstruction in Post-Katrina New Orleans"— which provides a quantitative analysis of material salvage from the Mercy Corps program.

Ewing, Bradley T., Jamie Brown Kruse, and Daniel Sutter. 2009. An Overview of Hurricane Katrina and economic loss. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-14.**

This article reviews the literature on business activity and disasters, and specifically hurricanes. An overview of the papers in the special issue on Economic Loss and Hurricane Katrina is also provided.

Hamblen, Jessica L., Fran H. Norris, Siobhan Pietruszkiewicz, Laura E. Gibson, April Naturale, and Claudine Louis. 2009. Cognitive behavioral therapy for post-disaster distress: A community based treatment program for survivors of Hurricane Katrina. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 206-214.**

Many disaster survivors suffer from postdisaster distress regardless of whether or not they meet criteria for specific psychiatric diagnoses. Cognitive Behavior Therapy for Post-disaster Distress, a ten-session manualized intervention, was developed to address a range of cognitive, emotional, and behavioral reactions to disaster. Trained community-based therapists provided CBT-PD to adult survivors of Hurricane Katrina as part of InCourage, a program sponsored by the Baton Rouge Area Foundation. Participants (n = 88) who were assessed at referral, pretreatment, intermediate treatment, and post-treatment showed significant improvement. The overall pre-post effect size was 1.4 in intention-to-treat analyses. Improvements were comparable for persons with more severe distress and persons with moderate distress at referral. Benefits were maintained at follow-up for the 66 adults who have been assessed.

Hinkel, Jochen, and Richard J.T. Klein. 2009. Integrating knowledge to assess coastal vulnerability to sea level rise: The development of the DIVA tool. ***Global Environmental Change*** **19 (3): 384-395.**

This paper describes the development of DIVA, a user-friendly tool for assessing coastal vulnerability from subnational to global levels. The development involved the two major challenges of integrating knowledge in the form of data, scenarios, and models from various natural, social, and engineering science disciplines and making this integrated knowledge accessible to

a broad community of end users. These challenges were addressed by: (i) creating and applying the DIVA method, an iterative, modular method for developing integrating models amongst distributed partners; and (ii) making the data, scenarios, and integrated model—equipped with a powerful graphical user interface—directly and freely available to end users.

Jarmin, Ron S., and Javier Miranda. 2009. The impact of Hurricanes Katrina, Rita, and Wilma on business establishments. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-27.**
The authors show that GIS based estimates of the economic impact of the 2005 hurricanes provide a more accurate characterization of affected businesses than widely reported estimates constructed from county level data. Their methodology relies on mapping business establishments into damage zones defined by remote sensing information provided by the Federal Emergency Management Agency. The methodology is based on pre-storm data, so estimates can be made available very quickly to inform the public and policy makers. The GIS-based estimates indicate significantly smaller impacts on business payroll than previous estimates using county level data. Tests using post-storm data support our GIS methodology.

Jenkins, Jennifer Lee, Melissa McCarthy, Gabor Kelen, Lauren Sauer, and Thomas Kirsch. 2009. Changes needed in the care of sheltered persons: A multistate analysis from Hurricane Katrina. ***American Journal of Disaster Medicine*** **4 (2): 101-106.**
Following Hurricane Katrina, nearly 1,400 evacuation shelters were opened in 27 states across the nation to accommodate the more than 450,000 evacuees from the gulf region. The levee breaks in New Orleans and storm surge in Mississippi brought about significant morbidity and mortality, ultimately killing more than 1,300 people. This study summarizes the health needs of approximately 30,000 displaced persons who resided in shelters in eight states, including prescription medical needs, disbursement of durable medical equipment, and referrals for further care. The first available 31,272 medical encounter forms were utilized as a convenience sample of displaced persons in Louisiana, Mississippi, Texas, Alabama, Georgia, Tennessee, Missouri, and Florida. This medical encounter form was completed by volunteer nurses, was standardized across all shelters, and included demographic information, need for acute or preventive care, pre-existing medical conditions, disposition referrals, need for prescription medication, and frequency of volunteer providers who were providing care outside of their first-aid scope. Sheltered persons who received only acute care numbered 11,306 (36.2%), and those who received only preventive/chronic care numbered 10,403 (33.3%). A similar number 9,563 (30.6%) persons, received both acute and preventive/chronic care. There were 3,356 (10.7%) sheltered persons who received some form of durable medical equipment. Glasses were given to 2,124 people (6.8% of the total visits receiving them) and were the most commonly dispensed item. This was followed by dental devices (495, 1.6%) and glucose meters (339, 1.1%). Prescriptions were given to 8,154 (29.0%) sheltered persons. Referrals were made to 13,815 (44.2%) of sheltered persons who presented for medical care. The pharmacy was the most common location for referrals for 5,785 (18.5%) of all sheltered persons seeking medical care and were referred to the emergency department or hospital for further care. Hurricane Katrina illustrated the need to strengthen health-care planning and response in regard to sheltered persons with a particular focus on primary and preventive care services. This study has reemphasized the need for primary medical care and pharmaceuticals in sheltered persons and shown new data regarding the disbursement of durable medical equipment and the frequent need for health care beyond the shelter setting as evidenced by referrals.

Jones, Kris, Mardi Allen, Fran H. Norris, and Christy Miller. 2009. Piloting a new model of crisis counseling: Specialized crisis counseling services in Mississippi after Hurricane Katrina. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 195-205.**
During January to April 2007, Project Recovery, a federally funded crisis counseling program implemented by Mississippi's Department of Mental Health, piloted a new model of Specialized Crisis Counseling Services (SCCS) on the Mississippi Gulf Coast. In this team-based approach, a masters level counselor trained in a variety of intervention techniques and a resource coordinator worked together with people whose needs were relatively intense. Compared to regular program (RCCS) participants over the same interval (n = 29,522), SCCS participants (n = 281) were more likely to be female, middle-aged, and at greater risk for severe distress. In a participant survey conducted in both programs over the same week, SCCS participants reported significantly greater benefit than did RCCS participants. A subset of 129 SCCS participants provided pre- and post-participation assessments and showed large improvements in disaster-related distress.

Kaiser, Mark J., David A. Dismukes, and Yunke Yu. 2009. The value of lost production from the 2004-2005 hurricane seasons in the Gulf of Mexico. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-34**
The oil and gas industry in the Gulf of Mexico has the greatest weather exposure in the world, and is vulnerable to a range of losses that include physical damage, destruction, business interruption, and pollution liability. During the 2004 and 2005 hurricane seasons, a number of offshore facilities, drilling rigs, and pipelines were destroyed or extensively damaged. In total, Hurricanes Ivan, Katrina, and Rita destroyed 122 structures and severely damaged 76 others. Most of the destroyed infrastructures were mature assets that are unlikely to meet the economic thresholds to support redevelopment, and in the majority of cases, the production and revenue from these structures will be "lost" and written off by operators. The purpose of this paper is to examine the destroyed infrastructure from the 2004 and 2005 hurricane seasons and the likely contribution

this collection of assets would have made to future production in the Gulf. The article estimates the amount andvalue of lost production under various model scenarios, present the results of sensitivity analysis, and discuss the limitations of the analysis. It is estimated that between 60 million and 65 million barrels of oil and 231 billion to 266 billion cubic feet of gas were permanently lost in the 2004-2005 hurricane seasons with an estimated value ranging between $1.3 billion and $4.5 billion, depending on the future price profiles of oil and gas.

Kirgiz, Kivanc, Michelle Burtis Burtis, and David A. Lunin. 2009. Petroleum refining industry business interruption losses due to Hurricane Katrina. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-13.**

Hurricane Katrina had a significant destructive effect on the Gulf Coast's petroleum refining industry. In many cases, refineries sustained considerable damage and had to suspend operations for extended periods of time. Multiple Gulf Coast refineries filed substantial business interruption loss insurance claims following Hurricane Katrina's disruption of their production. This paper presents a methodology to calculate refinery business interruption losses taking into account the effect of Hurricane Katrina on input and output market prices during the period of restoration. The results indicate that adjusting for Hurricane Katrina's effects on crude oil and petroleum product market prices significantly changes the magnitude of refinery business interruption loss claims.

Kleidt, Benjamin, Dirk Schiereck, and Christof Sigl-Grueb. 2009. Rationality at the eve of destruction: Insurance stocks and huge catastrophic events. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-25**

This study looks at the valuation impact on 148 insurance stocks caused by 25 of the largest catastrophic events that occurred in recent history. Because of their exceptional severity and the consequent attention they experience in the media, the authors expect to find significant overreactions of insurance stocks relative to the market, which would be in line with an availability bias known from the behavioral finance literature. However, insurance stock investors behave as rationally as the market does under these conditions. Clear exceptions to this are the September 11, 2001, terror attacks. In general, the article finds that insurance stocks adjust gradually to a new valuation level.

Laditka, Sarah L., James N. Laditka, Carol B. Cornman, Courtney B. Davis, and Jane V.E. Richter. 2009. Resilience and challenges among staff of Gulf Coast nursing homes sheltering frail evacuees following Hurricane Katrina, 2005: Implications for planning and training. ***Prehospital and Disaster Medicine*** **24 (1): 54-62.**

The purpose of this study was to: (1) explore experiences and responses of staff in caring for sheltered, frail, Hurricane Katrina evacuees; and (2) identify how planning and training can be enhanced for staff who may care for frail older populations during and after disasters. Individual, in-person, semi-structured interviews were conducted with 38 staff members in four nursing homes in Mississippi, sheltering 109 evacuees in November 2005, nine weeks after Hurricane Katrina. Twenty-four were direct care staff, including certified nursing assistants, licensed nurses, dietary aides, and social workers; 14 were support staff, including maintenance and business managers. The number interviewed in each nursing home averaged 9.5 (range 6-15). Using a discussion guide and focusing on their experiences caring for nursing home evacuees, staff were asked to describe: (1) experiences; (2) problems; (3) what helped; and (4) what was learned. Data were processed using grounded theory and thematic analysis. Responses of direct care staff differed in emphasis from those of support staff in several areas. Responses from these groups were analyzed separately and together. Three of the researchers identified recurring themes; two organized themes conceptually. Staff emphasized providing emotional reassurance to evacuees as well as physical care. Many described caring for evacuees as "a blessing," saying the experience helped them bond with residents, evacuees, and other staff. However, caring for evacuees was difficult because staff members were extremely anxious and in poor physical condition after an arduous evacuation. Challenges included communicating with evacuees' families, preventing dehydration, lack of personal hygiene supplies, staff exhaustion, and emotional needs of residents, evacuees, and staff. Teamwork, community help, and having a well-organized disaster plan, extra supplies, and dependable staff helped personnel cope with the situation. Conclusions: Staff of nursing homes that sheltered Katrina evacuees demonstrated resilience in the disaster's aftermath. Many placed the well-being of residents as their first priority. Results underscore the importance of planning, teamwork, and adequate supplies and staffing. Training for long-term care staff should emphasize providing emotional support as well as physical care for residents and evacuees during and following disasters. Nurses, social workers, and other staff members responsible for promoting emotional well-being for nursing home residents should be prepared to respond to disasters.

Marchand, M., J. Buurman, A. Pribadi, and J. Kurniawan. 2009. Damage and casualties modeling as part of a vulnerability assessment for tsunami hazards: A case study from Aceh, Indonesia. ***Journal of Flood Risk Management*** **2 (2): 111-119.**

Vulnerability reduction to tsunamis has become a major issue after the December 2004 Indian Ocean tsunami disaster. An ex ante (before the event) evaluation of possible disaster reduction measures requires insight into the potential risks. As part of a study focusing on sea defense measures for Aceh and Nias provinces in Indonesia, the authors developed a model that is capable of quantifying potential damages and casualties for tsunami-prone coastal areas. The model was able to reproduce the damage of 2004 sustained in Banda Aceh quite accurately. Because it is GIS based, the model also shows the spatial distribution of damage. Maps can be

prepared that show high- and low-impact areas for various tsunami event scenarios. This information is very useful for cost-benefit analyses of mitigation measures, such as sea defense measures, spatial planning, and evacuation procedures.

Norris, Fran H., and Nikki D. Bellamy. 2009. Evaluation of a national effort to reach Hurricane Katrina survivors and evacuees: The Crisis Counseling Assistance and Training Program. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 165-175.**

Hurricane Katrina created the largest population of internally displaced persons in the history of the United States. Exceptions to the Federal Emergency Management Agency's usual eligibility requirements allowed states from across the nation to apply for Crisis Counseling Assistance and Training Program (CCP) grants to provide services to evacuees. Over a 16-month period, crisis counselors documented 1.2 million individual and group encounters across 19 CCPs. Most encounters (936,000, 80%) occurred in Presidential disaster-declared areas of Louisiana, Mississippi, and Alabama, but many (237,000, 20%) occurred in 16 smaller ''undeclared'' programs across the country. Programs showed excellent reach relative to external benchmarks provided by FEMA registrations for individual assistance and population characteristics. Programs varied widely in service mix and intensity. The declared programs reached more people, but the undeclared programs provided more intensive services to fewer people with higher needs.

Norris, Fran H., Jessica L. Hamblen, and Craig S. Rosen. 2009. Service characteristics and Counseling outcomes: Lessons from a cross-site evaluation of crisis counseling After hurricanes Katrina, Rita, and Wilma. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 176-185.**

The 2005 hurricane season was the worst on record, resulting in disaster declarations and the implementation of federally funded crisis counseling programs in five states. As part of a larger cross-site evaluation of these programs, data from 2,850 participant surveys, 805 provider surveys, and 132,733 encounter logs (submitted from three weeks before to three weeks after the participant surveys) were aggregated to the county level (N=50) and used to test hypotheses regarding factors that influence program performance. County-level outcomes (aggregate ratings of participants' perceived benefits) improved as service intensity, service intimacy, and frequency of psychological referrals increased, and as provider job stress decreased. The percent of providers with advanced degrees was indirectly related to participants' perceived benefits by increasing service intensity and referral frequency. The results yielded recommendations for achieving excellence in disaster mental health programs.

Norris, Fran H., and Craig S. Rosen. 2009. Innovations in disaster mental health services and evaluation: National, state, and local responses to Hurricane Katrina. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 159-146.**

The severe consequences of Hurricane Katrina on mental health have sparked tremendous interest in improving the quality of mental health care for disaster victims. This special issue seeks to illustrate the breadth of work emerging in this area. The five empirical examples each reflect innovation, either in the nature of the services being provided or in the evaluation approach. Most importantly, they portray the variability of post-Katrina mental health programs, which ranged from national to state to local in scope and from educational to clinical in intensity. As a set, these papers address the fundamental question of whether it is useful and feasible to provide different intensities of mental health care to different populations according to presumed need. The issue concludes with recommendations for future disaster mental health service delivery and evaluation.

Paul, Bimal Paul. 2009. Why relatively fewer people died: The case of Bangladesh's Cyclone Sidr. ***Natural Hazards*** **50 (1): 289-304.**

Cyclone Sidr, a Category IV storm, struck the southwestern coast of Bangladesh on November 15, 2007 killing 3,406 people. Despite a similar magnitude, Sidr claimed far fewer lives than Cyclone Gorky, also a Category IV storm, which struck Bangladesh in 1991, causing an estimated 140,000 fatalities. The relatively low number of deaths experienced with Sidr is widely considered the result of the Bangladesh government's efforts to provide timely cyclone forecasting and early warnings, and successful evacuation of coastal residents from the projected path of Cyclone Sidr. Using information collected from both primary and secondary sources, this study identified several other reasons for the unexpectedly lower mortality associated with Cyclone Sidr relative to Cyclone Gorky. Fewer casualties may be attributed to a number of physical characteristics of Cyclone Sidr, such as duration of the storm and storm surge, landfall time and site, varied coastal ecology, and coastal embankment. This article recommends improvements to the cyclone warning systems, establishment of more public cyclone shelters, and implementation of an education campaign in coastal areas to increase the utilization of public shelters for future cyclone events.

Rateau, Margaret R. 2009. Differences in emotional well-being of hurricane survivors: A secondary analysis of the ABC News Hurricane Katrina Anniversary Poll. ***Archives of Psychiatric Nursing*** **23 (3): 269-271.**

Literature suggests that survivors of catastrophic loss may suffer long-term emotional damage. This paper presents a secondary data analysis from the ABC News Hurricane Katrina Poll conducted in August, 2006. Following analyses, a significantly higher percentage of women (44%) and those who experienced residential damage (66.7%) reported long-term negative impact on emotional well-being. Overall, 70.3 percent of Katrina survivors reported a strengthening in fellow man following the disaster. These results may serve as beginning evidence for appropriate identification and implementation of mental health support for those most in need following disaster.

Richards, Elizabeth A., Julie Cowan Novak, and Lynn V. Davis. 2009. Disaster response after Hurricane Katrina: A model for an academic community partnership in Mississippi. ***Journal of Community Health Nursing*** **26 (3): 114-120.**

Team Reach Out Biloxi is a nursing student-initiated service-learning project with the goal of providing ongoing assistance to the victims of Hurricane Katrina. On six different occasions from 2005 to 2008, Purdue nursing students integrated their leadership skills with application of public health knowledge, compassion, and concern as they worked in partnership with the Gulfport region Coastal Family Health Clinics. This article reviews the service-learning framework, course planning, and implementation of a three-year post-hurricane disaster project.

Rosen, Craig S., Monica M. Matthieu, and Fran H. Norris. 2009. Factors predicting crisis counselor referrals to other crisis counseling, disaster relief, and psychological services: A cross-site analysis of post-Katrina programs. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 186-194.**

An important aspect of crisis counseling is linking survivors with services for their unmet needs. The authors examined determinants of referrals for disaster relief, additional crisis counseling, and psychological services in 703,000 crisis counseling encounters 318 months after Hurricane Katrina. Referrals for disaster relief were predicted by clients' losses, age (adults rather than children), and urbanicity. Referrals for additional counseling and psychological services were predicted by urbanicity, losses and trauma exposure, prior trauma, and preexisting mental health problems. Counseling and psychological referrals declined over time despite continuing mental health needs. Results confirm large urban-rural disparities in access to services.

Sprang, Ginny, and A. Scott LaJoie. 2009. Exposure, avoidance, and PTSD among Hurricane Katrina evacuees. ***Traumatology*** **15 (2): 10-19.**

This article describes an investigation into the relationship between exposure, avoidant coping, and posttraumatic stress disorder (PTSD) in Hurricane Katrina evacuees. Specifically, this study examines the unique contribution of the dose of exposure to variance in PTSD and provides a mediational analysis to determine the degree to which avoidant coping affects the relationship between exposure and PTSD. Findings reveal that the dose of exposure is a strong predictor of threshold-level PTSD at one year post-disaster and identifies avoidant coping strategies as a partial mediator between exposure and the development of PTSD. Identification of avoidant coping as a significant factor in the causal pathway between exposure and PTSD provides a clearly definable and specific target for clinical intervention.

Swanson, David A. 2009. Hurricane Katrina: A case study of its impacts on medical service providers and their client populations. ***Open Demography*** **2: 8-17.**

There is a great deal of literature in the areas of: (1) medical demography; (2) the effect of disasters on first responders; (3) measuring the immediate demographic and social effects of a disaster; and (4) the short- and long-term economic and financial effects of disasters. However, there is very little about the demographic effects of large-scale disasters on medical providers once rescue operations have been completed and operations move into the relief and recovery/rehabilitation phases associated with a disaster. This paper seeks to bridge this gap by providing a "recovery/ rehabilitation" case studY: estimates of the effects of Hurricane Katrina on the client populations and candidates for a specific medical procedure in the service areas associated with two medical facilities on the Mississippi gulf coast. The estimates presented here show that Katrina had a substantial demographic impact and that this translated into an adverse impact on the client base of both medical facilities. Although the results come from a single case study, they suggest that the effects of a disaster can have substantial impacts on medical care providers and their ability to continue business that goes well beyond physical damage. That is, the impact of demographic effects of a disaster on a client base can be more important than physical damage—a fact that does not appears to be widely recognized. The first step in effectively dealing with a disaster is the presence of a plan. It is typical of organizations to have both "disaster recovery" plans and "business continuation" plans. Given the long-term effects of Katrina on client populations found in this case study, it would be prudent that medical care providers include estimates of demographic impacts on their client populations in these plans, particularly in regard to the long-term "effects horizon" of a given disaster.

Thompson, Mark A. 2009. Hurricane Katrina and economic loss: An alternative measure of economic activity. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-11.**

This paper examines the effect of Hurricane Katrina on Louisiana's economy. In particular, it uses a state coincident index to assess the economic loss from Hurricane Katrina. This alternative approach provides policy makers with a simple and timely measure of the economy for modeling disasters.

Walker, Douglas M., and John D. Jackson. 2009. Katrina and the Gulf States casino industry. Journal of Business Valuation and Economic Loss Analysis - ***Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-17.**

Hurricane Katrina devastated the Louisiana and Mississippi Gulf Coast. The casino industry, especially in Mississippi, suffered staggering losses. This article describes the industry's losses and provides data on the industry before and after Katrina. Following previous research which has indicated that casino development may be a stimulus to a state's economy, the authors use a simple OLS model to examine whether rebuilding the Gulf Coast casinos has had an impact on personal income in Louisiana and Mississippi. After accounting for other factors, their results indicate that the casino industry has had a positive impact on post-Katrina personal incomes in Louisiana and Mississippi.

Information & Spatial Technology

Ajami, Sima, and Mahshid Fattahi. 2009. The role of earthquake information management systems (EIMSs) in reducing destruction: A comparative study of Japan, Turkey and Iran. ***Disaster Prevention and Management*** **18 (2): 150-161.**

The most important factor for a manager to be able to overcome a crisis depends on his or her readiness. The main objective of this study was to determine an earthquake information management system (EIMS) in Japan, Turkey and Iran and describe how it can reduce destruction by crisis management. The study was an analytical comparison in which data were collected by questionnaire, observation, and checklist. The subject was the EIMS in selected countries. Sources of information were staff in related organizations, scientific documentation, and the Internet. To analyze the findings, criteria rating technique, Delphi technique, and descriptive methods were used. Findings showed that the EIMSs in Japan, Turkey, and Iran are decentralized. The EIMS is called "Phoenix" in Japan, and "natural disaster management information system" or "AFAYBIS" in Turkey. In Iran there was not a useful and efficient EIMS to evaluate earthquake information. It is clear that an information system can only influence decisions if it is relevant, reliable, and available for the decision-makers in a timely fashion. Therefore, it is necessary to design a model that contains responsible organizations and their functions.

Bayrak, Tuncay. 2009. Identifying requirements for a disaster monitoring system. ***Disaster Prevention and Management*** **18 (2): 86-99.**

The importance of disaster monitoring and response systems increased in recent years because of an increase in the numbers of deaths, the numbers of people affected by disasters, and their devastating impacts on human life, economy and environment. These systems have the potential to significantly reduce losses from natural disasters. This study proposes a model which may be valuable to state and federal agencies, public sector managers and administrators, system analysts, trainers in disaster management, researchers and practitioners involved in disaster and emergency response studies, managers of police, fire, and ambulance systems, and mayors and governors. Its main objective is to identify and define three sets of factors that might be useful for designing a disaster monitoring and response system. First, a literature (meta) analysis is presented using academic research. The method was mainly based on a review of the scientific literature. The paper then identifies three sets of factors that may be employed when designing disaster monitoring and response systems. Findings reveal that the successful operation of an organization that hosts a disaster monitoring system requires that operators and computers work together. While the model itself in this study is not all-inclusive, an issue that deserves to be looked into is what role other technical, human, and organizational factors play in system performance.

Gaynor, Mark, Scott Brander, Alan Pearce, and Ken Post. 2009. Open infrastructure for a nationwide emergency services network. ***International Journal of Information Systems for Crisis Response and Management*** **1 (2): 31-46.**

This article proposes a public policy in which the Federal Communications Commission would resolve some of the nation's critical communications problems in times of crises with the allocation of a portion of the spectrum at 700 MHz for the deployment of a nationwide interoperable emergency broadband wireless network built by a public-private partnership. The authors present a convincing theoretical model that advocates an open and/or neutral network advancing public safety along with the deployment of new and valuable technologies, applications, and services.

Harnesk, Dan, John Lindstrom, and Soren Samuelsson. 2009. Socio-technical design approach for crisis management information systems. ***International Journal of Information Systems for Crisis Response and Management*** **1 (3): 1-18.**

This article describes research in progress of a design approach for crisis management information systems. A qualitative study was designed to gather data from four municipalities in northern Sweden, which all have responsibility for crisis management in each local environment. The purpose with the article is to discuss broad but strongly related information issues to crisis management and from that suggest a socio-technical oriented approach for crisis management information systems design. The preliminary design approach suggests that a network of knowledge, IT management and information integration is a promising base for design in the area. Considering that responsible actors in crisis environments have great knowledge in crisis planning and operation indicates that such an environment can be understood as a network of knowledge that accounts for both the social and technical dimension during a crisis. Theories from IT management and information integration provide input to the technical dimension of the suggested design approach.

Malka, Ariel, Jon A. Krosnick, and Gary Langer. 2009. The association of knowledge with concern about global warming: Trusted information sources shape public thinking. ***Risk Analysis*** **29 (5): 633-647.**

During the last decade, a great deal of news media attention has focused on informing the American public about scientific findings on global warming. Has learning this sort of information led the American public to become more concerned about GW? Using data from two surveys of nationally representative samples of American adults, this article shows that the relation between self-reported knowledge and concern about GW is more complex than what previous research has suggested. Among people who trust scientists to provide reliable information about the environment, and among Democrats and Independents, increased knowledge has been associated with increased concern. But among people who are skeptical about scientists and among Republicans more knowledge was generally not associated with greater concern. The association of knowledge

with concern among Democrats and Independents who trust scientists was mediated by perceptions of consensus among scientists about GW's existence and by perceptions that humans are a principal cause of GW. Moreover, additional analyses of panel survey data produced findings consistent with the notion that more knowledge yields more concern among Democrats and Independents, but not among Republicans. Thus, when studying the relation of knowledge and concern, it is important to take into account the content of the information that different types of people acquire and choose to rely upon.

Marchand, M., J. Buurman, A. Pribadi, and J. Kurniawan. 2009. Damage and casualties modeling as part of a vulnerability assessment for tsunami hazards: A case study from Aceh, Indonesia. ***Journal of Flood Risk Management*** **2 (2): 111-119.**
Vulnerability reduction to tsunamis has become a major issue after the December 2004 Indian Ocean tsunami disaster. An ex ante (before the event) evaluation of possible disaster reduction measures requires insight into the potential risks. As part of a study focusing on sea defense measures for Aceh and Nias provinces in Indonesia, the authors developed a model that is capable of quantifying potential damages and casualties for tsunami-prone coastal areas. The model was able to reproduce the damage of 2004 sustained in Banda Aceh quite accurately. Because it is GIS based, the model also shows the spatial distribution of damage. Maps can be prepared that show high- and low-impact areas for various tsunami event scenarios. This information is very useful for cost-benefit analyses of mitigation measures, such as sea defense measures, spatial planning, and evacuation procedures.

Pau, L.F., and P. Simonsen. 2009. Emergency messaging to general public via public wireless networks. International ***Journal of Information Systems for Crisis Response and Management*** **1 (3): 56-68.**
Warning to the broad population in an emergency situation, irrespective of location and condition, is a public policy responsibility. Public wireless networks offer now the opportunity to deliver emergency warnings in this way with explanations, because in many countries the mobile penetration rates and coverage are higher that any other access form. The article summarizes the analysis of the selection process between Short messaging services and Cell Broadcast messaging in the context of Denmark, based on end user requirements, stakeholder roles, and case-based analysis. It demonstrates the many technical, cost-benefit, and other tradeoffs needed in supporting the population now with a dependable, widespread technology. This research is the basis for a national policy.

Schmitz, Walter. 2009. Simulation experiments: The emerging instruments for CIP. ***International Journal of Critical Infrastructures*** **5 (1/2): 5-23.**
Critical Infrastructures (CIs) are vital backbones of modern societies and are increasingly dependent upon Information Technology (IT) and communication networks. Due to the increasing IT penetration, CIs are more and more connected with each other, with advantages and disadvantages. Due to this interconnection, CIs can provide their services more cost effectively. On the other hand, in case of disturbances, their behavior cannot ever be mastered, as the extensive blackouts in the United States and Europe have shown. The increasing complexity and manifold conventional and emerging threats jeopardize the system of mutually dependent CIs. Critical Infrastructure Protection (CIP) attracts notice more and more from the public. Modeling and simulation expand now into the analysis and planning of processes and procedures of infrastructures. This paper gives an overview of the recent research in the field of CIP, where the EU project Integrated Risk Reduction of Information-based Infrastructure Systems is used as a role model.

Seiler, Ralf, Jana Schmidt, Ousmane Diallo, and Elmar Csaplovics. 2009. Flood monitoring in a semi-arid environment using spatially high resolution radar and optical data. ***Journal of Environmental Management*** **90 (7):2121-2129.**

Walton, Darren, and Steven Lamb. 2009. An experimental investigation of post-earthquake travel behaviors: The effects of severity and initial location. ***International Journal of Emergency Managemen*****t 6 (1): 14-32.**
A computer-aided personal interviewing survey containing 63 items examining post-earthquake travel behaviors was administered to 802 members of the general public. Earthquake simulation videos modeled a moderate and severe event (6.8 and 7.5 respectively, on the Richter scale) in an office and home setting. Travel movements were recorded over a simulated 48-hour period following the earthquake. GIS software was used to obtain trip origins and destinations the routes taken and trip distances. The results indicate that an event which induces significant travel produces trips that are for a variety of purposes, not just to return home. While individually rational, this behavior is a form of collective social disorder. Mode choice varies with event severity and distance (walking was preferred up to 3.25 km, then vehicles were preferred). Well-prepared emergency plans reduce the need to travel. The motivation to travel was affected by available information and is discussed as a form of information seeking.

Ynag, Lili, Raj Prasanna, and Malcolm King. 2009. Situation awareness oriented user interface design for fire emergency response. ***Journal of Emergency Management*** **7 (2): 65-74.**
Emergency response management demands certain characteristics of the individuals involved. They need to act decisively, often on little or incomplete information within tight time schedules or, sometimes, with too much data from which it is difficult to extract key information. Procuring the right information at the right time, in the right format, and to getting it to the right people is a challenge in any emergency response management system design. Poor design can lead to response systems that are not used, are ineffective, and in some cases dangerous to the emergency personnel. This article explores how situation awareness oriented

design can be used for on-site emergency response system development. The end-user requirements are identified through extensive interviews with firefighters and observations of fire emergency response training simulations. These requirements are calculated against the identified responsibilities of the core members in the first responder hierarchy. The on-site dynamic information which could be presented to emergency personnel is examined through the use of three situation awareness levels to meet the various requirements of the first response party. Finally, an interface prototype of an information system for fire and rescue services is presented to illustrate the methods proposed in the article. Although our focus was on structural fire and firefighters, the interface design for an on-site emergency response system proposed here is applicable for other emergency response situations as well, due to standard operating procedures.

Insurance & Economic Impact

Carden, William. 2009. Sound and fury: Rhetoric and rebound after Katrina. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-14.**
Free markets in capital and labor are essential to rapid recovery from natural disaster. Political and rhetorical responses to Hurricane Katrina included denunciation of "price gougers" in the market for gasoline. The arbitrariness associated with anti-price gouging legislation may create uncertainty that reduces the attractiveness of the investment climate.

Changnon, Stanley A., and David Changnon. 2009. Assessment of a method used to time adjust past storm losses. ***Natural Hazards*** **50 (1): 5-12.**
A widely used method for adjusting past annual storm losses to present day values, needed to address the ever-changing socio-economic conditions, was assessed. The property insurance industry developed a comprehensive method for adjusting losses in past years to current year loss values. Characteristics of hurricanes occurring 50 or more years ago and those in the recent years were examined to find similar early and recent pairs of storms for a comparative evaluation of their property losses. One pair found was hurricanes Hazel (1954) and Hugo (1989), and another pair with similar features was Hhurricanes Carol (1954) and Bob (1991). The insurance-based adjusted property loss values for these two pairs of storms were compared to determine if the early year values were comparable to the recent year values. The adjusted losses of the two pairs of hurricanes were found to have small differences of 7.8 percent and 8.1 percent. These differences were due to somewhat different storm paths and slightly higher wind speeds in the two storms with higher losses. The adjustment method appears to adequately capture time differences in storm losses due to changes in population, wealth, inflation, structural density, and insurance coverage.

Dabral, Apoorv, and Ewing Bradley. 2009. Analysis of wind-induced economic losses resulting from roof damage to a metal building. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-20.**
Metal roofs are highly susceptible to hurricane wind damage. Roof damage is a particularly important element in the estimation of economic losses as even minor roof damage can augment the total loss due to entrance of rain and subsequent interior and content loss. Dabral developed a probabilistic damage model to predict the physical damage in a metal roof due to wind. This study estimates economic losses associated with high wind, hurricane events that cause roof damage to metal buildings using Hurricane Katrina data and a hurricane simulation data set. A cost benefit study is also performed to establish the cost effectiveness of mitigation.

Ewing, Bradley T., Jamie Brown Kruse, and Daniel Sutter. 2009. An Overview of Hurricane Katrina and economic loss. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-14.**
This article reviews the literature on business activity and disasters, and specifically hurricanes. An overview of the papers in the special issue on Economic Loss and Hurricane Katrina is also provided.

Hung, Hung-Chih. 2009. The attitudes towards flood insurance purchase when respondents' preferences are uncertain: A fuzzy approach. ***Journal of Risk Research*** **12 (2): 239-258.**
Individuals may have difficulty in determining whether or not to buy insurance against low-probability, high-loss events. This ambivalence would cause preference uncertainty and decrease homeowners' interest in voluntarily buying insurance. This paper incorporated fuzzy set theory into contingent valuation analysis to examine the determinants of attitude towards buying flood insurance under preference uncertainty. The results show that the perceived levels of flood risk, experience with flood, disposable income, as well as house conditions, are influential factors in the decision-making process for insurance purchase. However, both the estimated price and income elasticities are low for flood insurance purchase. It is worth noting that governments' artificial structures provide a disincentive for buying insurance, although respondents perceived or/and are exposed to a high level of flood risk. The findings also show that the spread of fuzzy willingness to pay regions is wide, resulting from respondents' high uncertainty on their value judgment of insurance. This indicates that preference uncertainty and conservatism rule are the key factors that cause respondents to tend to reject buying insurance.

Jarmin, Ron S., and Javier Miranda. 2009. The impact of Hurricanes Katrina, Rita, and Wilma on business establishments. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-27.**
The authors show that GIS based estimates of the economic impact of the 2005 hurricanes provide a more accurate characterization of affected businesses than widely reported estimates constructed from county level data. Their methodology relies on mapping business

establishments into damage zones defined by remote sensing information provided by the Federal Emergency Management Agency. The methodology is based on pre-storm data, so estimates can be made available very quickly to inform the public and policy makers. The GIS-based estimates indicate significantly smaller impacts on business payroll than previous estimates using county level data. Tests using post-storm data support our GIS methodology.

Kaiser, Mark J., David A. Dismukes, and Yunke Yu. 2009. The value of lost production from the 2004-2005 hurricane seasons in the Gulf of Mexico. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-34.**
The oil and gas industry in the Gulf of Mexico has the greatest weather exposure in the world, and is vulnerable to a range of losses that include physical damage, destruction, business interruption, and pollution liability. During the 2004 and 2005 hurricane seasons, a number of offshore facilities, drilling rigs, and pipelines were destroyed or extensively damaged. In total, Hurricanes Ivan, Katrina, and Rita destroyed 122 structures and severely damaged 76 others. Most of the destroyed infrastructures were mature assets that are unlikely to meet the economic thresholds to support redevelopment, and in the majority of cases, the production and revenue from these structures will be "lost" and written off by operators. The purpose of this paper is to examine the destroyed infrastructure from the 2004 and 2005 hurricane seasons and the likely contribution this collection of assets would have made to future production in the Gulf. The article estimates the amount andvalue of lost production under various model scenarios, present the results of sensitivity analysis, and discuss the limitations of the analysis. It is estimated that between 60 million and 65 million barrels of oil and 231 billion to 266 billion cubic feet of gas were permanently lost in the 2004-2005 hurricane seasons with an estimated value ranging between $1.3 billion and $4.5 billion, depending on the future price profiles of oil and gas.

Kirgiz, Kivanc, Michelle Burtis Burtis, and David A. Lunin. 2009. Petroleum refining industry business interruption losses due to Hurricane Katrina. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2):1-13.**
Hurricane Katrina had a significant destructive effect on the Gulf Coast's petroleum refining industry. In many cases, refineries sustained considerable damage and had to suspend operations for extended periods of time. Multiple Gulf Coast refineries filed substantial business interruption loss insurance claims following Hurricane Katrina's disruption of their production. This paper presents a methodology to calculate refinery business interruption losses taking into account the effect of Hurricane Katrina on input and output market prices during the period of restoration. The results indicate that adjusting for Hurricane Katrina's effects on crude oil and petroleum product market prices significantly changes the magnitude of refinery business interruption loss claims.

Kleidt, Benjamin, Dirk Schiereck, and Christof Sigl-Grueb. 2009. Rationality at the eve of destruction: Insurance stocks and huge catastrophic events. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-25.**
This study looks at the valuation impact on 148 insurance stocks caused by 25 of the largest catastrophic events that occurred in recent history. Because of their exceptional severity and the consequent attention they experience in the media, the authors expect to find significant overreactions of insurance stocks relative to the market, which would be in line with an availability bias known from the behavioral finance literature. However, insurance stock investors behave as rationally as the market does under these conditions. Clear exceptions to this are the September 11, 2001, terror attacks. In general, the article finds that insurance stocks adjust gradually to a new valuation level.

Nielsen-Arnbjerg, K., and H.S. Fleischer. 2009. Feasible adaptation strategies for increased risk of flooding in cities due to climate change. ***Water Science & Technology*** **60 (2): 273-281.**
Northern Europe is one of the regions where more frequent and more severe storms and storm surges are expected due to climatic changes. In order to maintain an acceptable risk of flooding, suitable adaptation strategies must be defined and implemented. Optimum solutions demand collaboration of different professionals and thus simple graphical means must be employed to illustrate the economic impacts of the change in risk of flooding. A case study indicates that urban drainage infrastructure capacity should be upgraded while there is currently no economic incentive to improve protection against sea surges.

Perucca, Laura P., and M. Yanina Esper Angillieri. 2009. Evolution of a debris-rock slide causing a natural dam: The flash flood of Rýo Santa Cruz, Province of San Juan-November 12, 2005. ***Natural Hazards*** **50 (2): 305-320.**
Between 2001 and 2005, a large debris rock slide occurred on the western slope of the Cordillera de Santa Cruz in the southeast Andean corner of the Province of San Juan in Argentina. The landslide material accumulated in a downstream gorge as a natural dam of the Santa Cruz river, forming a large-volume lake. In November 2005, probably as a result of the increasing pressure of the water volume, this natural dam breached off with a violent and unexpected flash flood. In addition to threatening the lives of people downstream, this flood caused great economic loss to main localities of the Department of Calingasta, as well as considerable damage to one of the most relevant projects of the Province, the Caracoles Hydropower Project dam on the San Juan River. Considering the high costs of any physical remediation for a natural dam located in this high, remote, and inaccessible mountain area with no reliable road access, the main protective measures left are the installation of a flash flood early warning system connected to downstream localities, along with a program of hydro-

logical monitoring at the dam-forming area and annual satellite monitoring to verify the evolution of accumulated mass movements.

Posthumus, H., J. Morris, T.M. Hess, D. Neville, E. Phillips, and A. Baylis. 2009. Impacts of the summer 2007 floods on agriculture in England. ***Journal of Flood Risk Management*** **2 (3): 182-189.**
Exceptional rainfall during the summer of 2007 caused widespread flooding in parts of England. While the focus of attention has been correctly placed on the impact on densely populated urban areas, large tracts of rural land were seriously affected. Summer flooding is particularly damaging to farming. This paper presents the results from an evaluation of the impacts of the summer 2007 flood events on agriculture. High financial losses were incurred in the horticultural sector. Arable farmers incurred direct losses in the form of crop loss or yield reduction due to flooding and associated waterlogging of fields. Livestock farmers incurred indirect losses in the form of additional housing and feeding costs for livestock. Although total costs to agriculture were small compared with urban flood costs, they were typically large at the individual farm scale. Such impacts should be properly acknowledged in future strategies for flood risk management.

Powers, John R. 2009. An alternative approach to disaster relief. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-7.**
There is an alternative to the federal role in disaster relief as specified in the Disaster Relief Act (PL 93-288 as amended). This alternative would be infinitely more effective in reducing the costs of disasters and would be much fairer to the taxpayers. As the Federal Emergency Management Agency regional director in Chicago during the 1993 Mississippi floods, the author's mitigation division director groused over the fact that many of the same people in the lines were there after the previous floods. While FEMA shouldn't tell people where to live, they shouldn't come to the agency for money when they get hit by a predictable disaster without the necessary insurance. The requirements for making this alternative a reality are threefold: (a) Set actuarially correct premiums for individuals, municipalities and states based on the risk—an outline for how the Federal government can build a risk model is discussed; (b) have the Federal government serve as the "reinsurer" for losses that exceed those projected by its model—an approach is provided; and (c) change the legislation and insist that the Congress not bail out people who didn't get the insurance or otherwise reduce their risk by moving out of the high risk area. The point of this approach is to force individuals, municipalities and states to stop doing dumb things and accept responsibility for their decisions. The benefits to the tax payers who are subsidizing these bad decisions would be huge.

Rose, Adam Z. 2009. A framework for analyzing the total economic impacts of terrorist attacks and natural disasters. ***Journal of Homeland Security and Emergency Management*** **6 (1).**
Policies to mitigate natural hazards and terrorism are facing increasing scrutiny, such as the benefit-cost test. The benefits are the losses that can be avoided by the mitigation actions. For sound policy making, it is necessary that the various types of losses and major factors affecting them be identified and that metrics be established for their measurement in accordance with economic principles. This paper presents a comprehensive framework for the analysis and measurement of ordinary economic impacts and two categories of impacts that have recently gained the attention of analysts and policy makers, but for which operational definitions are lacking. The first is resilience, which refers to how the economy manages to keep functioning and how quickly it recovers. The second major extension of loss estimation pertains to behavioral and systems linkages. These refer to considerations unique to disasters that cause indirect impacts to be orders of magnitude greater than ordinary indirect effects in cases where risks are amplified, systems are overwhelmed, and resilience is eroded. The framework combines a checklist of types of impacts, consistent definitions, metrics, and strategies for estimation. The framework is serving as a template for loss estimation and benefit-cost analysis by several offices of the U.S. Department of Homeland Security.

Thompson, Mark A. 2009. Hurricane Katrina and economic loss: An alternative measure of economic activity. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-11.**
This paper examines the effect of Hurricane Katrina on Louisiana's economy. In particular, it uses a state coincident index to assess the economic loss from Hurricane Katrina. This alternative approach provides policy makers with a simple and timely measure of the economy for modeling disasters.

Tuler, Seth, and Thomas Webler. 2009. Stakeholder perspectives about marine oil spill response objectives: A comparative Q study of four regions. ***Journal of Contingencies and Crisis Management*** **17 (2): 95-107.**
Marine oil spills can cause major social, economic, and ecological disruptions. Spill response managers must weigh different options and objectives when deciding what to do. We investigated the ways in which preferences for spill response objectives vary among those who are responsible for oil spill contingency planning and response in Buzzards Bay, Delaware Bay, San Francisco Bay, and Washington state regions. The authors begin this paper with a discussion of the research method used in the study: the Q method. In Buzzards Bay, Delaware Bay, and San Francisco Bay three perspectives were identified in each case. In Washington state, two perspectives were identified. An analysis of the 11 case-specific perspectives reveals that they can be described by four "composite" perspectives that describe how different stakeholders prioritize spill response objectives. These four perspectives are compared on several themes, including the emphasis they placed on mitigating economic impacts, protecting health and safety, mitigating ecological impacts, implementing a coordinated and timely response, addressing

the needs and concerns of the affected public/communities, gaining public support for the response, mitigating cultural impacts, and mitigating social nuisance impacts. The implications for spill response planning and spill response evaluation are discussed.

Vranes, Kevin, and Roger Pielke Jr. 2009. Normalized earthquake damage and fatalities in the United States: 1900-2005. ***Natural Hazards Review*** **10 (3): 84-101.**
Damage estimates from 80 U.S. earthquakes since 1900 are "normalized" to 2005 dollars by adjusting for inflation, increases in wealth, and changes in population. Factors accounting for mitigation at one and two percent loss reduction per year are also considered. The earthquake damage record is incomplete, perhaps by up to 25 percent of total events that cause damage, but all of the most damaging events are accounted for. For events with damage estimates, cumulative normalized losses since 1900 total $453 billion, or $235 billion and $143 billion when one percent and two percent mitigation is factored, respectively. The 1906 San Francisco earthquake and fire adjusts to $39 billion–$328 billion depending on assumptions and mitigation factors used, likely the most costly natural disaster in U.S. history in normalized 2005 values. Since 1900, 13 events would have caused $1 billion or more in losses had they occurred in 2005; five events adjust to more than $10 billion in damages. Annual average losses range from $1.3 billion to $5.7 billion with an average across data sets and calculation methods of $2.5 billion, below catastrophe model estimates and estimates of average annual losses from hurricanes. Fatalities are adjusted for population increase and mitigation, with five events causing over 100 fatalities when mitigation is not considered, four (three) events when one percent (2%) mitigation is considered. Fatalities in the 1906 San Francisco event adjusts from 3,000 to over 24,000, or 8,900 (3,300) if one percent (2%) mitigation is considered. Implications for comparisons of normalized results with catastrophe model output and with normalized damage profiles of other hazards are considered.

Walker, Douglas M., and John D. Jackson. 2009. Katrina and the Gulf States casino industry. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-17.**
Hurricane Katrina devastated the Louisiana and Mississippi Gulf Coast. The casino industry, especially in Mississippi, suffered staggering losses. This article describes the industry's losses and provides data on the industry before and after Katrina. Following previous research which has indicated that casino development may be a stimulus to a state's economy, the authors use a simple OLS model to examine whether rebuilding the Gulf Coast casinos has had an impact on personal income in Louisiana and Mississippi. After accounting for other factors, their results indicate that the casino industry has had a positive impact on post-Katrina personal incomes in Louisiana and Mississippi.

Widener, Patricia. 2009. Oil tourism: Disasters and destinations in Ecuador and the Philippines. ***Sociological Inquiry*** **79 (3): 266-288.**
This article examines the links between the petroleum and tourism industries by analyzing how an oil disaster, whether actual or perceived, may attract nature-based tourism interests. To better understand the role of communities, local governments, and the media in establishing links between the petroleum and tourism industries, this article explores how the construction of an oil pipeline in Ecuador and an oil spill in the Philippines created opportunities for tourism. Each case contributes to our understanding of how an oil disaster supports nature-based tourism and how both industries supply a resource or an experience to non-local consumers, while converging to alter local communities, economies, and ecosystems. Indeed, tourism investments following a disaster may become a sideshow to the disaster that shifts attention from the disaster to participation in new economic opportunities. In addition, tourism may represent ecological alterations, which are more subtle, yet as damaging, as an oil disaster. The proposed model is then applied to two additional cases, the Exxon Valdez oil spill and Hurricane Katrina, to test its use in understanding other postdisaster developments.

Landslides & Avalanches

Bagg, Stefano, and Jurg Schweizer. 2009. Characteristics of wet-snow avalanche activity: 20 years of observations from a high alpine valley (Dischma, Switzerland). ***Natural Hazards*** **50 (1): 97-108.**
The occurrence of wet-snow avalanches is, in general, poorly understood. For 20 years during the winters from 1975-1976 to 1994-1995, avalanche activity has been observed in the Dischma valley near Davos in the eastern Swiss Alps. The study area comprises a large starting zone of northeasterly aspect (2,300 meters above sea level) with several avalanche paths. The authors have analyzed the occurrence data in combination with meteorological and snowpack data collected at an elevation of 2,090 meters altitude. During the 20-year observation period, almost 800 wet-snow avalanches were observed, about 4.5 times more loose snow avalanches than slab avalanches. Considering both types of avalanches jointly, snow depth, precipitation, and air temperature showed the highest correlation with avalanche activity. Most loose snow avalanches occurred when air temperature was high and/or after a precipitation period. Slab avalanches occurrence was primarily related to warm air temperatures and snowpack properties such as the isothermal state and the existence of capillary barriers. Radiation did not show up as a significant variable. The results suggest that in a transitional snow climate, wet-snow avalanches are, as dry snow avalanches, often related to precipitation events, and that wet slab instability strongly depends on snowpack properties in relation to warming of the snowpack and melt water production.

Singh, Ashish Kumar. 2009. Causes of slope instability in the Himalayas. ***Disaster Prevention and Management*** **18 (3): 283-298.**
Landslides occur frequently and without any appre-

ciable warning, often causing insurmountable damage to life and property. Despite the uncertainties, causative factors and indicators of slope instability are well known. The magnitude of these events, susceptible areas, the timing, and their potential impact can be analyzed on the basis of past occurrences and existing knowledge to mitigate their impact. This paper generates a better systematic and scientific understanding of the reasons behind slope instability to help develop the basic principles of landslide hazard zonation, monitoring, and forecasting. Based on extensive field observations and intensive reviews of literature from secondary sources, the paper presents valuable insights into the basic reasons behind a landslide. The results should increase awareness, educate, and sensitize people toward effective landslide hazard mitigation, thereby ensuring people's participation in disaster management. It also aims to encourage research in the field of landslide management. The real value of the study is to minimize losses due to landslides through better understanding of the phenomenon and its management by avoiding those things that could lead to slope instability problems.

Wechsler, Neta, Oded Katz, Yehoshua Dray, Ilana Gonen, and Shmuel Marco. 2009. Estimating location and size of historical earthquake by combining archaeology and geology in Umm-El-Qanatir, Dead Sea Transform. ***Natural Hazards*** **50 (1): 27-43.**
This article looks at the Byzantine-to-Ummayad (6th-8th century) archaeological site of Umm-El-Qanatir, located 10 kilometers east of the Dead Sea Transform (DST) in northern Israel. The site was damaged by an earthquake-induced landslide, and in this work the authors use slope stability analysis to constrain the historical seismic acceleration that occurred along the northern segment of the DST. Umm-El-Qanatir archaeological site is located on a slope of a canyon and contains evidence for earthquake-related damage, including fallen columns and walls, horizontal shift of heavy masonry blocks, and complete burial of ceramic pots and farming tools beneath fallen ceilings. A water pool that collected spring water is displaced nearly one meter by the landslide. The artifacts from the village and the spring area indicate that people inhabited the site until the middle of the 8th century. They argue that the destruction, which forced the abandonment of Umm-El-Qanatir together with nearby settlements, was associated with the earthquake of January 18, 749 CE. In order to evaluate the ground acceleration related to the above earthquake, the authors back-analyze the stability of a failed slope, which cut and displaced the water-pool, using slope stability software (Slope/W). The results show that the slope is statically stable and that high values of horizontal seismic acceleration (>0.3 g) are required to induce slope failure. Subsequently, they use the Newmark displacement method to calculate the earthquake magnitude needed to cause the slope failure as a function of distance from the site. The results (attributed to the 749 CE earthquake) show that a MW>7.0 earthquake up to 25 km from the site could have induced the studied landslide.

Near Earth Objects

Badescu, Viorel. 2009. Asteroid impacts or nuclear explosions in the northern part of Black Sea and risks for poisoning the inland population. ***Journal of Environmental Assessment Policy and Management*** **11 (1): 131-159.**
The impact of a large asteroid or a nuclear explosion in the Black Sea may cause catastrophic poisonous gas (H2S) release into the atmosphere. Some effects of this phenomenon are evaluated. The land surface area covered by the hydrogen sulfide cloud generated by a 1,000 meter diameter asteroid ranges between 5,760 km2 and 9,920 km2. This may affect between 1,400,000 and 2,470,000 people. In case of a 70m size asteroid, the cloud covers between 105 km2 and 210 km2 and 26,000 and 52,000 people may be affected. The evaluations of one megaton and 50 Mton of TNT may be compared to the impact by asteroids of about 33 m and 120 m diameter respectively. The social effects of these events may be diminished if some general procedures are implemented.

Public Health, Mental Health, and Emergency Medicine

Agrinier, Nelly, Artus Albessard, Valerie Schwoebel, Eloi Diene, and Thierry Lang. 2009. Direct assistance to victims in rescue operations as a risk factor for post-tramatic stress disorder in police officers: The experience of the Toulouse disaster in 2001. ***Journal of Emergency Management*** **7 (3): 59-67.**
The aim of this study was to describe the prevalence of symptoms consistent with post-traumatic stress disorder (S-PTSD) in police personnel involved in rescue operations after the AZF chemical plant explosion in Toulouse, France, on September 21, 2001, and the relationship between S-PTSD and the type of rescue operations. A cross-sectional survey was performed, using a mailed questionnaire. Six hundred and thirty-five out of 1,500 rescue operations police officers participated in the study. All were involved with the explosion site after the after the event. The outcome variable was the presence of S-PTSD. The explanatory variables were the level of exposure during the rescue tasks. Logistics regression was used to calculate the adjusted odds ratios (OR). The prevalence of S-PTSD among policemen was 4.1 percent [95% CI: 2.1-6.2]. Policemen who had immediate health consequences (OR 4.6; [95% CI: 1.3-16.4]) and those who provide medical assistance to the victims (OR 5.7; [95% CI: 1.6-20.2]) had a higher prevalence of S-PTSD. Providing medical assistance to the victims was a major risk factor of S-PTSD for police officers. Training police officers to take part in medical activities at the time of the disaster might lead to a reduction of SPTSD incidence in this group.

Armas, Iuliana, and Avram Eugen. 2009. Perception of flood risk in Danube Delta, Romania. ***Natural Hazards*** **50 (1): 269-287.**
For exposed and vulnerable communities, the perception of natural risk is an essential link in the analysis of human-environment coping relationships. It is also an important parameter in the quantification of com-

plex vulnerability as a central predictive variable in the risk equation. This study reveals the conscious and unconscious attitudes towards the flood risk for the inhabitants of the Danube Delta in Romania. These attitudes, defined by different degrees of psychological vulnerability, represent the background for a series of psycho-behavioral patterns that generate certain adjustment mechanisms and strategies. Application of a specially designed questionnaire and the statistical analysis of the results revealed two psychological factors as essential in establishing the psychosocial vulnerability degree of the interviewed subjects: (i) an internal control factor; and (ii) an external control factor. The persons characterized by inner control have a significantly reduced general anxiety level in comparison to individuals with the control factor placed externally. As confidence diminishes, it increases the tendency of the individual to rely on the external factors for support and security. The lack of resources (indicating lower resilience) and mistrust in the support given emphasizes non-adaptive behaviors.

Atlas, Ronald M., Richard D. Clover, and W. Paul McKinney. 2009. Enhancing biosecurity through early recognition and reporting of public health risks: Meeting the challenges of the revised international health regulations. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 280-289.**

The revised international health regulations recognize the importance of shortening the time from a disease outbreak to its detection and notification to the international public health community so that effective responses that enhance global security can be taken. The new international health regulations aim at requiring countries to issue alerts early enough that responses can be initiated in a timely manner. But these regulations represent a real challenge for achieving early detection and translating notification into effective public health actions that reduce the risks of mass casualties from emerging infectious disease and bioterrorism. Coordinated early warning mechanisms to facilitate rapid recognition of a disease outbreak are needed so that an effective response within the medical and public health communities can be initiated. Effective training is essential for early recognition of rare biothreat diseases. Such training must be realistic to achieve an effective response. Responder and system capabilities should be verified periodically through the use of full-scale exercises or virtual drills. Such training and skills are critical for achieving biosecurity.

Bierenbaum, Arnold B., Beth Neiley, and Craig R. Savageau. 2009. Importance of business continuity in health care. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S7-S9.**

Brigantic, Robert T., John D. Malone, George A. Muller, Russell Lee, Jim Kulesz, William Woody Delp, and Benjamin H. McMahon. 2009. Simulation to assess the efficacy of US airport entry screening of passengers for pandemic influenza. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 290-310.**

The article presents a methodology and stochastic discrete-event simulation developed to model the screening of passengers for pandemic influenza at U.S. port-of-entry airports. The model combines epidemiology modeling, evolving infected states and conditions of passengers over time, and operational considerations of screening in a single simulation. The simulation begins with international aircraft arrivals in the United States. Passengers are then randomly assigned to one of three states—not infected, infected with pandemic influenza, and infected with other respiratory illness. Passengers then pass through various screening layers (i.e. departure screening, en route screening, primary screening, and secondary screening) and ultimately exit the system. Each passenger's status is tracked over time, with a special emphasis on false negatives (i.e. passengers infected with pandemic influenza, but are not identified as such) as these passengers pose a significant threat since they could unknowingly spread the pandemic influenza virus throughout the nation.

Campbell, James. 2009. The future of biosecurity. International ***Journal of Risk Assessment and Management*** **12 (2/3/4): 248-261.**

The future of biosecurity will be determined by international scientific and political responses to the rapid worldwide expansion of genetic engineering technologies in infectious disease research, and by implementation of cooperative global surveillance and public health response policies to control the emergence of new strains of natural disease organisms. Effective responses will depend on a better understanding of the forces driving molecular evolution of emerging pathogens, as well as integrated understanding of advanced biothreat agent design, potential applications and effects of the agent, exposure techniques or methods of deployment, and concealment techniques, including dual use strategies.

Cavey, Andrew M.J., Jonathan M. Spector, Derek Ehrhardt, Theresa Kittle, Mills McNeill, Gregg P. Greenough, and Thomas D. Kirsch. 2009. Mississippi's infectious disease hotline: A surveillance and education model for future disasters. ***Prehospital and Disaster Medicine*** **24 (1): 11-17.**

The potential for outbreaks of epidemic disease among displaced residents was a significant public health concern in the aftermath of Hurricane Katrina. In response, the Mississippi Department of Health and the American Red Cross implemented a novel infectious disease surveillance system, in the form of a telephone "hotline," to detect and rapidly respond to health threats in shelters. All ARC-managed shelters in Mississippi were included in the surveillance system. A symptom-based, case reporting method was developed and distributed to shelter staff, who were linked with MDH and ARC professionals by a toll-free telephone service. Hotline staff investigated potential infectious disease outbreaks, provided assistance to shelter staff regarding optimal patient care, and helped facilitate the evaluation of ill evacuees by local medical personnel. Forty-three shelters sheltering 3,520 evacuees participated in the program. Seventeen shelters made 29 calls notifying the hotline of the following cases: (1) fever (six cases); (2) respiratory

infections (37 cases); (3) bloody diarrhea (two cases); (4) watery diarrhea (15 cases); and (5) other, including rashes (33 cases). Thirty-four of these patients were referred to a local physician or hospital for further diagnosis and disease management. Three cases of chickenpox were identified. No significant infectious disease outbreaks occurred and no deaths were reported. The surveillance system used direct verbal communication between shelter staff and hotline managers to enable more rapid reporting, mapping, investigation, and intervention, far beyond the capabilities of a more passive or paper-based system. It also allowed for immediate feedback and education for staff unfamiliar with the diseases and reporting process. Replication of this program should be considered during future disasters when health surveillance of a large, disseminated shelter population is necessary.

Cherntob, Claude M., Yoko Nomura, Louis Josephson, Richard E. Adams, and Lloyd Sederer. 2009. Substance use and functional impairment among adolescents directly exposed to the 2001 World Trade Center attacks. ***Disasters*** **33 (3): 337-352.**

The relationship between exposure to the World Trade Center attacks, increased substance use, functional impairment, and mental health service use—controlling for depression and post-traumatic stress disorder—was assessed through an in-school survey of directly exposed students (N=1040) attending the five middle and five high schools nearest the WTC. The survey was conducted 18 months after the attacks. Students with one WTC exposure risk factor had a five-fold increase in substance use, while those with three or more exposure risks had a nearly 19-fold increase. Increased substance use was associated with impaired school work, school behaviour, and grades. Students reporting increased substance use were nearly twice as likely to want help but were no more likely than asymptomatic students to receive services. Adolescents reporting increased substance use, without co-morbidity, were less likely to receive psychological services than others. Attention to the needs of substance-using adolescents exposed to disaster is needed.

Chu, Alvin F., Steven M. Marcus, and Bruce Ruck. 2009. Poison Control Centers' role in glow product-related outbreak detection: Implications for comprehensive surveillance system. ***Prehospital and Disaster Medicine*** **24 (1): 68-72.**

The development of syndromic surveillance systems to detect bioterrorist attacks and emerging infectious diseases has become an important and challenging goal to many governmental agencies and health care authorities. This study utilized the sharp increase of glow product-related calls to demonstrate the utility of poison control data for early detection of potential outbreaks during the week of Halloween in 2007. A review was conducted of the electronic records of exposures reported to the New Jersey Poison Information and Education System Poison Control Hotline from 2002 through 2007 with generic code number 0201027 (glow products) set by the American Association of Poison Control Centers. Key information such as age, gender, time of the call, exposure reason, clinical effects, and medical outcomes along with telephone number, zip code, and county location were used in the analysis to determine the extent of the outbreak. Analyses included a total of 139 glow product-related calls during the week of Halloween in 2007 with a single-day high of 59 calls on Halloween Day. More than 90 percent of the glow product exposures were in children one-to-10 years of age. The glow product-related calls on Halloween Day increased from 14 calls in 2002 to 59 calls in 2007, a 321 percent increase over a six-year period. Poison control centers in the United States are equipped with a unique and uniform input data collection system—the National Poison Data System—that provides an important data source in the development of a comprehensive surveillance system for early outbreak detection.

Considine, Julie, and Belinda Mitchell. 2009. Chemical, biological and radiological incidents: Preparedness and perceptions of emergency nurses. ***Disasters*** **33 (3): 482-497.**

Despite their important role in chemical, biological, and radiological (CBR) incident response, little is known about emergency nurses' perceptions of these events. The study explores emergency nurses' perceptions of CBR incidents and factors that may influence their capacity to respond. Sixty-four nurses from a metropolitan emergency department took part. The majority were willing to participate in CBR incidents and there was a positive association between willingness to participate and postgraduate qualification in emergency nursing. Willingness decreased, however, with unknown chemical and biological agents. One third of participants reported limitations to using personal protective equipment. Few participants had experience with CBR incidents although 70.3 percent of participants had undergone CBR training. There were significant differences in perceptions of choice to participate and adequacy of training between chemical, biological, and radiological incidents. The study results suggest that emergency nurses are keen to meet the challenge of CBR incident response.

Decker, K.C., and Keith Holtermann. 2009. The role for exercises in senior policy pandemic influenza preparedness. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-17.**

Preparedness for a pandemic of influenza is a policy issue currently attracting increased attention from international organizations, governments, and businesses. This is due in large part to the absenteeism rates that could be caused by a virulent strain of influenza affecting all demographics in our population, and the impact that would have on society as a whole. It is also an issue whose effects cut across the private and public sectors equally, making it a critical issue for society as a whole. Either prospectively agreeing when to implement certain strategies or having a process in place for decision making during the event, is an essential element of pandemic preparedness. One of the most effective and efficient methods for insuring readiness and evaluating preparedness is through exercises where different stakeholders are brought together to dialogue on how they will react to a given set of circumstances. Exercises

create awareness among senior policy makers about the critical role of exercises in societal pandemic influenza preparedness and the critical process steps. Taking the collective objective experience from designing and implementing over 100 exercises for senior policy makers, 20 of which were pan flu related, the authors have advanced the science in the field, observed phenomena, and drawn conclusions regarding appropriate exercise design, similarities to other forms of research and best practices for flu exercises and all-hazards preparedness. Employing a decision matrix using the factors policy, plan, procedure, tactics, and skills, an entity can determine the appropriate exercise typology and associated resource requirements. It was important to consistently raise specific issues in order to comprehensively address various preparedness and response issues. Despite a lack of common framework and methodology for the conduct of table top exercises (TTX), discussion based TTX have demonstrated to be an efficacious, effective, and efficient means for identifying policy gaps and fostering pandemic influenza response readiness.

Denhart, Hazel. 2009. Deconstructing disaster: Psycho-social impact of building deconstruction in Post-Katrina New Orleans. ***Cities*** **26 (4): 195-201.**
This phenomenological study inquired into the psychosocial impact of building deconstruction in disaster response. Nine building owners participating in a Mercy Corps' sponsored building deconstruction program in Post-Katrina New Orleans (2005-2008) engaged in extensive interviews about their experience. The core phenomenon they shared was empowerment arising from a synthesis of positive social interaction and material discovery. Dedicated, local, Mercy Corps trained contractors brought immediate relief to these distressed participants by facilitating "a dignified end" to their buildings and by proxy to the lives they held before the catastrophe. Deconstruction allowed participants to reclaim wealth that would have been scrapped for landfill waste by federal mandate. Participants reported a sudden psychological shift from despair to enthusiasm as they regained control of their property and then discovered value out of the ruined buildings. Data indicated that merely possessing reclaimed material did not explain the psychological transformation. Four of nine informants (including impoverished individuals) experienced psychological transformation by giving all of their reclaimed material away. The sharing of material was described as akin to "donating organs" giving life to their critically injured community. Data indicated the program also promoted more environmentally sustainable behavior. Previously, deconstruction has only been addressed in terms of technical, mechanical, economic, or environmental outcomes. This study adds a new component by seeing the human side of that technical process. This report is a companion study to another— "Deconstructing Disaster; Economic and Environmental Impacts of Deconstruction in Post-Katrina New Orleans"— which provides a quantitative analysis of material salvage from the Mercy Corps program.

Endress, Lee H. 2009. Terrorism, biosecurity and endogenous risk. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 161-185.**
Bioterrorism and infectious disease are biosecurity threats that can be modeled as biological invasions (like alien species) incorporating the concept of endogenous risk from the environmental economics literature, i.e., that human behavior may alter, deliberately or unintentionally, the likelihood and severity of these threats. Application of this modeling approach to investment strategy in pre-event, biosecurity readiness yields efficiency conditions for optimum allocation to expenditure between prevention and preparation for emergency response to bioterrorism and to infectious disease, which may occur individually or jointly. Model results provide a unified framework for interpreting empirical studies and deriving broad policy implications, such as the optimal investment in prevention vs. preparedness strategies. The threat of biological attack can also be analyzed within the broader context of transnational terrorism. A model of compound lotteries helps illuminate the trade-off between investment in preemptive counterterrorism activities and investment in defensive anti-terrorism programs, especially when terrorists can make strategic substitutions among targets and modes of attack, including use of biological agents. In combination, the endogenous risk and terrorism lottery models support a biosecurity investment strategy that favors enhancing public health capacity in prevention (e.g., medical surveillance) and strengthening pre-emptive counterterrorism capability.

Fertel, Baruch S., Stephan A. Kohlhoff, Patricia M. Roblin, and Bonnie Arquilla. 2009. Lessons from the "Clean Baby 2007" pediatric decontamination drill. ***American Journal of Disaster Medicine*** **4 (2): 77-85.**
Children have unique needs and are at risk of being exposed to hazardous materials necessitating decontamination. A drill was conducted to identify problems that arise in the decontamination of children and to develop recommendations for effective, age-appropriate decontamination. In a prospective, observational, multi-center, simulation exercise, the authors assessed the management of patients ages 0.25 to 15 years and their adult guardians, who self-presented for treatment at two hospital emergency departments (a tertiary care university hospital and an urban, municipal, level 1 trauma center) after a radiation exposure. The drill and responses of the participants were evaluated by trained observers using standardized forms and focus group interviews. Twenty children (aged 0 to 15 years, mean 10.7, median 12.0) and five adults presented to two emergency rooms. Eighty-five percent of the children were successfully decontaminated in showers. Reasons for non-completion included medical (respiratory distress n=1) and behavioral (n=2) limitations. Sixty-five percent of children shivered and none were provided with appropriate sized covering immediately after showering. Forty percent were reluctant to undress and all children (<5 years (n=4)) needed assistance undressing and showering. Eighty-four percent received post-decontamination radiation screening and all had their contaminated belongings secured. Moods were described as: happy, 25

percent; cooperative, 80 percent; consolable, 35 percent; fearful, 15 percent; and crying, 10 percent. There was an association between children younger than 12 years of age and fearful mood or crying (<0.05). This drill identified several key areas of concern, including the need to maintain children's warmth by using heaters and sufficient body coverings, and to increase staffing to better focus on age-specific requirements such as psychosocial needs that included anxiety, modesty, and keeping families together. These needs may compromise effective decontamination. Pediatric decontamination protocols and interventions addressing all these concerns should be further studied and implemented.

French, P. Edward, and Eric S. Raymond. 2009. Pandemic influenza planning: An extraordinary ethical dilemma for local government officials. ***Public Administration Review*** **69 (5): 823-830.**

The possibility of an influenza pandemic occurring within the next two decades is very real. The role of local governments in comprehensive preparation for this global threat is crucial. The federal government has provided broad guidelines for state and local officials who are ultimately responsible for emergency response and lifesaving services, vaccination, antiviral use, and the provision of other critical support. Much of this influenza pandemic preparedness has occurred under conditions of uncertainty, and these government actions may have unprecedented legal and ethical implications. This study evaluates the pandemic influenza policies of eight large U.S. cities to determine how Department of Health and Human Services recommendations with ethical and legal implications have been addressed. The authors find that several important aspects of these guidelines are vague in many plans, and input from key stakeholders is inadequate.

Hamblen, Jessica L., Fran H. Norris, Siobhan Pietruszkiewicz, Laura E. Gibson, April Naturale, and Claudine Louis. 2009. Cognitive behavioral therapy for post-disaster distress: A community based treatment program for survivors of Hurricane Katrina. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 206-214.**

Many disaster survivors suffer from postdisaster distress regardless of whether or not they meet criteria for specific psychiatric diagnoses. Cognitive Behavior Therapy for Post-disaster Distress, a ten-session manualized intervention, was developed to address a range of cognitive, emotional, and behavioral reactions to disaster. Trained community-based therapists provided CBT-PD to adult survivors of Hurricane Katrina as part of InCourage, a program sponsored by the Baton Rouge Area Foundation. Participants (n = 88) who were assessed at referral, pretreatment, intermediate treatment, and post-treatment showed significant improvement. The overall pre-post effect size was 1.4 in intention-to-treat analyses. Improvements were comparable for persons with more severe distress and persons with moderate distress at referral. Benefits were maintained at follow-up for the 66 adults who have been assessed.

Hansen, Katil Fred. 2009. Approaching doomsday: How SARS was presented in the Norwegian media. ***Journal of Risk Research*** **12 (3-7): 345-360.**

This article reviews why SARS received so much media attention in Norway, beginning with descriptions of the dynamics and dilemmas faced in health risk communication from the point of view of medical experts and generalist journalists. How the Norwegian media covered SARS is then described and analyzed in relation to these risk communication dynamics and dilemmas. Based on the description and short analysis, connotations of the main narratives in the different phases of the SARS outbreak are then discussed. In the conclusion, the nature of SARS itself is used to explain the enormous exposure it received and the massive fear it created in Norway compared to the meager medical damages it produced there.

Harris, Mark, and John Powell. 2009. Societal stability, public health, and primary care as three pillars of defense in biosecurity. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 262-279.**

Infectious diseases have threatened humanity since the beginning of time, causing more death and illness than all wars of mankind combined. This historical review describes some outbreaks and endemic diseases, examining risk factors and individual organizational and governmental responses. History teaches us that the most effective response to mitigating biological disaster requires coordination at all levels, from the individual to the state. The past also clearly demonstrates that basic factors such as societal and institutional stability, public health, and primary care form the most important pillars of defense against infectious disease.

Hartwig, Kari A., David Burich Burich, Christopher Cannon, Louis Massari, Lloyd Mueller, and Louise-Marie Dembry. 2009. Critical challenges ahead in bioterrorism preparedness training for clinicians. ***Prehospital and Disaster Medicine*** **24 (1): 47-53.**

A survey was distributed to determine physicians' confidence levels in recognizing potential Category-A bioterrorism disease threats (e.g., smallpox, anthrax), preferred means of obtaining continuing medical education (CME) credits, and their knowledge of the Connecticut Department of Public Health's isease reporting requirements. Surveys were mailed to all physicians in the three-hospital Yale New Haven Health System (2,174) from January to March 2004; there were 820 respondents for a 37.7 percent response rate. A total of 71 percent of physicians indicated that they were "not confident" that they could recognize five of the infectious agents named; they had higher confidence rates for smallpox (48.8%). Infectious diseases and emergency medicine physicians had the highest rates of confidence. Seventy-eight percent of physicians indicated conferences and lectures as their preferred CME learning modality. Nearly 72 percent of physicians reported a low familiarity with the DPH reporting requirements. The results highlighted the breadth of perceived weaknesses among clinicians from disease recognition to reporting incidents, which signifies the need for greater training in these areas. As clinicians themselves emphasized

their lack of skills and knowledge in this area, there should be a rapid development and dissemination of problem-based learning CME courses in bioterrorism preparedness.

Hick, John L., Joseph A. Barbera, and Gabor Kelen. 2009. Refining surge capacity: Conventional, contingency, and crisis capacity. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S59-S67.**
Health care facility surge capacity has received significant planning attention recently, but there is no commonly accepted framework for detailed, phased surge capacity categorization and implementation. This article proposes a taxonomy within surge capacity of conventional capacity (implemented in major mass casualty incidents and representing care as usually provided at the institution), contingency capacity (using adaptations to medical care spaces, staffing constraints, and supply shortages without significant impact on delivered medical care), and crisis capacity (implemented in catastrophic situations with a significant impact on standard of care). Suggested measurements used to gauge a quantifiable component of surge capacity and adaptive strategies for staff and supply challenges are proposed. The use of refined definitions of surge capacity as it relates to space, staffing, and supply concerns during a mass casualty incident may aid phased implementation of surge capacity plans at health care facilities and enhance the consistency of terminology and data collection between facilities and regions.

Hodge Jr., James G., Andrea M. Garcia, Evan D. Anderson, and Torrey Kaufman. 2009. Emergency legal preparedness for hospitals and health care personnel. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S37-S44.**
During the past decade, hospital emergency preparedness has become a focus of local, state, and federal governments seeking to address emergencies or disasters that affect the public health. Integral to hospital emergency preparedness are numerous legal challenges that hospitals and their health care personnel face during declared states of emergencies. This article evaluates legal requirements for hospital emergency preparedness, key legal concerns that hospitals should consider in emergency preparedness activities, and how the changing legal landscape during emergencies necessitates real-time decision making. It then analyzes legal issues including negligence, discrimination, and criminal culpability that may arise during or after medical triage. Finally, the article examines the legal risks of evading preparedness, specifically asking how a hospital and its personnel may be held liable for failing to plan or prepare for an emergency.

Hopmeier, Michael, Catherine Y. Lee, and Jeffrey A. Lowell. 2009. The bug and the bomb: Medical readiness as a national strategic priority. ***International Journal of Risk Assessment and Management*** **12 (2/3/4):2 22-247.**
Throughout the 20th and 21st centuries, numerous threats have developed, matured, and grown into what would be considered "strategic" in nature. Few, however, have had as much impact on our government and to efforts at preparedness as the scourges of terrorism, nuclear war, and conventional conflict. The economic costs for preparation and response to these threats have been great. Among other things, we have developed highly institutionalized and formalized processes for ensuring that these threats are identified, assessed, analyzed, and reanalyzed within a highly complex, robust, and redundant system to ensure that no single factor is missed and no possibility for preparation is overlooked. There remains a preeminent threat to this nation, in that during this same period of time it has cost the United States almost 4.5 times as many lives (3.2 million) and nearly seven times the expense ($4.7 trillion) as the terror, nuclear and conventional threats combined. This threat is infectious disease. This article discusses infectious diseases in comparison with other strategic threats. It also discusses the process of creating a strategic plan which is both vital and well within our understanding and existing current processes to develop, similar to concepts applied in preparation for more conventional threats.

Jenkins, J Lee, Edbert B. Hsu, Lauren M. Sauer, Yu-Hsiang Hsieh, and Thomas D. Kirsch. 2009. Prevalence of unmet health care needs and description of health care: Seeking behavior among displaced people after the 2007 California wildfires. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S24-S28.**
The southern California wildfires in autumn 2007 resulted in widespread disruption and one of the largest evacuations in the state's history. This study identifies unmet medical needs and health care-seeking patterns as well as prevalence of acute and chronic disease among displaced people following fires. These data can increase the accuracy, and therefore capacity, of the medical response. A team of emergency physicians, nurses, and epidemiologists conducted surveys of heads of households at shelters and local assistance centers in San Diego and Riverside counties for three days beginning 10 days post-disaster. All households present in shelters on the day of the survey were interviewed, and at the local assistance centers, a two-stage sampling method was used that included selecting a sample size proportionate to the number of registered visits to that site compared with all sites followed by a convenience sampling of people who were not actively being aided by local assistance center personnel. The survey covered demographics; needs following the wildfires (shelter, food, water, and health care); acute health symptoms; chronic health conditions; access to health care; and access to prescription medications. Among the 175 households eligible, 161 (92.0%) participated. Within the 47 households that reported a health care need since evacuation, 13 (27.7%) did not receive care that met their perceived need. Need for prescription medication was reported by 47 (29.2%) households, and 20 (42.6%) of those households did not feel that their need for prescription medication had been met. Mental health needs were reported by 14 (8.7%) households with seven of these (50.0%) reporting unmet needs. At least one family member per household left prescription medications behind during evacuation in 46 households (28.6%), and one family member in 48 households (29.8%) had seen a

health care provider since their evacuation. Most people sought care at a clinic (24, 50.0%) or private doctor (11, 22.9%) as opposed to an emergency department (six, 12.5%). A significant portion of the households reported unmet health care needs during the evacuations of the southern California wildfires. The provision of prescription medication and mental health services were the most common unmet need. In addition, postdisaster disease surveillance should include outpatient and community clinics, given that these were the most common treatment centers for the displaced population.

Jenkins, J. Lee, Gabor D. Kelen, Lauren M. Sauer, Kimberly A. Frederickson, and Melissa L. McCarthy. 2009. Review of hospital preparedness instruments for National Incident Management System compliance. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S83-S89.**

The role of hospitals in the community response to disasters has received increased attention, particularly since the terrorist attacks of September 11, 2001. Hospitals must be prepared to respond to and recover from all-hazards emergencies and disasters. There have been several initiatives to guide hospitals' role in these events and to assist hospitals in their effort to prepare for them. This article focuses on the efforts of four distinct groups: The Joint Commission, the executive branch of the U.S. government, the U.S. Congress, and the Department of Health and Human Services. Despite the different approach each group uses to assist hospitals to improve their emergency management capabilities, the initiatives reinforce one another and have resulted in increased efforts by hospitals to improve their disaster preparedness and response capabilities and community integration. The continued progress of our medical response system in all-hazard emergencies and disasters depends in large part on the future guidance and support of these four key institutions.

Jenkins, Jennifer Lee, Melissa McCarthy, Gabor Kelen, Lauren Sauer, and Thomas Kirsch. 2009. Changes needed in the care of sheltered persons: A multistate analysis from Hurricane Katrina. ***American Journal of Disaster Medicine*** **4 (2): 101-106.**

Following Hurricane Katrina, nearly 1,400 evacuation shelters were opened in 27 states across the nation to accommodate the more than 450,000 evacuees from the gulf region. The levee breaks in New Orleans and storm surge in Mississippi brought about significant morbidity and mortality, ultimately killing more than 1,300 people. This study summarizes the health needs of approximately 30,000 displaced persons who resided in shelters in eight states, including prescription medical needs, disbursement of durable medical equipment, and referrals for further care. The first available 31,272 medical encounter forms were utilized as a convenience sample of displaced persons in Louisiana, Mississippi, Texas, Alabama, Georgia, Tennessee, Missouri, and Florida. This medical encounter form was completed by volunteer nurses, was standardized across all shelters, and included demographic information, need for acute or preventive care, pre-existing medical conditions, disposition referrals, need for prescription medication, and frequency of volunteer providers who were providing care outside of their first-aid scope.
Sheltered persons who received only acute care numbered 11,306 (36.2%), and those who received only preventive/chronic care numbered 10,403 (33.3%). A similar number 9,563 (30.6%) persons, received both acute and preventive/chronic care. There were 3,356 (10.7%) sheltered persons who received some form of durable medical equipment. Glasses were given to 2,124 people (6.8% of the total visits receiving them) and were the most commonly dispensed item. This was followed by dental devices (495, 1.6%) and glucose meters (339, 1.1%). Prescriptions were given to 8,154 (29.0%) sheltered persons. Referrals were made to 13,815 (44.2%) of sheltered persons who presented for medical care. The pharmacy was the most common location for referrals for 5,785 (18.5%) of all sheltered persons seeking medical care and were referred to the emergency department or hospital for further care. Hurricane Katrina illustrated the need to strengthen health-care planning and response in regard to sheltered persons with a particular focus on primary and preventive care services. This study has reemphasized the need for primary medical care and pharmaceuticals in sheltered persons and shown new data regarding the disbursement of durable medical equipment and the frequent need for health care beyond the shelter setting as evidenced by referrals.

Johnson, Yvette J., John A. Herrmann, Richard L. Wallace, Harry F. Troutt, and Maung S. Myint. 2009. Development and implementation of a functional exercise to assess public health agency response to food-borne bioterrorism. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-14.**

Agroterrorism and food terrorism have been identified as important homeland security issues by officials in the public health, government, and food industry sectors of the United States. Intentional contamination of food has already occurred both abroad and in North America. Outbreak investigation and control measures in response to intentional contamination differ from those employed in cases of naturally occurring contamination. Operations-based exercise efforts specific to bioterrorism events are essential to train public health personnel and first responders to consider the possibility of deliberate contamination during an outbreak investigation. A recent search of the Rand Corporation's Public Health Preparedness database identified no operations-based (functional or full-scale) exercises involving food-borne contamination with a biological or chemical agent. This manuscript describes a functional exercise developed and conducted by the University of Illinois College of Veterinary Medicine Section of Community Health and Preventive Medicine. The functional exercise simulated a food-borne terrorism event and was designed to evaluate the efficacy of the Food Emergency Response Plan of the Illinois Department of Public Health, Division of Food, Drugs and Dairies. The exercise was held on November 18th and 19th, 2008 at the College of Veterinary Medicine, University of Illinois, Urbana, Illinois. Based on this and previous exercises and training programs, it is apparent that the more exercise designers, evaluators, public health, and support agency

participants move away from discussion-based exercises and towards operations-based exercises, the more strengths and deficiencies in preparation and response of participating agencies are revealed. Although public health agencies have begun training personnel and partner agencies to consider intentional contamination of food during an outbreak investigation, the relative lack of widespread operations-based exercises to assess preparedness in response to an intentional incident of food-borne contamination seems to be an important deficiency in homeland security. Additional funding to create opportunities for public health and first responder personnel to participate in operations-based bioterrorism response exercises is needed.

Jones, Kris, Mardi Allen, Fran H. Norris, and Christy Miller. 2009. Piloting a new model of crisis counseling: Specialized crisis counseling services in Mississippi after Hurricane Katrina. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 195-205.**

During January to April 2007, Project Recovery, a federally funded crisis counseling program implemented by Mississippi's Department of Mental Health, piloted a new model of Specialized Crisis Counseling Services (SCCS) on the Mississippi Gulf Coast. In this team-based approach, a masters level counselor trained in a variety of intervention techniques and a resource coordinator worked together with people whose needs were relatively intense. Compared to regular program (RCCS) participants over the same interval (n = 29,522), SCCS participants (n = 281) were more likely to be female, middle-aged, and at greater risk for severe distress. In a participant survey conducted in both programs over the same week, SCCS participants reported significantly greater benefit than did RCCS participants. A subset of 129 SCCS participants provided pre- and post-participation assessments and showed large improvements in disaster-related distress.

Kalish, Brian T., Charlotte A. Gaydos, Yu-Hsiang Hsieh, Bryan E. Christensen, Karen C. Carroll, Andy Cannons, Jacqueline A. Cattani, and Richard E. Rothman. 2009. National survey of Laboratory Response Network sentinel laboratory preparedness. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S17-S23.**

The Laboratory Response Network is the United States' laboratory system for detecting, confirming, and reporting potential bioterrorism agents. The first tier—sentinel laboratories—is composed principally of hospital-based laboratories and is tasked with ruling out potential biological threat agents in clinical specimens or the identification of suspicious specimens for further testing in higher tiers of the LRN system. The aim of the present study was to broadly describe preparedness of the sentinel laboratories, with a specific focus on training, personnel, and communications. A semi-structured cross-sectional survey of U.S. sentinel laboratories was designed and conducted. Hospitals with greater than 250 beds and an emergency department were considered eligible for inclusion. A geographically weighted sample of 201 hospitals was selected. The survey was administered by telephone to the microbiology managers (or designees) at the selected hospitals. The survey contained questions related to drill frequency, proficiency survey participation, personnel training, personnel responsibilities, procedures for biological threat response, and overall confidence in preparedness. Overall, 179 hospitals (89.1%) identified themselves as sentinel laboratories and participated in the survey; 11.7 percent reported that they had had an emergency alert within the last two years. Although rates of internal drills were low (20.7%), participation in some form of bioterrorism proficiency evaluation was high (79.9%). In all, 83.8 percent of laboratories reported that they had personnel designated to coordinate response to acts of bioterrorism. More than 73 percent of respondents indicated that they had sufficient personnel, equipment, and training to respond to a biological terrorism event. By multivariate analysis, sentinel laboratories were 3.4 times more likely to feel confident that they had sufficient personnel, equipment, and training to respond to a biological terrorism event if they had designated personnel for bioterrorism roles. This pilot study of sentinel laboratory bioterrorism preparedness demonstrated that hospital laboratory personnel, training, and communication preparedness were not universal, despite designation as sentinel laboratories. A need for unified monitoring of sentinel laboratories exists. Efforts should be made to develop standardized metrics for sentinel laboratory preparedness.

Kelen, Gabor D., Melissa L. McCarthy, Chadd K. Kraus, Ru Ding, Edbert B. Hsu, Guohua Li, Judy B. Shahan, James J. Scheulen, and Gary B. Green. 2009. Creation of surge capacity by early discharge of hospitalized patients at low risk for untoward events. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S10-S16.**

U.S. hospitals are expected to function without external aid for up to 96 hours during a disaster. However, concern exists that there is insufficient capacity in hospitals to absorb large numbers of acute casualties. This study determines the potential for creation of inpatient bed surge capacity from the early discharge (reverse triage) of hospital inpatients at low risk of untoward events for up to 96 hours. In a health system with three capacity-constrained hospitals that are representative of U.S. facilities (academic, teaching affiliate, community), a variety (N=50) of inpatient units were prospectively canvassed in rotation using a blocked randomized design for 19 weeks ending in February, 2006. Intensive care units, nurseries, and pediatric units were excluded. Assuming a disaster occurred on the day of enrollment, patients who did not require any (previously defined) critical intervention for four days were deemed suitable for early discharge. Of 3491 patients, 44 percent did not require any critical intervention and were suitable for early discharge. Accounting for additional routine patient discharges, full use of staffed and unstaffed licensed beds, gross surge capacity was estimated at 77, 95, and 103 percent for the three hospitals. Factoring likely continuance of nonvictim emergency admissions, net surge capacity available for disaster victims was estimated at 66, 71, and 81 percent, respectively. Reverse triage made up the majority (50%, 55%, and 59%) of

surge beds. Most realized capacity was available within 24 to 48 hours. Hospital surge capacity for standard inpatient beds may be greater than previously believed. Reverse triage, if appropriately harnessed, can be a major contributor to surge capacity.

Khan, Sinan, and Anke Richter. 2009. Using decision analysis to select alternate modes of dispensing: An example from Los Angeles County Public Health. ***Journal of Emergency Management*** **7 (2): 39-51.**

To comply with the Center for Disease Control's mass prophylaxis mandates, many public health jurisdictions must supplement their existing Point of Dispensing-based system. Because of limited budgets and personnel availability, only one or two alternatives out of the many potential options can be implemented. Multicriteria decision analysis is a powerful tool that allows public health officials to assess the relative effectiveness of alternate modes of dispensing while incorporating the opinions of their multidisciplinary emergency response planning teams.This process was used to analyze the effectiveness of alternate modes of dispensing that could supplement the existing POD system within the Los Angeles County Department of Public Health. The top two options for were prepositioning for civil service, and partnership with a major health maintenance organization. These choices were stable under a variety of sensitivity analyses, and the differences in opinion between the agencies and other stakeholders do not change them. The transparency of the model and analysis may allow decision makers and planners in the DPH to garner support for their alternate modes of dispensing plans. By making the decision criteria clear and demonstrating the robustness of the results in the sensitivity analyses, public health partners gain a deeper understanding of the issues and their potential roles. The process can be repeated by any jurisdiction, but definition of "best" will rely on the issues and gaps that are identified with the jurisdiction's POD plan for mass prophylaxis.

Klaiman, Tamar A., Jennifer Ibrahim, and Alice Hausman. 2009. Do state written pandemic plans include federal recommendations? A national study. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-24.**

The U.S. government has worked to empower states to respond to a pandemic, but there is minimal evaluation to determine the success of such efforts. The purpose of this study was to examine states' preparedness for a pandemic as documented by states' written pandemic plans. The study was a cross-sectional comparative analysis of 50 states' pandemic influenza plans as of March 2008. The CDC's State and Local Pandemic Influenza Planning Checklist was turned into a matrix with each of 85 recommendations making up 10 overarching domains coded as "no mention"=1, "brief mention but no description or action item"=2, or "description or action of the item"=3. Domain scores were constructed by summing each state's factor scores and dividing the sums by the total possible score for that domain. Federal recommendations surrounding leadership, networking and surveillance have been well-integrated, but greater efforts are needed to develop partnerships with health care agencies and focus on antiviral preparedness and infection controls. The use of a clearly defined measurement tool can help states determine their level of preparedness and look to more prepared states for guidance as well as lobby their legislatures for additional resources.

Knebel, Ann, and Sally Phillips. 2009. National strategy for health care system preparedness. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S4-S5.**

Lee, Eva K., Hannah K. Smalley, Yang Zhang, Ferdinand Pietz, and Bernard Benecke. 2009. Facility location and multi-modality mass dispensing strategies and emergency response for biodefense and infectious disease outbreaks. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 311-351.**

Mass dispensing for medical prophylaxis and treatment of the general population requires rapid establishment of a network of dispensing sites and health facilities that are flexible, scalable, and sustainable. This article describes a systems approach to analyze mass dispensing of countermeasures, and presents a set of powerful modeling and computational tools to assist in strategic and operational planning. Facility location models are used to determine the number of dispensing sites required. The models account for variable population densities, the maximum distance individuals should have to travel, the types of private and public facilities available and the availability of critical staff to man the point-of-dispensing facilities (PODs). Large-scale simulation is employed to model the stochastic service and dynamic flow behavior within PODs. Optimization is interwoven to determine appropriate staffing levels for efficient operations logistics. A cost effective mass dispensing network for anthrax prophylaxis involving a metropolitan area with over five million people is presented. The study reveals: (1) the sharing of labor resources across counties and districts is important; (2) the most cost-effective dispensing plan across a region involves a multi-modality strategy, consisting of a combination of drive-through, walk-through and closed PODs, each operating at the availability of critical public health personnel; (3) the optimal combination of POD modalities changes according to various facility capacity restrictions, as well as the availability of critical public health personnel; (4) an increase in the number of PODs in operation does not necessarily increase the total number of core public health personnel needed; (5) optimal staffing is non-linear with respect to throughput—the optimal staffing and throughput cannot simply be estimated using an average estimate; (6) there exists an optimal capacity for each POD location, depending on the population, that provides the most effective staffing needs. The study also reveals that such computationally sophisticated decision support tools are invaluable to emergency managers. The tools provide flexibility to quickly analyze design strategies and decisions, and can generate a feasible regional dispensing plan based on the best estimates and analysis available, and then allow for reconfiguration of various PODs as the event unfolds. They type of disaster being confronted (e.g. biological attack, infectious disease outbreak or natural disaster) also dictates different design considerations

with respect to the dispensing clinic, facility locations, dispensing and backup strategies, and level of security protection.

Leo, James D., Desiree Thomas, and Ginger Alhadeff. 2009. A unique hospital physician disaster response system for a nonemployed medical staff. ***American Journal of Disaster Medicine*** **4 (2): 95-100.**
Private hospitals with nonemployed, volunteer medical staffs face a special challenge in meeting the patient-care needs posed by a mass casualty incident (MCI). Although most disaster response systems focus on emergency department and trauma management, such systems often do not provide for the need to triage existing inpatients to create room for incoming casualties, for continuity of physician care for those patients, as well as for MCI victims in case of major disaster. Such systems must also provide a mechanism for ethical and appropriate rationing of limited resources during a MCI. Community hospitals without 24/7 in-house physicians must provide a mechanism for physician care for patients in situations in which access to the hospital may be limited by the disaster (e.g., major earthquake or flood). This article describes a system established at Long Beach Memorial Medical Center, a 740-bed, not-for-profit hospital with a volunteer medical staff to ensure continuity of physician care in a major disaster. To the authors knowledge, this is the first published report of such a system.

Liao, Qiuya, Wendy Wing Tak Lam, Chao Qiang Jiang, Yuk Yi Ho, Ella, Min Liu, Yi, Wei Sen Zhang, and Richard Fielding. 2009. Avian influenza risk perception and live poultry purchase in Guangzhou, China, 2006. ***Risk Analysis*** **29 (3): 416-424.**
Human H5N1 highly pathogenic avian influenza (HPAI) infection is associated with intimate exposure to live poultry. Perceptions of risk can modify behaviors, influencing actual exposure. However, greater hazard is not necessarily followed by perception of greater risk and more precautionary behavior because self-serving cognitive biases modulate precautionary and hazardous behaviors. This article examines risk perception associated with avian influenza. A total of 1,550 face-to-face, within-household interviews, and 1,760 telephone interviews were derived to study avian influenza risk perception and live poultry use in Guangzhou and Hong Kong, respectively. Chi-square and Mann-Whitney tests assessed bivariate associations and risk distributions, respectively, and fully adjusted multivariate logistic models determined independent risk associations. Relative to Hong Kong, perceived "generalized" risk from buying live poultry and perceived self/family risk from buying were higher in Guangzhou. Higher perceived "generalized" risk was associated with not buying live poultry, consistent with the pattern seen in Hong Kong, while perceived higher self/family risk was associated with buying; no such association was seen in Hong Kong. Multivariate adjustment indicated older age was associated with buying live poultry in Guangzhou. Guangzhou respondents perceived greater risk relative to Hong Kong. Buying live poultry was associated with perceptions of less "generalized" risk but more self/family risk. Higher generalized risk was associated with fewer live poultry purchases, suggesting generalized risk may be a useful indicator of precautionary HPAI risk behavior.

Lyons, Wendy H., Jr. Burkle, Frederick M., Deborah L. Roepke, and James E. Bertz. 2009. An influenza pandemic exercise in a major urban setting, Part 1: Hospital health systems lessons learned and implications for future planning. ***American Journal of Disaster Medicine*** **4 (2): 120-128.**

Macintyre, Anthony G., Joseph A. Barbera, and Peter Brewster. 2009. Health care emergency management: Establishing the science of managing mass casualty and mass effect incidents. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S52-S58.**
Particularly since 2001, the health care industry has witnessed many independent and often competing efforts to address mitigation and preparedness for emergencies. Clinicians, health care administrators, engineers, safety and security personnel, and others have each developed relatively independent efforts to improve emergency response. A broader conceptual approach through the development of a health care emergency management profession should be considered to integrate these various critical initiatives. When based on long-standing emergency management principles and practices, health care emergency management provides standardized, widely accepted management principles, application concepts, and terminology. This approach could also promote health care integration into the larger community emergency response system. The case for a formally defined health care emergency management profession is presented with discussion points outlining the advantages of this approach.

Maese, John. 2009. Medical society's blueprint for a successful community response to emergency preparedness. ***Prehospital and Disaster Medicine*** **24 (1): 73-75.**
It is clear from disaster evaluations that communities must be prepared to act independently before government agencies can cope with the early ramifications of disasters. In response to devastation to the borough of Staten Island, New York in the wake of September 11, 2001, the Richmond County Medical Society established a structure to incorporate community needs and institutions to work together for the common good. A program that brings together two hospital systems, nursing homes, emergency medical services, and the Office of Emergency Management physician leadership in a meaningful way now is in place. This approach has improved the disaster preparedness of Staten Island and demonstrated how the Medical Society can provide leadership in disaster preparedness and serve as a conduit for communication amongst entities that normally do not communicate.

Malish, Richard, David E. Oliver, Robert M. Rush Jr., Esmeraldo Zarzabal, and Michael J. Burkle Jr. Sigmon, Frederick M. 2009. Potential roles of military-specific response to natural disasters: Analysis of the rapid deployment of a mobile surgical team to the

2007 Peruvian earthquake. ***Prehospital and Disaster Medicine*** **24 (1): 3-8.**
The August 2007 earthquake in Peru resulted in the loss of critical health infrastructure and resource capacity. A regionally located United States Military Mobile Surgical Team was deployed and operational within 48 hours. However, a post-mission analysis confirmed a low yield from the military surgical resource. The experience of the team suggests that nonsurgical medical, transportation, and logistical resources filled essential gaps in health assessment, evacuation, and primary care in an otherwise resource poor surge response capability. Due to an absence of outcomes data, the true effect of the mission on population health remains unknown. The military should focus their disaster response efforts on employment of logistics, primary medical care, and transportation and evacuation. Future response strategies should be evidence-based and incorporate a means of quantifying outcomes.

McCarthy, Melissa L., Peter Brewster, Edbert B. Hsu, Anthony G. Macintyre, and Gabor D Kelen. 2009. Consensus and tools needed to measure health care emergency management capabilities. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S45-S51.**
There is no widely accepted, validated framework of health care emergency management capabilities (HEMCs) that can be used by facilities to guide their disaster preparedness and response efforts. We reviewed the HEMCs and the evaluation methods used by the Veterans Health Administration, The Joint Commission, the Institute of Medicine Metropolitan Medical Response System committee, the Department of Homeland Security, and the Department of Health and Human Services to determine whether a core set of HEMCs and evaluative methods could be identified. Despite differences in the conceptualization of health care emergency management, there is considerable overlap among the agencies regarding major capabilities and capability-specific elements. Of the five agencies, four identified occupant safety and continuity of operations as major capabilities. An additional five capabilities were identified as major by three agencies. Most often the differences were related to whether a capability should be a major one versus a capability-specific element (e.g., decontamination, management of resources). All of the agencies rely on multiple indicators and data sources to evaluate HEMCs. Few performance-based tools have been developed and none have been fully tested for their reliability and validity. Consensus on a framework and tools to measure HEMCs is needed.

McManus, John G., Annette McClinton, and Melinda J. Morton. 2009. Ethical issues in conduct of research in combat and disaster operations. ***American Journal of Disaster Medicine*** **4 (2): 87-93.**
The conduct of research in the combat and disaster environments shares many of the same fundamental principles and regulations that govern civilian biomedical research. However, Department of Defense research protocols stipulate additional requirements designed to preserve service members' informed consent rights, uphold ethical standards, and protect sensitive or classified information. The authors review studies approved for the conduct of research in current combat operations and discuss their applicability in disaster settings. This is a descriptive, retrospective study of protocols that have been approved for conduct of research in Operation Iraqi Freedom and Operation Enduring Freedom. During the period of July 2005 through October 2007, 38 retrospective chart review protocols, seven prospective studies requiring consent or an alteration of the consent document and 12 prospective observational studies were submitted through the Deployed Research Committee in Iraq for review and approval at the Brooke Army Medical Center Institutional Review Board. A total of 55 protocols were approved by the IRB form implementation in the Iraq combat theater. Most of these protocols involved trauma care treatment. One prospective study investigating the effects of blast-concussive injuries on US soldiers in Iraq requiring informed consent was reviewed and approved.The conduct of military medical research has made, and will make, significant and lasting contributions to the practice of both civilian and military medicine. Although policies and regulations to conduct research and release associated findings often seem cumbersome and stringent, these added hurdles serve not only to ensure protection of the rights of human subjects during a time of potentially increased vulnerability, but also to protect the security of interests of US troops. Many of these principles and practices are directly applicable in disaster research environments.

McQueen, Kelly K.A., William Magee, Thomas Crabtree, Christopher Romano, and Frederick M. Burkle Jr. 2009. Application of outcome measures in international humanitarian aid: Comparing indices through retrospective analysis of corrective surgical care cases. ***Prehospital and Disaster Medicine*** **24 (1): 39-46.**
It is common for international organizations to provide surgical corrective care to vulnerable populations in developing countries. However, a current worsening of the overall surgical burden of disease in developing countries reflects an increasing lack of sufficient numbers of trained health care personnel, and renders outside volunteer assistance more desirable and crucial than ever. Unfortunately, program evaluation and monitoring, including outcome indices and measures of effectiveness, is not measured commonly. In 2005, Operation Smile International implemented an electronic medical record system that helps monitor a number of critical indices during surgical missions that are essential for quality assurance reviews. This record system also provided an opportunity to retrospectively evaluate cases from previous missions. Review of data sets from more than 8,000 cases in 2005 and 2006 has provided crucial information regarding the priority of surgery, perioperative and operative complications, and surgical program development. The most common procedure provided was unilateral cleft lip repair, followed closely by cleft palate. A majority of these interventions occurred for patients who were older than routinely provided for in the western world. The average child treated had an age-weight ratio at or below the U.S. Centers for Disease Control and Prevention 50th percentile, with a small percentage falling below the CDC

20th percentile. A majority of children had acceptable levels of hemoglobin, but the relative decreased age-weight ratio nonetheless can reflect mild malnutrition. Complications requiring medical intervention were seen in 1.2 percent of cases in 2005 and one percent in 2006. Thirty percent were reported as anesthesia complications, and 61 percent reported as surgical complications. One death was reported, but it occurred after discharge outside the perioperative period. Complication rates are similar to rates reported in the United States and United Kingdom, emphasizing the importance of standardization with uniform indices to compare quality performance and equity of care. This study offers an important example of the importance of collecting, analyzing, and reporting measures of effectiveness in all surgical settings.

Meyerson, Frederick A.B., Laura A. Meyerson, and James K. Reaser. 2009. Biosecurity from the ecologist's perspective: Developing a more comprehensive approach. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 147-160.**

National planning for biological security should encompass more than just protection against biological weapons. Global forces such as the introduction and spread of invasive species (including emerging infectious diseases), in conjunction with population growth, climate change and sea level rise, also constitute threats to security. These linked biological and abiotic phenomena make the United States and other countries less secure by degrading ecosystems and ecosystem services, posting risks to human health and safety, and altering patterns of agriculture, settlement, migration, and economic opportunity. Several other countries already use a more comprehensive definition of biosecurity than the United States, one that includes biological threats to the environment, the economy, and human health and well-being. This article asserts that an expanded definition of biosecurity is necessary in a world undergoing rapid change due to altered climate, growing population and increased rates of trade, transport, and travel.

Nicas, Mark, and Rachael M. Jones. 2009. Relative contributions of four exposure pathways to influenza infection risk. ***Risk Analysis*** **29 (9): 1292-1303.**

The relative contribution of four influenza virus exposure pathways—(1) virus-contaminated hand contact with facial membranes, (2) inhalation of respirable cough particles, (3) inhalation of inspirable cough particles, and (4) spray of cough droplets onto facial membranes—must be quantified to determine the potential efficacy of nonpharmaceutical interventions of transmission. The authors used a mathematical model to estimate the relative contributions of the four pathways to infection risk in the context of a person attending a bed-ridden family member ill with influenza. Considering the uncertainties in the sparse human subject influenza dose-response data, they assumed alternative ratios of 3,200:1 and 1:1 for the infectivity of inhaled respirable virus to intranasally instilled virus. For the 3,200:1 ratio, pathways (1), (2), and (4) contribute substantially to influenza risk. At a virus saliva concentration of 106 mL.1, pathways (1), (2), (3), and (4) contribute, respectively, 31 percent, 17 percent, 0.5 percent, and 52 percent of the infection risk. With increasing virus concentrations, pathway (2) increases in importance, while pathway (4) decreases in importance. In contrast, for the 1:1 infectivity ratio, pathway (1) is the most important overall: at a virus saliva concentration of 106 mL.1, pathways (1), (2), (3), and (4) contribute, respectively, 93 percent, 0.037 percent, 3.3 percent, and 3.7 percent of the infection risk. With increasing virus concentrations, pathway (3) increases in importance, while pathway (4) decreases in importance. Given the sparse knowledge concerning influenza dose and infectivity via different exposure pathways, nonpharmaceutical interventions for influenza should simultaneously address potential exposure via hand contact to the face, inhalation, and droplet spray.

Norris, Fran H., and Nikki D. Bellamy. 2009. Evaluation of a national effort to reach Hurricane Katrina survivors and evacuees: The Crisis Counseling Assistance and Training Program. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 165-175.**

Hurricane Katrina created the largest population of internally displaced persons in the history of the United States. Exceptions to the Federal Emergency Management Agency's usual eligibility requirements allowed states from across the nation to apply for Crisis Counseling Assistance and Training Program (CCP) grants to provide services to evacuees. Over a 16-month period, crisis counselors documented 1.2 million individual and group encounters across 19 CCPs. Most encounters (936,000, 80%) occurred in Presidential disaster-declared areas of Louisiana, Mississippi, and Alabama, but many (237,000, 20%) occurred in 16 smaller ''undeclared'' programs across the country. Programs showed excellent reach relative to external benchmarks provided by FEMA registrations for individual assistance and population characteristics. Programs varied widely in service mix and intensity. The declared programs reached more people, but the undeclared programs provided more intensive services to fewer people with higher needs.

Norris, Fran H., Jessica L. Hamblen, and Craig S. Rosen. 2009. Service characteristics and Counseling outcomes: Lessons from a cross-site evaluation of crisis counseling After hurricanes Katrina, Rita, and Wilma. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 176-185.**

The 2005 hurricane season was the worst on record, resulting in disaster declarations and the implementation of federally funded crisis counseling programs in five states. As part of a larger cross-site evaluation of these programs, data from 2,850 participant surveys, 805 provider surveys, and 132,733 encounter logs (submitted from three weeks before to three weeks after the participant surveys) were aggregated to the county level (N=50) and used to test hypotheses regarding factors that influence program performance. County-level outcomes (aggregate ratings of participants' perceived benefits) improved as service intensity, service intimacy, and frequency of psychological referrals increased, and as provider job stress decreased. The percent of provid-

ers with advanced degrees was indirectly related to participants' perceived benefits by increasing service intensity and referral frequency. The results yielded recommendations for achieving excellence in disaster mental health programs.

Norris, Fran H., and Craig S. Rosen. 2009. Innovations in disaster mental health services and evaluation: National, state, and local responses to Hurricane Katrina. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 159-146.**
The severe consequences of Hurricane Katrina on mental health have sparked tremendous interest in improving the quality of mental health care for disaster victims. This special issue seeks to illustrate the breadth of work emerging in this area. The five empirical examples each reflect innovation, either in the nature of the services being provided or in the evaluation approach. Most importantly, they portray the variability of post-Katrina mental health programs, which ranged from national to state to local in scope and from educational to clinical in intensity. As a set, these papers address the fundamental question of whether it is useful and feasible to provide different intensities of mental health care to different populations according to presumed need. The issue concludes with recommendations for future disaster mental health service delivery and evaluation.

Rateau, Margaret R. 2009. Differences in emotional well-being of hurricane survivors: A secondary analysis of the ABC News Hurricane Katrina Anniversary Poll. ***Archives of Psychiatric Nursing*** **23 (3): 269-271.**
Literature suggests that survivors of catastrophic loss may suffer long-term emotional damage. This paper presents a secondary data analysis from the ABC News Hurricane Katrina Poll conducted in August, 2006. Following analyses, a significantly higher percentage of women (44%) and those who experienced residential damage (66.7%) reported long-term negative impact on emotional well-being. Overall, 70.3 percent of Katrina survivors reported a strengthening in fellow man following the disaster. These results may serve as beginning evidence for appropriate identification and implementation of mental health support for those most in need following disaster.

Raymond, Eric S., and Edward P. French. 2009. Pandemic influenza vaccination distribution: Evaluation of the policies of several large municipalities across the United States. ***Journal of Emergency Management*** **7 (3): 33-41.**
The H5N1 influenza viral strain, or "avian flu," has been a cause of concern for health officials at all levels of government since 2003. As it currently exhibits a 60 percent mortality rate, this strain uncomfortably resembles the H1N1 viral strain that killed more that 50 million people worldwide in the early twentieth century. Although limited worldwide vaccine production capabilities prevent the mass distribution of vaccines in the event of a pandemic from this or any other viral strain, government officials are left with few options but to develop vaccination distribution policies for their respective communities. This research evaluates the vaccine distribution policies followed by eight municipalities with populations greater than 100,000 across the United States to determine the reasoning for prioritizing certain individuals over others. The authors find that each of the vaccination distribution policies follow Department of Health and Human Services guidelines with some minor modifications. We propose that a cost-benefit analysis model which includes public participation, and considers social continuance, economics, and the flexibility to adjust vaccination distribution would be a more favorable approach.

Richards, Elizabeth A., Julie Cowan Novak, and Lynn V. Davis. 2009. Disaster response after Hurricane Katrina: A model for an academic community partnership in Mississippi. ***Journal of Community Health Nursing*** **26 (3): 114-120.**
Team Reach Out Biloxi is a nursing student-initiated service-learning project with the goal of providing ongoing assistance to the victims of Hurricane Katrina. On six different occasions from 2005 to 2008, Purdue nursing students integrated their leadership skills with application of public health knowledge, compassion, and concern as they worked in partnership with the Gulfport region Coastal Family Health Clinics. This article reviews the service-learning framework, course planning, and implementation of a three-year post-hurricane disaster project.

Rosen, Craig S., Monica M. Matthieu, and Fran H. Norris. 2009. Factors predicting crisis counselor referrals to other crisis counseling, disaster relief, and psychological services: A cross-site analysis of post-Katrina programs. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 186-194.**
An important aspect of crisis counseling is linking survivors with services for their unmet needs. The authors examined determinants of referrals for disaster relief, additional crisis counseling, and psychological services in 703,000 crisis counseling encounters 318 months after Hurricane Katrina. Referrals for disaster relief were predicted by clients' losses, age (adults rather than children), and urbanicity. Referrals for additional counseling and psychological services were predicted by urbanicity, losses and trauma exposure, prior trauma, and preexisting mental health problems. Counseling and psychological referrals declined over time despite continuing mental health needs. Results confirm large urban-rural disparities in access to services.

Sauer, Lauren M., Melissa L. McCarthy, Ann Knebel, and Peter Brewster. 2009. Major influences on hospital emergency management and disaster preparedness. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S68-S73.**
The role of hospitals in the community response to disasters has received increased attention, particularly since the terrorist attacks of September 11, 2001. Hospitals must be prepared to respond to and recover from all-hazards emergencies and disasters. There have been several initiatives to guide hospitals' role in these events and to assist hospitals in their effort to prepare for them. This article focuses on the efforts of

four distinct groups: The Joint Commission, the executive branch of the U.S. government, the U.S. Congress, and the Department of Health and Human Services. Despite the different approach each group uses to assist hospitals to improve their emergency management capabilities, the initiatives reinforce one another and have resulted in increased efforts by hospitals to improve their disaster preparedness and response capabilities and community integration. The continued progress of our medical response system in all-hazard emergencies and disasters depends in large part on the future guidance and support of these four key institutions.

Smith, Susan M., Linda Peoples, and Peggy Johnson. 2009. Disaster response: Community mental health service capacity in the United States. ***International Journal of Emergency Management*** **5 (3/4): 311-323.**
Following a natural disaster such as a major hurricane or flood, the ability of community mental health facilities to respond during the recovery stage with adequate resources and capacity to meet community needs is critical. Community mental health agencies have an important role to play in preparing for and responding to large-scale disasters, such as the 2005 hurricanes Katrina and Rita. The timely provision of mental health services to disaster victims has long been recognized as an important component of effective emergency management. In addition to a discussion of the findings from previous research studies conducted throughout the United States addressing the issue of mental health community response following a disaster, this paper presents the survey findings of a retrospective research study designed to assess the status of emergency disaster preparedness and client service capacity at community mental health facilities prior to and following the Katrina/Rita disaster. This discussion also provides a qualitative assessment of the responses provided by community mental health administrators one year after Katrina/Rita, when they were asked to identify the resources needed by their facilities to effectively address future disasters.

Sprang, Ginny, and A. Scott LaJoie. 2009. Exposure, avoidance, and PTSD among Hurricane Katrina evacuees. ***Traumatology*** **15 (2): 10-19.**
This article describes an investigation into the relationship between exposure, avoidant coping, and posttraumatic stress disorder (PTSD) in Hurricane Katrina evacuees. Specifically, this study examines the unique contribution of the dose of exposure to variance in PTSD and provides a mediational analysis to determine the degree to which avoidant coping affects the relationship between exposure and PTSD. Findings reveal that the dose of exposure is a strong predictor of threshold-level PTSD at one year post-disaster and identifies avoidant coping strategies as a partial mediator between exposure and the development of PTSD. Identification of avoidant coping as a significant factor in the causal pathway between exposure and PTSD provides a clearly definable and specific target for clinical intervention.

Swanson, David A. 2009. Hurricane Katrina: A case study of its impacts on medical service providers and their client populations. ***Open Demography*** **2: 8-17.**
There is a great deal of literature in the areas of: (1) medical demography; (2) the effect of disasters on first responders; (3) measuring the immediate demographic and social effects of a disaster; and (4) the short- and long-term economic and financial effects of disasters. However, there is very little about the demographic effects of large-scale disasters on medical providers once rescue operations have been completed and operations move into the relief and recovery/rehabilitation phases associated with a disaster. This paper seeks to bridge this gap by providing a "recovery/ rehabilitation" case studY: estimates of the effects of Hurricane Katrina on the client populations and candidates for a specific medical procedure in the service areas associated with two medical facilities on the Mississippi gulf coast. The estimates presented here show that Katrina had a substantial demographic impact and that this translated into an adverse impact on the client base of both medical facilities. Although the results come from a single case study, they suggest that the effects of a disaster can have substantial impacts on medical care providers and their ability to continue business that goes well beyond physical damage. That is, the impact of demographic effects of a disaster on a client base can be more important than physical damage—a fact that does not appears to be widely recognized. The first step in effectively dealing with a disaster is the presence of a plan. It is typical of organizations to have both "disaster recovery" plans and "business continuation" plans. Given the long-term effects of Katrina on client populations found in this case study, it would be prudent that medical care providers include estimates of demographic impacts on their client populations in these plans, particularly in regard to the long-term "effects horizon" of a given disaster.

Thoreson, Siri, Arnfinn Tonnessen, Camilla Vibe Lindgaard, Anne Lie Andreassen, and Lars Weisaeth. 2009. Stressful but rewarding: Norwegian personnel mobilized for the 2004 tsunami disaster. ***Disasters*** **33 (3): 353-368.**
Adequate responses to disasters and emergency situations rely, among other factors, on coping abilities in disaster workers and emergency personnel. In this study, different aspects of disaster-related stressors and training/experience were investigated in Norwegian personnel (n=581) mobilized for the 2004 Indian Ocean tsunami disaster. The level of stress reactions, measured nine to ten months after the tsunami, was relatively low in this sample, indicating that the personnel coped well with the challenges of the disaster. The level of intrusive memories was higher in disaster-area personnel (n=335) than in home-base personnel (n=246). Stress reactions were significantly associated with witnessing experiences (disaster-area group) and with having to reject victims in need of help (both groups). Specific preparation for the mission was associated with a lower level of stress reactions in disaster-area personnel. Such factors may be considered in training and preparation programs for disaster workers.

Uscher-Pines, Lori, Corey L. Farrell, Steven M. Babin, Jacqueline Cattani, Charlotte A. Gaydos, Yu-Hsiang Hsieh, Michael D. Moskal, and Richard E. Rothman. 2009. Framework for the development of response protocols for public health syndromic surveillance systems: Case studies of eight U.S. states. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S29-S36.**

This research describes current syndromic surveillance system response protocols in health departments from eight different states in the United States and develops a framework for health departments to use as a guide in initial design and enhancement of response protocols. Case study design incorporates in-depth interviews with health department staff, textual analysis of response plans, and a Delphi survey of syndromic surveillance response experts. All eight states and 30 of the 33 eligible health departments agreed to participate (91% response rate). Fewer than half (48%) of surveyed health departments had a written response protocol, and health departments reported conducting in-depth investigations on fewer than 15 percent of syndromic surveillance alerts. A panel of experts identified 32 essential elements for inclusion in public health protocols for response to syndromic surveillance system alerts. Because of the lack of guidance, limited resources for development of response protocols, and few examples of syndromic surveillance detecting previously unknown events of public health significance, health departments have not prioritized the development and refinement of response protocols. Systems alone, however, are not effective without an organized public health response. The framework proposed here can guide health departments in creating protocols that will be standardized, tested, and relevant given their goals with such systems.

Watson, Patricia J., and Josef I. Ruzek. 2009. Academic/state/federal collaborations and the improvement of practices in disaster mental health services and evaluation. ***Administration and Policy in Mental Health and Mental Health Services Research*** **36 (3): 215-220.**

Academic, state, and federal agencies collaborated over the last nine years to improve disaster mental health services and evaluation. This process, which included literature reviews, a number of expert panels, and case studies, is described. The products resulting from this process have included the development of a systematic cross-site evaluation of the federally funded crisis counseling program and field guides for interventions aimed at providing services to distressed individuals in the immediate aftermath of disasters and to individuals needing resilience skills training weeks or months after the event. Future improvement of disaster mental health services calls for continued research, evaluation, training, and intervention development.

Wein, Lawrence M., and Michael P. Atkinson. 2009. Assessing infection control measures for pandemic influenza. ***Risk Analysis*** **29 (7): 949-962.**

The authors construct a mathematical model of aerosol (i.e., droplet-nuclei) transmission of influenza within a household containing one infected member and embed it into an epidemic households model in which infecteds occasionally infect someone from another household; in a companion paper, they argue that the contribution from contact transmission is trivial for influenza and the contribution from droplet transmission is likely to be small. The model predicts that the key infection control measure is the use of N95 respirators, and that the combination of respirators, humidifiers, and ventilation reduces the threshold parameter (which dictates whether or not an epidemic breaks out) by about 20 percent if 70 percent of households comply, and by about 40 percent if 70 percent of households and workplaces comply (approximately 28% reduction would have been required to control the 1918 pandemic). However, only about 30 percent of the benefits in the household are achieved if these interventions are used only after the infected develops symptoms. It is also important for people to sleep in separate bedrooms throughout the pandemic, space permitting. Surgical masks with a device (e.g., nylon hosiery) to reduce face-seal leakage are a reasonable alternative to N95 respirators if the latter are in short supply.

Ying Yang Chan, Emily. 2009. Why are older peoples' health needs forgotten post-natural disaster relief in developing countries? A healthcare provider survey of 2005 Kashmir, Pakistan earthquake. ***American Journal of Disaster Medicine*** **4 (2): 107-112.**

Although older people may be recognized as a vulnerable group after natural disasters, their particular needs are rarely met by the providers of emergency services. Studies about older people's health needs postdisaster in the South East Asian Tsunami, Kashmir, Pakistan, China and the United States have revealed the lack of concern for older people's health needs. Recent study of older people's health needs after the Kashmir Pakistan earthquake (2005) found their health needs were masked within the general population. This survey examines the provider's perceptions of older people's vulnerabilities after the Kashmir earthquake. It aims to understand the awareness of geriatric issues and issues related to current service provision and planning for older people's health needs after disasters, specifically comparing service delivery patterns among different relief agencies. Cross-sectional, structured stakeholder interviews were conducted within a two-week period in February, 2006, four months after the earthquake in Pakistan-administered Kashmir. Three types of health and medical relief agencies—international nongovernmental organizations, national organizations, and local/community groups—were solicited to participate in the study. A descriptive analysis was conducted. Important issues identified include the need to sensitize relief and health workers about older people's health needs postdisaster, the development of relevant clinical guidelines for chronic disease management postdisaster in developing countries, and the advocacy of building in geriatric-related components in natural disaster medical relief programs. To address the vulnerability of older people, it is important for governments, relief agencies, and local partners to include and address these issues during their relief operations and policy planning.

Zeitz, Kathryn M., Heather M. Tan, M. Grief, P.C. Couns, and Christopher J. Zeitz. 2009. Crowd behavior at mass gatherings: A literature review. ***Prehospital and Disaster Medicine*** **24 (1): 30-31.**

Gaining an understanding of crowd behavior is important in supporting timely and appropriate crowd management principles in the planning and provision of emergency services at mass gatherings. This paper provides a review of the current understanding of the psychological factors of a crowd within the psychosocial domain as they apply to mass gatherings. We conclude there is a large theory-practice gap in relation to crowd psychology and the mass gathering setting. The literature has highlighted two important elements of crowd behavior: there must be a "seed" and people must engage. Understanding these behaviors may provide opportunities to change crowd behavior outcomes.

Risk and Decision Making

Achuthan, Nisha Sahai. 2009. Four years beyond tsunami: Contours of a roadmap for a coordinated "multi-hazard (including tsunami) risk management action plan for tsunami-affected villages in Tamil Nadu": Overview of ongoing/projected initiatives. ***Disaster Prevention and Management*** **18 (3): 249-269.**

This research, undertaken in a June 2005 field trip and updated with online work, looks at the tsunami-affected villages in Tamil Nadu. It provides an overview of discrete, ongoing initiatives by different stakeholders—nongovernmental organizations, government, and UNDP—and the government's plan to have a tsunami early warning system for the Indian Ocean in place by mid-2007, paralleled by a partnership of different stakeholders to launch a pan-India village-info-kiosk movement in July 2005. The first step in the study was to identify existing reports or programs on disaster preparedness and mitigation, and then track the progress of the implementation of initiatives by different stakeholders. While highlighting the need for coordinated action, the author also proposed initiating a pilot project in preselected village-sites, which in turn could be upgraded to make them "multihazard-ready." While the initiatives by different stakeholders were aimed at covering the targeted villages, as per their respective plans, there was as yet little visible attempt to privilege the tsunami-affected villages, as was being done with their recovery efforts. Significantly, there was no mention of the proposed post-tsunami Central Recovery Resource Center (CRRC) at Chennai "to meet the need for a coordinated action by all stakeholders" in the course of the discussions of early June, nor a reference to the potential for such a forum to deliberate on a coordinated multihazard, early warning action plan along the lines highlighted through vertical and horizontal linkages. While the above activities were not part of a grand design conceptualized, implemented, and overseen by an overarching coordinating agency, together they add up to a broad based comprehensive disaster management resource base upon which an agency like the INCOIS in coordination with different stakeholders—possibly under the aegis of the Chennai CRRC—could build up its mandated tsunami multihazard early warning system and its dissemination to the village-level in Tamil Nadu. The paper serves as a "one window resource guide" to provide the contours of a road map pointing to one of ways to go about a risk management plan in a coordinated and focused mode.

Ajami, Sima, and Mahshid Fattahi. 2009. The role of earthquake information management systems (EIMSs) in reducing destruction: A comparative study of Japan, Turkey and Iran. ***Disaster Prevention and Management*** **18 (2): 150-161.**

The most important factor for a manager to be able to overcome a crisis depends on his or her readiness. The main objective of this study was to determine an earthquake information management system (EIMS) in Japan, Turkey and Iran and describe how it can reduce destruction by crisis management. The study was an analytical comparison in which data were collected by questionnaire, observation, and checklist. The subject was the EIMS in selected countries. Sources of information were staff in related organizations, scientific documentation, and the Internet. To analyze the findings, criteria rating technique, Delphi technique, and descriptive methods were used. Findings showed that the EIMSs in Japan, Turkey, and Iran are decentralized. The EIMS is called "Phoenix" in Japan, and "natural disaster management information system" or "AFAYBIS" in Turkey. In Iran there was not a useful and efficient EIMS to evaluate earthquake information. It is clear that an information system can only influence decisions if it is relevant, reliable, and available for the decision-makers in a timely fashion. Therefore, it is necessary to design a model that contains responsible organizations and their functions.

Armas, Iuliana, and Avram Eugen. 2009. Perception of flood risk in Danube Delta, Romania. *Natural Hazards* **50 (1): 269-287.**

For exposed and vulnerable communities, the perception of natural risk is an essential link in the analysis of human-environment coping relationships. It is also an important parameter in the quantification of complex vulnerability as a central predictive variable in the risk equation. This study reveals the conscious and unconscious attitudes towards the flood risk for the inhabitants of the Danube Delta in Romania. These attitudes, defined by different degrees of psychological vulnerability, represent the background for a series of psycho-behavioral patterns that generate certain adjustment mechanisms and strategies. Application of a specially designed questionnaire and the statistical analysis of the results revealed two psychological factors as essential in establishing the psychosocial vulnerability degree of the interviewed subjects: (i) an internal control factor; and (ii) an external control factor. The persons characterized by inner control have a significantly reduced general anxiety level in comparison to individuals with the control factor placed externally. As confidence diminishes, it increases the tendency of the individual to rely on the external factors for support and security. The lack of resources (indicating lower resilience) and mistrust in the support given emphasizes non-adaptive behaviors.

Aven, Terje, and Ortwin Renn. 2009. On risk as an event where the outcome is uncertain. *Journal of Risk Research* 12 (1): 1-11.

In the social sciences, two prevailing definitions of risk are: (1) risk is a situation or event where something of human value (including humans themselves) is at stake and where the outcome is uncertain; or (2) risk is an uncertain consequence of an event or an activity with respect to something that humans value. According to these definitions, risk expresses an ontology (a theory of being) independent of our knowledge and perceptions. This paper looks more closely into these two types of definitions. It concludes they provide a sound foundation for risk research and risk management, but compared to common terminology, they lead to conceptual difficulties that are incompatible with the everyday use of risk in most applications. By considering risk as a state of the world, we cannot conclude, for example, about the risk being high or low, or compare different options with respect to risk. A rephrasing of the two definitions is suggested: Risk refers to uncertainty about, and severity of, the consequences (or outcomes) of an activity with respect to something that humans value.

Baker, Justin, W. Douglass Shaw, David Bell, Sam Brody, Mary Riddel, Richard T. Woodward, and William Neilson. 2009. Explaining subjective risks of hurricanes and the role of risks in intended moving and location choice models. *Natural Hazards Review* 10 (3): 102-112.

Using stated choice survey data, we report on subjects' perceptions of the risks of hurricanes and intended relocation decisions when faced with such risks. All of the subjects were displaced by either Hurricane Katrina or Rita, in New Orleans and other Gulf Coast areas in 2005. Results here suggest that subjective perceptions of risk are quite high as compared to scientific estimates of risk, and relocation decisions revealed from a discrete choice experiment are significantly determined by levels of hurricane strike risks.

Baker, Justin, W. Douglass Shaw, Mary Riddel, and Richard T. Woodward. 2009. Changes in subjective risks of hurricanes as time passes: Analysis of a sample of Katrina evacuees. *Journal of Risk Research* 12 (1): 59-74.

Using a quasi-field experiment, this article reports on subjects' perceptions of the risks of hurricanes. All experimental subjects were displaced by either Hurricane Katrina or Rita, in New Orleans and other Gulf Coast areas, except for a small control group consisting of people who live in central Texas. The authors examined their perceptions of risks just after the hurricanes occurred, and over one year later to evaluate the change in subjective risk perceptions over time. A latent risk model is estimated in which subjective probabilities of hurricane strike risk are represented as a function of respondents' demographic characteristics and experiences following the storms.

Beresford, Anthony, and Stephen Pettit. 2009. Emergency logistics and risk mitigation in Thailand following the Asian tsunami. *International Journal of Risk Assessment and Management* 13 (1): 7-21.

A series of recent natural disasters (earthquakes, floods, droughts) and man-made crises (civil unrest, war, political disturbances) have highlighted the vulnerability of communities to unstable conditions. Reaching displaced people in crisis conditions is heavily dependent on the effectiveness of the supply chain and its management systems. Disaster responses have been modeled into, for example, three stages: preparedness, response, and recovery. In the case of the Asian tsunami, one of the principal weaknesses was the absence of such events from existing government response plans. There was therefore no top-down strategy and no implementation mechanisms on the ground. Whatever communications networks were in place were quickly overwhelmed. They became the subject of a major review in the months following the disaster. This paper highlights the fact that disaster preparedness in the manner suggested by W.N. Carter is shown to be less appropriate than the "soft approach" taken by the Thai government post-tsunami, whereby emphasis is on well-organized local communication networks, early warning systems, and danger mitigation rather than accumulation and management of large scale emergency stocks of, for example, food, tents, and equipment.

Birkland, Thomas A. 2009. Disasters, catastrophes, and policy failure in the homeland security era. *Review of Policy Research* 26 (4): 423-438.

The September 11, 2001, attacks triggered federal policy changes designed to influence emergency management in the United States, even though these attacks did not suggest a need for a wholesale restructuring of federal policy in emergency management. Instead, for several reasons, federal policy's emphasis on terrorism and emergency management significantly degraded the nation's ability to address natural disasters. The federal government sought to create a top-down, command and control model of emergency management that never fully accounted for, positively or normatively, the way local emergency management works in practice. The Obama administration will have to address the questions raised by the reorganization of federal emergency management responsibilities. While the context in which these changes have occurred is unique to the U.S. federal system, there are interesting implications for emergency management in nonfederal systems.

Caponecchia, Carlo. 2009. Strategies to improve the communication of probability information in risk analysis. *International Journal of Risk Assessment and Management* 12 (2/3/4): 380-419.

Difficulties in interpreting probabilities can impede the progress of risk analyses and impair the communication of risk information to stakeholders. This review examines how people have problems in interpreting probability information, leading to several strategies for improved understanding. The inconsistent translation of probability terms to numerical expressions, and the biases that influence their interpretation, highlight the need to improve the communication of probabilities wherever possible. Current probability communication strategies from medicine and behavioral science, such as natural frequencies and systematic ovals, are reviewed. Practical complications presented by large-scale risk

analysis may be solved by conveying key probabilities graphically, providing recurrent guide material throughout documentation, or using stakeholder workshops. While various disciplines can guide the development of improved communication tools for probabilities, research specific to their use in risk management applications needs to be conducted.

Chen, Yi-Ming, Dachrahn Wu, and Cheng-Kuang Wu. 2009. A game theory approach for evaluating terrorist threats and deploying response agents in urban environments. *Journal of Homeland Security and Emergency Management* 6 (1): 27.

The Homeland Security Advisory System lacks specific measures for rational decision making. Mathematical modeling has not been applied to capture the interaction between defender and attacker in terrorist attacks. An efficient emergency response system must determine how and when to alert and advise the critical and appropriate response agents to the danger of terrorist attacks, particularly when available resources are limited in an urban environment. This article proposes a framework for HSAS that incorporates two game theory models designed to advise response agents when raising the threat advisory level. In the first step, the interactive behaviors between the elements or participants of the multi-emergency event and the district response agent are modeled and analyzed as a noncooperative game, after which the terrorist threat value (TTV) is derived from the mixed strategy Nash equilibrium. In the second step, the TTV is used to compute the Shapley value of all district response agents for five different threat levels; a fair allocation of response agents based on the Shapley value creates a minimum set of resource deployment costs. Simulation results show that the emergency manager can use this framework to quantitatively evaluate the terrorist threat to each response agent and easily discover where response agents are most at risk within the five threat levels.

Chryssochoidis, George, Anna Strada, and Athanasios Krystallis. 2009. Public trust in institutions and information sources regarding risk management and communication: Towards integrating extant knowledge. *Journal of Risk Research* 12 (2): 137-185.

This is an integrative review of knowledge on public trust in institutions and information sources regarding risk management and communication. The review is based on 27 empirical studies, and is organized around four groups of trust-related factors. The empirical studies reveal that this field of research suffers from a lack of consistency in conceptualizing "trust." Based on the review, a layering of four different aspects of trust, from more general to more specific, has been designed, reflecting the identified layers of trust-related factors vis-a-vis: (1) sociocultural and individual personality characteristics; (2) perceived attributes of institution or information source; (3) risk aspects; (4) information-specific aspects. This layered conceptualization of trust demonstrates that trust in those managing and communicating risk is a complex phenomenon operative simultaneously in and interplaying across a number of levels.

Clark, Renee M., and Mary E. Besterfield-Sacre. 2009. A new approach to hazardous materials transportation risk analysis: Decision modeling to identify critical variables. *Risk Analysis* 29 (3): 344-354.

The article takes a novel approach to analyzing hazardous materials transportation risk. Previous studies analyzed this risk from an operations research or quantitative risk assessment perspective by minimizing or calculating risk along a transport route. Even though the majority of incidents occur when containers are unloaded, the research has not focused on transportation-related activities, including container loading and unloading. In this work, a decision model of a hazardous materials release during unloading was developed using actual data and an exploratory data modeling approach. Previous studies have had a theoretical perspective in terms of identifying and advancing the key variables related to this risk. There hasn't been a focus on probability- and statistics-based approaches for doing this. This decision model empirically identifies the critical variables using an exploratory methodology for a large, highly categorical database involving latent class analysis, log-linear modeling, and Bayesian networking. The model identified the most influential variables and countermeasures for two consequences of a hazmat incident, dollar loss, and release quantity. It is one of the first models to do this. The most influential variables were found to be related to failure of the container. In addition to analyzing hazmat risk, this methodology can be used to develop data-driven models for strategic decision making in other domains involving risk.

Cobby, D., S. Morris, A. Parkes, and V. Robinson 2009. Groundwater flood risk management: Advances towards meeting the requirements of the EU floods directive. *Journal of Flood Risk Management* 2 (2): 111-119.

Identifying areas that may be susceptible to groundwater flooding through both hazard and risk maps is a requirement of the EU Floods Directive. For groundwater flooding, hazard maps could show flood extent and depth or water level (velocity would not generally be appropriate) with risk maps additionally showing the potential adverse consequences. The EU Floods Directive allows member states to limit groundwater flood maps to floods with a low probability, or extreme events. This paper focuses on feasible techniques, available data and current limitations for producing groundwater flood maps that could meet the requirements of the Floods Directive. In addition, to set mapping in the wider context of groundwater flood risk management, advances in data collection and flood warning are also reviewed. Specifically, determining the likelihood and the likely depth of groundwater flooding will be particular challenges where further work will have to build on the advances already made.

Considine, Julie, and Belinda Mitchell. 2009. Chemical, biological and radiological incidents: Preparedness and perceptions of emergency nurses. *Disasters* 33 (3): 482-497.

Despite their important role in chemical, biologi-

cal, and radiological (CBR) incident response, little is known about emergency nurses' perceptions of these events. The study explores emergency nurses' perceptions of CBR incidents and factors that may influence their capacity to respond. Sixty-four nurses from a metropolitan emergency department took part. The majority were willing to participate in CBR incidents and there was a positive association between willingness to participate and postgraduate qualification in emergency nursing. Willingness decreased, however, with unknown chemical and biological agents. One third of participants reported limitations to using personal protective equipment. Few participants had experience with CBR incidents although 70.3 percent of participants had undergone CBR training. There were significant differences in perceptions of choice to participate and adequacy of training between chemical, biological, and radiological incidents. The study results suggest that emergency nurses are keen to meet the challenge of CBR incident response.

Costa-Font, Joan, Elias Mossialos, and Caroline Rudisill. 2009. Optimism and the perceptions of new risks. ***Journal of Risk Research*** **12 (1): 27-41.**

While many risks, especially new ones, are not objectively quantifiable, individuals still form perceptions of risks using incomplete or unclear evidence about the true nature of those risks. In the case of well-known risks, such as smoking, individuals perceive risks to be smaller for themselves than others, exhibiting "optimism bias." Although existing evidence supports optimism bias occurring in the case of risks about which individuals are familiar, evidence does not yet exist to suggest that optimism bias applies for new risks. This paper addresses this question by examining the gap in perceptions of risks individuals have for themselves versus society and the environment, conceptualized as social and/or environmental optimism biases. The authors draw upon the 2002 UEA-MORI Risk Survey to examine the existence of optimism bias and its effects on risk perceptions and acceptance regarding five science- and technology-related topics: climate change, mobile phones, radioactive waste, genetically modified food, and genetic testing. Findings provide evidence of social and environmental optimism bias following similar patterns and optimism bias appearing greater for those risks bringing sizable benefit to individuals (e.g. mobile phone radiation) rather than those more acutely affecting society or the environment (e.g. GM food or climate change). Social optimism bias is found to reduce risk perceptions for risks that have received large amounts of media attention, namely, climate change and GM food. On the other hand, optimism bias appears to increase risk perceptions about genetic testing.

Cox, Jr., Louis Anthony. 2009. Improving risk-based decision making for terrorism applications. ***Risk Analysis*** **29 (3): 344-354.**

The article takes a novel approach to analyzing hazardous materials transportation risk. Previous studies analyzed this risk from an operations research or quantitative risk assessment perspective by minimizing or calculating risk along a transport route. Even though the majority of incidents occur when containers are unloaded, the research has not focused on transportation-related activities, including container loading and unloading. In this work, a decision model of a hazardous materials release during unloading was developed using actual data and an exploratory data modeling approach. Previous studies have had a theoretical perspective in terms of identifying and advancing the key variables related to this risk. There hasn't been a focus on probability- and statistics-based approaches for doing this. This decision model empirically identifies the critical variables using an exploratory methodology for a large, highly categorical database involving latent class analysis, log-linear modeling, and Bayesian networking. The model identified the most influential variables and countermeasures for two consequences of a hazmat incident, dollar loss, and release quantity. It is one of the first models to do this. The most influential variables were found to be related to failure of the container. In addition to analyzing hazmat risk, this methodology can be used to develop data-driven models for strategic decision making in other domains involving risk.

Crona, Beatrice I., Patrik Ronnback, Narriman Jiddawi, Jacob Ochiewo, Sam Maghimbi , and Bandeira Saloma o. 2009. Murky water: Analyzing risk perception and stakeholder vulnerability related to sewage impacts in mangroves of East Africa. ***Global Environmental Change*** **18 (2): 227-239.**

Coastal cities in East Africa are growing rapidly. Consequently there is a rapid increase in urban sewage production, putting added pressure on already strained treatment systems. As a result, peri-urban mangroves are receiving extensive amounts of sewage but very little is known about the ecological and societal consequences of this. However, UNEP among others advocates the use of low-cost, natural sewage treatment technology whenever possible. Mangroves have been suggested as useful second stage biofilters. Because of the high resource dependency in many peri-urban coastal communities in East Africa, it is imperative to investigate potential societal impacts on local communities using sewage impacted mangroves. This paper characterizes stakeholder groups currently affected by sewage impacted mangroves and also maps vulnerabilities across local users in relation to future initiatives to use mangroves as biofilters along the East African coast. As risk perception is an important part of vulnerability, and risk perception related to sewage and pollution in an African setting has been little studied, the study also contributes baseline data on risk perception related to pollution across peri-urban populations in Kenya, Tanzania and Mozambique.

de Oliveira Mendes, Jose Manuel. 2009. Social vulnerability indexes as planning tools: Beyond the preparedness paradigm. ***Journal of Risk Research*** **12 (1): 43-58.**

This article draws from the experience of the ongoing drafting of the Regional Plan of the Centre Region of Portugal, and the empirical application of the Social Vulnerability Index proposed by Susan Cutter. It consists in the construction of an index of social vulnerability to natural and technological hazards and to social risks for all the municipalities of the region. Methodologically,

it extends the vulnerability analysis to technological hazards and social risks, as a more encompassing view is necessary for the elaboration of prevention and civil protection policies. The results confirm the interactive nature of social vulnerability, and they also reflect the diffuse urbanization and industrialization patterns that characterize Portugal. The scattered nature of social facilities and security and health infrastructures pose specific challenges to planners concerning risk prevention and mitigation, and the elaboration of effective risk communication strategies adapted to specific hazards and risks in the studied municipalities. The article concludes with some reflections on the need to revise established paradigms of disaster analysis and emphasize the importance of pre-event planning and the social cartography of vulnerable populations for effective prevention and security policies that take into account social inequalities and citizenship rights.

Debels, P., C. Szlafsztein, P. Aldunce, C. Neri, Y. Carvajal, M. Quintero-Angel, M. Bezanilla Celis, A., and D. Martýnez. 2009. IUPA: A tool for the evaluation of the general usefulness of practices for adaptation to climate change and variability. ***Natural Hazards*** **50 (1): 211-233.**

A prototype multipurpose index is proposed for use in the evaluation of practices for adaptation to climate variability and change. The Index of Usefulness of Practices for Adaptation allows the user to assign weights and scores to a set of user-defined evaluation criteria. Individual criterion scores are aggregated into a final index value. Both the final value and the individual parameter scores provide useful information for improved decision making in the context of climate change. An innovative aspect of IUPA is that guidance is given to the user through the inclusion of recommendations on evaluation criteria and criterion-specific weight factors. These have been defined by a panel of experts from the Latin-American and Caribbean Region. Application of the index is demonstrated for an existing adaptation practice from the Coquimbo Region, Chile. The IUPA tool is recommended for use in the evaluation of adaptation practices in their design, implementation, and post-implementation phase. It is practical for a quick first assessment or when limited financial resources are available, making the tool especially useful for practitioners in the developing world. The index is flexible both from the perspective of its construction and use. Additional expert opinions can easily be included in the future versions of the tool.

Enander, Ann, Susanne Hede, and Orjan Lajksjo. 2009. One crisis after another: Municipal experiences of severe storm in the shadow of the tsunami. ***Disaster Prevention and Management*** **18 (2): 137-149.**

The purpose of this paper is to develop a theoretical understanding of experiences of crisis management among municipal leaders. It provides a theoretical model highlighting the complex evaluations underlying managers' decisions and actions in real-life situations. A total of 16 chief officers and three politicians from three different municipalities were interviewed concerning experiences of dealing with a severe storm. Data were analyzed by a grounded theory approach. Data analysis generated a model. Central to the model is an evaluation sphere, which reflects tension between everyday circumstances and crisis needs, between assessments of legislation and practices as a support or hindrance, and assessments of human vulnerability versus coping resources. Manager characteristics, the societal context within which the event occurred, and crisis characteristics all influence this evaluation sphere. Particular stressors include the fact that the leaders themselves were personally affected by the storm, the difficult decisions and assessments that had to be made, the uncertainty of the situation and the timing, soon after the tsunami. Crisis management, decisions and actions can be seen as formed from the evaluation sphere and the influencing factors. The paper has a small sample and limited representativeness so generalizability of the model should be tested in other crisis events. The model can be used as a tool to design exercises and as a guideline for authorities, in providing preparedness and crisis support.

Falconer, R.H., D. Cobby, P. Smyth, G. Astle, J. Dent, and B. Golding. 2009. Pluvial flooding: New approaches in flood warning, mapping and risk management. ***Journal of Flood Risk Management*** **2 (3): 198-208.**

In response to Defra's First Government Response to the Making Space for Water consultation, the feasibility study into expanding flood warning to cover other flood risks has investigated the technical feasibility of providing warning services for sources of flooding other than from rivers and the sea. Following a review of all nonfluvial and noncoastal sources of flooding perceived as significant, it was concluded that it is currently technically feasible to consider providing some form of warning service for pluvial and three forms of groundwater flooding. Although a warning service for pluvial flooding is considered less advanced than that for groundwater, a trigger rainfall forecast and a method for identifying locations most susceptible to pluvial flooding has been proposed. This form of service could provide responding organizations with more warning of possible flooding than is currently available.

Faulkner, Hilary, Bonita L. McFarlane, and Tara K. Mcgee. 2009. Comparison of homeowner response to wildfire risk among towns with and without wildfire management. ***Environmental Hazards Human and Policy Dimensions*** **8 (1):38-51.**

Few studies have examined the relationship between wildfire and management by government agencies and homeowner wildfire risk mitigation. The goal of this paper is to compare perception of the wildfire risk, attribution of responsibility for mitigation, awareness of wildfire and mitigation, and adoption of wildfire mitigation activities among homeowners in towns where wildfire management activities have been completed by government (management group) and towns where no activities have been completed (no management group). Data were collected by mail survey of homeowners in six communities in Alberta, Canada, during 2007. Results showed that those in the management group expressed higher levels of perceived risk and greater

awareness of wildfire and mitigation that those in the no management, but they did not attribute greater responsibility for mitigation to the homeowner nor complete more mitigation activities on their properties.

Fuchs, Sven, Karl Spachinger, Wolfgang Dorner, Juliette Rochman, and Kamal Serrhini. 2009. Evaluating cartographic design in flood risk mapping. ***Environmental Hazards Human and Policy Dimensions*** **8 (1): 52-70.**
In order to mitigate flood hazards and to minimize associated losses, technical protection measures have been supplemented by non-technical mitigation, i.e. land use planning activities. This is commonly done by creating maps which indicate areas by different cartographic symbols, such as color, size, shape and typography. Hazard and risk mapping is the accepted procedure when dealing with natural hazards and is therefore required in the European Member States in order to meet demands of the European Flood Risk Directive. However, available information is sparse concerning the impact of such maps on different stakeholders, i.e. specialists in flood risk management, politicians, and affected citizens. The lack of information stems from a traditional approach to map production which does not take into account specific end-user mechanisms originating from different perception patterns. Different sets of small of small-scale as well as large-scale risk maps were tested with different groups of subjects in order to: (1) study reading behavior as well as understanding; and (2) deduce the most attractive components that are essential for target-oriented communication of cartographic information. Eye tracking was applied using a video-oculography technique. This resulted in a map template which fulfills the requirement to serve as an efficient communication tool for specialist and practitioners in hazard and risk mapping as well as for laypersons. Taking the results of this study will enable public authorities who are responsible for flood mitigation to: (1) improve their flood risk maps; (2) enhance flood risk awareness; and (3) create more disaster-resilient communities.

Gadomski, Adam Maria. 2009. Human organization socio-cognitive vulnerability: The TOGA meta-theory approach to the modeling methodology. ***International Journal of Critical Infastructures*** **5 (1/2): 120-155.**
The paper deals with the methodological approach to the identification of the sources of socio-cognitive vulnerability. The main attention is on large complex organizations whose mission is emergency and high-risk management. The paper gives a preliminary demonstration of how a systemic, unified, computational methodological approach enables the redefinition and structuring of a complex problem involving ill-defined human, organizational, and cultural factors into the form of computational models. The systemic socio-cognitive paradigms and the framework of the Top-down Object-based Goal-oriented Approach (TOGA) meta-theory have been presented and applied as a meta-ontological platform, basic formalization, and goal-oriented knowledge-ordering tool. In the case of human-caused threats and organizational crises, the methodology can be applied and used for the modeling of ill-defined vulnerabilities of human networks on individual, inter-organizational, and intraorganizational decision levels. It rigorously applies such key concepts as information, preferences, knowledge, and their recursive Information, Preferences, Knowledge (IPK) architecture. Some top modeling results related to the recent major natural and technological disasters illustrate the application of this approach.

Ghafory-Ashtiany, Mohsen. 2009. View of Islam on earthquakes, human vitality and disaster. ***Disaster Prevention and Management*** **18 (3): 218-232.**
The purpose of this paper is to increase public participation in reducing growing disaster risk in developing countries by making optimum benefit from the richness of Islamic teaching toward developing an effective and scientifically sound risk communication and education plan that blends with historical traditions, religious beliefs, and indigenous knowledge. The paper presents the correlation between the guiding principle of earthquake risk reduction and the views of Islam on disaster, earthquake, God's bounty, the earth, good deeds, human behavior, safety, and vitality in order to clear existing misconceptions. It shows the issues of environment protection, risk management, safety, and human life in terms of religious teaching. The dissemination of this type of knowledge has helped to clear the misconceptions and increase people's understanding of and knowledge about disaster-related issues as a necessary step in the process of disaster risk reduction and improving safety and development, all of which can be viewed as demonstrations of God's love for humankind. It is the first time that this correlation between religion and risk reduction has been explained in a paper, and it is expected to open the road for research and discussion on this topic.

Hansen, Katil Fred. 2009. Approaching doomsday: How SARS was presented in the Norwegian media. ***Journal of Risk Research*** **12 (3-7): 345-360.**
This article reviews why SARS received so much media attention in Norway, beginning with descriptions of the dynamics and dilemmas faced in health risk communication from the point of view of medical experts and generalist journalists. How the Norwegian media covered SARS is then described and analyzed in relation to these risk communication dynamics and dilemmas. Based on the description and short analysis, connotations of the main narratives in the different phases of the SARS outbreak are then discussed. In the conclusion, the nature of SARS itself is used to explain the enormous exposure it received and the massive fear it created in Norway compared to the meager medical damages it produced there.

Harvey, G.L., C.R. Thome, X. Cheng, Evans E.P., S Han, J.D. Simm, and Y. Wang. 2009. Qualitative analysis of future flood risk in the Taihu Basin, China. ***Journal of Flood Risk Management*** **2 (2): 85-100.**
This paper presents the results of a qualitative analysis of future flood risk in the Taihu Basin, China, performed using an adaptation of the UK Foresight Future Flooding approach. Drivers of increased flood risk

were identified and ranked according to their importance in contributing to future flooding by experts and stakeholders working within an inclusive, participatory framework. Management responses to increasing flood risk were also identified and assessed in terms, first, of their potential to reduce flood risks and, second, their sustainability. This analysis provides the foundation for quantitative flood risk modeling to be performed in the next phase of the project. It has also added value to flood risk management in the Taihu Basin by bringing stakeholders together to develop a shared understanding of the flooding system and the relative importance of multiple flood risk drivers and responses. Together, the qualitative and quantitative analyses will provide a comprehensive vision of possible future flood risk to inform policy development and decision making.

Hassel, Henrik, Henrik Tehler, and Marcus Abrahamsson. 2009. Evaluating the seriousness of disasters: An empirical study of preferences. *International Journal of Emergency Management* 6 (1): 33-54.
In making societal decisions concerning hazards with potentially disastrous consequences, it is important to have sound knowledge of how people evaluate the seriousness of disasters. In this study, a group of students evaluated the seriousness of disasters in terms of four basic attributes (and their ranges): number of fatalities (0-1000), number of serious injuries (0-4000), economic loss (SEK 0-40 billion), and cause of the disaster (natural, accidental, terrorism). Attribute weights were elicited by two separate methods, which taken together provide insight into the uncertainty of the elicited weights. Most participants regarded the attributes related to physical harm (especially the number of fatalities) as most serious, a finding that must be seen in relation to the ranges of the attributes. In addition, the cause of a disaster also affected many of the participants' judgments of its seriousness. This paper's findings are of value to societal decision making, particularly in the case of small to medium-sized projects in which specific elicitations of stakeholders' values are rarely made.

Howie, Luke. 2009. A role for business in the war on terror. *Disaster Prevention and Management* 18 (2): 100-107.
This paper presents research findings that improve our understanding of the role for business in the "War on Terror." It should assist managers in preparing their response to terrorism and the threat it poses to their business. It is not about examining counter-terrorism commodities or products. Rather, it examines management attitudes and techniques for creating images of security that work to reduce the risk of terrorism. Since research on terrorism and business is rare and often underdeveloped, this study contributes to our understanding of how businesses must confront and respond to terrorism. A brief exploration of the literature informs the research that was carried out in Melbourne, Australia, in 2005 with managers in organizations located in Melbourne's central business district. It comprised in-depth interviews of 40-60 minutes in length. In total, 12 managers were interviewed. Two key respondents emerged and their views are presented in this paper. The author argues that managers are compelled to engage in counterterrorism in order to protect customers, clients, and the public. Yet counter-terrorism security is often not what it seems. When businesses are engaged in countering terrorism they are engaged in creating images of security.

Hung, Hung-Chih. 2009. The attitudes towards flood insurance purchase when respondents' preferences are uncertain: A fuzzy approach. *Journal of Risk Research* 12 (2): 239-258.
Individuals may have difficulty in determining whether or not to buy insurance against low-probability, high-loss events. This ambivalence would cause preference uncertainty and decrease homeowners' interest in voluntarily buying insurance. This paper incorporated fuzzy set theory into contingent valuation analysis to examine the determinants of attitude towards buying flood insurance under preference uncertainty. The results show that the perceived levels of flood risk, experience with flood, disposable income, as well as house conditions, are influential factors in the decision-making process for insurance purchase. However, both the estimated price and income elasticities are low for flood insurance purchase. It is worth noting that governments' artificial structures provide a disincentive for buying insurance, although respondents perceived or/and are exposed to a high level of flood risk. The findings also show that the spread of fuzzy willingness to pay regions is wide, resulting from respondents' high uncertainty on their value judgment of insurance. This indicates that preference uncertainty and conservatism rule are the key factors that cause respondents to tend to reject buying insurance.

Johnstone, W.M., and B.J. Lence. 2009. Assessing the value of mitigation strategies in reducing the impacts of rapid onset, catastrophic floods. *Journal of Flood Risk Management* 2 (3): 209-221.
Communities worldwide face dangers from floods induced by natural events or technical failures. These vulnerabilities are increasing because of continued settlement along coastlines, and floodplains, and are further exacerbated by climate change. Flood losses can be mitigated via structural and nonstructural (or community based) means. Risk analysis can be undertaken on behalf of different stakeholders including: policy makers or regulatory bodies; asset owners; the local community; and individuals who live, work, or recreate in the hazard impact zones. While methods exist for assessing risks associated with water impoundment and control structures, less effort has been devoted to developing methods that assess the merits of community-based preparation and response activities such as evacuation and sheltering in place. There is a need to identify the best approaches for undertaking assessments of proposed plans, and to explore opportunities for adapting existing models to provide these capabilities. This paper posits the challenge of assessing nonstructural approaches in the context of existing risk analysis methods, proposes direction for developing new methods of analysis, and then demonstrates the application of the proposed methods in support of planning for tsunami hazards along the Pacific coast of North America.

Kallenberg, Kristian. 2009. Corporate risk management of chemicals: A stakeholder approach to the brominated flame retardants. *Journal of Risk Research* 12 (1): 75-89.
The prerequisites for chemicals risk management within the corporate sphere have changed over the last decade. This change has been driven by a number of factors such as an increased use of the precautionary principle, the reversed burden of proof, and an increased focus on environmental and sustainable development initiatives in the European Union, among member states, and elsewhere. In Sweden, this development has been pronounced. The objectives of the present study are to: (1) explore the opinions within Swedish industry concerning items related to chemicals risk assessment and regulation; and (2) to identify and rank various stakeholders and factors perceived to have affected the companies' risk management strategies of the brominated flame retardants. The results were somewhat contradictory and indicated that the sampled companies favored precautionary measures, while they at the same time favored scientific EU risk assessments over national regulation. Furthermore, contrary to industry opinions elsewhere, they were favorably inclined to the increased burden of proof, to the novel REACH Directive, and to the Swedish government's objective of a nontoxic environment. Regarding the BFRs, the companies' risk management strategies were believed to have been mostly influenced by (1) internal policies and guidelines regarding sustainable development and corporate social responsibilities, (2) the application of the precautionary principle, (3) EU directives/risk assessments, (4) the Swedish Chemicals Agency and Swedish research, and (5) public relations and marketing considerations. Overall, the study indicated that the sampled companies displayed some inconsistencies regarding preferred approaches to regulating and managing risk. In a somewhat tentative manner, the paper ends with a discussion of possible explanations for these inconsistencies.

Khan, Sinan, and Anke Richter. 2009. Using decision analysis to select alternate modes of dispensing: An example from Los Angeles County Public Health. *Journal of Emergency Management* 7 (2): 39-51.
To comply with the Center for Disease Control's mass prophylaxis mandates, many public health jurisdictions must supplement their existing Point of Dispensing-based system. Because of limited budgets and personnel availability, only one or two alternatives out of the many potential options can be implemented. Multicriteria decision analysis is a powerful tool that allows public health officials to assess the relative effectiveness of alternate modes of dispensing while incorporating the opinions of their multidisciplinary emergency response planning teams.This process was used to analyze the effectiveness of alternate modes of dispensing that could supplement the existing POD system within the Los Angeles County Department of Public Health. The top two options for were prepositioning for civil service, and partnership with a major health maintenance organization. These choices were stable under a variety of sensitivity analyses, and the differences in opinion between the agencies and other stakeholders do not change them. The transparency of the model and analysis may allow decision makers and planners in the DPH to garner support for their alternate modes of dispensing plans. By making the decision criteria clear and demonstrating the robustness of the results in the sensitivity analyses, public health partners gain a deeper understanding of the issues and their potential roles. The process can be repeated by any jurisdiction, but definition of "best" will rely on the issues and gaps that are identified with the jurisdiction's POD plan for mass prophylaxis.

Kuhar, Sara E., Kate Nierenberg, Barbara Kirkpatrick, and Graham A. Tobin. 2009. Public perceptions of Florida red tide risks. *Risk Analysis* 29 (7): 963-969.
This research integrates theoretical frameworks of risk perception, social amplification of risk, and the role of place-specific contexts in order to explore the various perceptions surrounding Florida red tides. Florida red tides are naturally occurring events that are increasing in frequency, duration, and severity. This has implications for public health, the local economy, and ecosystem health. While many of the negative impacts of Florida red tides are not easily controlled, some of the secondary impacts may be mitigated through individuals' responses. However, public perception and consequent reactions to Florida red tides have not been investigated. This research uses questionnaire surveys and semi-structured interviews, to explore the various perceptions of the risk. Surveys and interviews were conducted along two Florida west coast beaches. The results indicate that the underlying foundations of the social amplification of the risk framework are applicable to understanding how individuals form perceptions of risk relative to red tide events. There are key differences between the spatial locations of individuals and corresponding perceptions, indicating that place-specific contexts are essential to understanding how individuals receive and interpret risk information. The results also suggest that individuals may be lacking efficient and up-to-date information about Florida red tides and their impacts because of inconsistent public outreach. Overall, social and spatial factors appear to influence whether individuals amplify or attenuate the risks associated with Florida red tides.

Kulig, Judith C., Dana Edge, William Reimer, Ivan Townshend, and Nancy Lightfoot. 2009. Levels of risk: Perspectives from the Lost Creek Fire. *Australian Journal of Emergency Management* 24 (2): 33-39.
Risk has been considered as the probability of experiencing adverse events. Understanding risk and vulnerability is essential to disaster management and recovery. Through qualitative interviews in a community that experienced a wildfire, "at-risk" and "feeling at-risk" themes were identified for both the individuals and community in this study. Internal and external circumstances along with varying levels of dependence influenced the reports of risk. Individual and community risk during a major wildfire is discussed in order to explain links to community resiliency. Such understandings can aid in the development of appropriate measures to reduce short- and long-term impacts from natural disasters.

Lee, Jennifer E. C., and Louise Lemyre. 2009. A social-cognitive perspective of terrorism risk perception and individual response in Canada. *Risk Analysis* 29 (9): 1265-1280.
The volume of research on terrorism has increased since the events of September 11, 2001. However, efforts to develop a contextualized model incorporating cognitive, social context, and affective factors as predictors of individual responses to this threat have been limited. Therefore, the aim of this study was to evaluate hypotheses drawn from such a model that was generated from a series of interviews with members of the Canadian public. Data of a national survey on perceived chemical, biological, radiological, nuclear, and explosives terrorism threat and preparedness were analyzed. Results demonstrated that worry and behavioral responses to terrorism, such as individual preparedness, information seeking, and avoidance behaviors, were each a function of cognitive and social-contextual factors. As an affective response, worry about terrorism independently contributed to the prediction of behavioral responses above and beyond cognitive and social-contextual factors, and partially mediated the relationships of some of these factors with behavioral responses. Perceived coping efficacy emerged as the cognitive factor associated with the most favorable response to terrorism. Hence, findings highlight the importance of fostering a sense of coping efficacy to the effectiveness of strategies aimed at improving individual preparedness for terrorism.

Li, Hua, George E. Apostolakis, Joseph Gifun, William VanSchalkwyk, Susan Leite, and David Barber. 2009. Ranking the risks from multiple hazards in a small community. *Risk Analysis* 29 (3): 438-456.
Natural hazards, human-induced accidents, and malicious acts have caused great losses and disruptions to society. After September 11, 2001, critical infrastructure protection has become a national focus in the United States and is likely to remain one for the foreseeable future. Damage to the infrastructures and assets could be mitigated through pre-disaster planning and actions. A systematic methodology was developed to assess and rank the risks from these multiple hazards in a community of 20,000 people. It is an interdisciplinary study that includes probabilistic risk assessment, decision analysis, and expert judgment. Scenarios are constructed to show how the initiating events evolve into undesirable consequences. A value tree, based on multi-attribute utility theory, is used to capture the decision maker's preferences about the impacts on the infrastructures and other assets. The risks from random failures are ranked according to their expected performance index, which is the product of frequency, probabilities, and consequences of a scenario. Risks from malicious acts are ranked according to their PI, since the frequency of attack is not available. A deliberative process is used to capture the factors that could not be addressed in the analysis and to scrutinize the results. This methodology provides a framework for the development of a risk-informed decision strategy. Although this study uses the Massachusetts Institute of Technology campus as a case study, it is a general methodology that could be used by other similar communities and municipalities.

Liao, Qiuya, Wendy Wing Tak Lam, Chao Qiang Jiang, Yuk Yi Ho, Ella, Min Liu, Yi, Wei Sen Zhang, and Richard Fielding. 2009. Avian influenza risk perception and live poultry purchase in Guangzhou, China, 2006. *Risk Analysis* 29 (3): 416-424.
Human H5N1 highly pathogenic avian influenza (HPAI) infection is associated with intimate exposure to live poultry. Perceptions of risk can modify behaviors, influencing actual exposure. However, greater hazard is not necessarily followed by perception of greater risk and more precautionary behavior because self-serving cognitive biases modulate precautionary and hazardous behaviors. This article examines risk perception associated with avian influenza. A total of 1,550 face-to-face, within-household interviews, and 1,760 telephone interviews were derived to study avian influenza risk perception and live poultry use in Guangzhou and Hong Kong, respectively. Chi-square and Mann-Whitney tests assessed bivariate associations and risk distributions, respectively, and fully adjusted multivariate logistic models determined independent risk associations. Relative to Hong Kong, perceived "generalized" risk from buying live poultry and perceived self/family risk from buying were higher in Guangzhou. Higher perceived "generalized" risk was associated with not buying live poultry, consistent with the pattern seen in Hong Kong, while perceived higher self/family risk was associated with buying; no such association was seen in Hong Kong. Multivariate adjustment indicated older age was associated with buying live poultry in Guangzhou. Guangzhou respondents perceived greater risk relative to Hong Kong. Buying live poultry was associated with perceptions of less "generalized" risk but more self/family risk. Higher generalized risk was associated with fewer live poultry purchases, suggesting generalized risk may be a useful indicator of precautionary HPAI risk behavior.

Lindell, Michael K., Sudha Arlikatti, and Carla S. Prater. 2009. Why people do what they do to protect against earthquake risk: Perceptions of hazard adjustment attributes. *Risk Analysis* 29 (8): 1072-1088.
This study examined respondents' self-reported adoption of 16 hazard adjustments (preimpact actions to reduce danger to persons and property), their perceptions of those adjustments' attributes, and the correlations of those perceived attributes with respondents' demographic characteristics. The sample comprised 561 randomly selected residents from three cities in Southern California prone to high seismic risk and three cities from Western Washington prone to moderate seismic risks. The results show that the hazard adjustment perceptions were defined by hazard-related attributes and resource-related attributes. More significantly, the respondents had a significant degree of consensus in their ratings of those attributes and used them to differentiate among the hazard adjustments, as indicated by statistically significant differences among the hazard adjustment profiles. Finally, there were many significant correlations between respondents' demographic characteristics and the perceived characteristics of hazard adjustments, but there were few consistent patterns among these correlations.

Mancebo, Francois, and Imak Renda-Tanali. 2009. Towards an integrated policy of risk management: A critical analysis of Turkey and France. ***International Journal of Emergency Management*** **6 (1): 99-115.**

This paper discusses the background and issues surrounding Turkish disaster management policy. It also discusses the French experience and provides comparative analysis and direction for future policy issues concerning both countries. French hazard risk management policies have evolved as a result of European Union land use, environmental, and industrial safety directives. Consistent with Turkey's efforts to join the EU, Turkish policy makers should consider French hazard risk management procedures and incorporate them to the degree that they apply to Turkey's complex hazard management issues. In free societies, the development of long-term strategies for creating sustainable urban environments requires political will and a buy-in from the citizens. Current and future steps that are being taken towards integrating the Turkish society with the EU should include rehabilitation of the emergency management process. The French system, as presented in this paper, is based on principles of risk management that place as much emphasis on the front end (predisaster) as on the back end (postdisaster). Turkey should adopt this philosophy. However, the French system cannot be adopted wholesale without proper analysis that addresses the underlying societal, economic, and cultural context of the Turkish system.

Meyerson, Frederick A.B., Laura A. Meyerson, and James K. Reaser. 2009. Biosecurity from the ecologist's perspective: Developing a more comprehensive approach. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 147-160.**

National planning for biological security should encompass more than just protection against biological weapons. Global forces such as the introduction and spread of invasive species (including emerging infectious diseases), in conjunction with population growth, climate change and sea level rise, also constitute threats to security. These linked biological and abiotic phenomena make the United States and other countries less secure by degrading ecosystems and ecosystem services, posting risks to human health and safety, and altering patterns of agriculture, settlement, migration, and economic opportunity. Several other countries already use a more comprehensive definition of biosecurity than the United States, one that includes biological threats to the environment, the economy, and human health and well-being. This article asserts that an expanded definition of biosecurity is necessary in a world undergoing rapid change due to altered climate, growing population and increased rates of trade, transport, and travel.

Nicas, Mark, and Rachael M. Jones. 2009. Relative contributions of four exposure pathways to influenza infection risk. ***Risk Analysis*** **29 (9): 1292-1303.**

The relative contribution of four influenza virus exposure pathways—(1) virus-contaminated hand contact with facial membranes, (2) inhalation of respirable cough particles, (3) inhalation of inspirable cough particles, and (4) spray of cough droplets onto facial membranes—must be quantified to determine the potential efficacy of nonpharmaceutical interventions of transmission. The authors used a mathematical model to estimate the relative contributions of the four pathways to infection risk in the context of a person attending a bed-ridden family member ill with influenza. Considering the uncertainties in the sparse human subject influenza dose-response data, they assumed alternative ratios of 3,200:1 and 1:1 for the infectivity of inhaled respirable virus to intranasally instilled virus. For the 3,200:1 ratio, pathways (1), (2), and (4) contribute substantially to influenza risk. At a virus saliva concentration of 106 mL.1, pathways (1), (2), (3), and (4) contribute, respectively, 31 percent, 17 percent, 0.5 percent, and 52 percent of the infection risk. With increasing virus concentrations, pathway (2) increases in importance, while pathway (4) decreases in importance. In contrast, for the 1:1 infectivity ratio, pathway (1) is the most important overall: at a virus saliva concentration of 106 mL.1, pathways (1), (2), (3), and (4) contribute, respectively, 93 percent, 0.037 percent, 3.3 percent, and 3.7 percent of the infection risk. With increasing virus concentrations, pathway (3) increases in importance, while pathway (4) decreases in importance. Given the sparse knowledge concerning influenza dose and infectivity via different exposure pathways, nonpharmaceutical interventions for influenza should simultaneously address potential exposure via hand contact to the face, inhalation, and droplet spray.

Nirupama, Niru, and David Etkin. 2009. Emergency managers in Ontario: An exploratory study of their perspectives. ***Journal of Homeland Security and Emergency Management*** **6 (1): ePub.**

Creating effective disaster and emergency management programs can be an enormously challenging task because of the many difficulties and barriers that present themselves to people and institutions working in this field. The present study addresses two main concerns: (1) what barriers exist within Canadian society to effective disaster risk reduction from the perspective of the emergency management community; and (2) what barriers exist within the Canadian emergency management community to effective disaster risk reduction, both from a cultural and institutional perspective. The authors conducted interviews with emergency management professionals from the public and private sectors as well as some nongovernmental organizations in order to ascertain their opinions and perspectives with respect to these questions. The results have been analyzed and discussed in this paper.

Nja, Ove, and Elvind L. Rake. 2009. A discussion of decision making applied in incident command. ***International Journal of Emergency Management*** **6 (1): 55-72.**

Rescuers respond to unique emergency situations. Decision making on the scene of an accident is context bound, embedded in ever-changing environments. Thus, decisions in action sometimes involve huge uncertainty. This paper discusses decision making as part of incident management, as presented in the research literature. Two main theoretical perspectives on decision making in crises are compared. The "naturalistic decision making" and "contingent decision path" perspectives show

the similarities and difference in on-scene crisis decision making. In the light of prevailing crisis management research the authors conclude that the researcher faces several challenges. Assumptions about experiences, situation awareness, cognitive reasoning, and the reconstruction of on-scene behavior are not easily retrieved. There is a need to develop a better understanding of decision making in crisis settings.

Poston Jr., Dudley L., Li Zhang, David J. Gotcher, and Yuan Gu. 2009. The effect of climate on migration: United States, 1995–2000. ***Social Science Research*** **38 (3): 743-753.**
This paper examines the effect of climate on migration. It examines whether climate is an influential factor in internal migration. The authors assume that most persons tend to avoid exposure to bitter and cold winters, and excessively hot and humid summers, preferring climates between these extremes. When engaging in migration decision making, therefore, to the extent possible, considerations involving climate are believed to be brought into the calculus. There is a very limited demographic literature on the effects of climate on migration. This paper undertakes an aggregate-based analysis of the effect of climate on migration. It examines this relationship among the 50 states of the United States, focusing attention on the varying effects of climate on three migration measures for the 1995–2000 time period, namely, in-migration, out-migration, and net migration. It also evaluates the effect of climate on migration in the context of a broad application of human ecology. Here climate, a manifestation of the physical environment, is measured with three major independent variables. The other ecological predictors pertaining to organization, population, technology, and the social environment are used as controls. This allows the author to examine the effects of climate on migration in the context of competing ecological hypotheses.

Powers, John R. 2009. An alternative approach to disaster relief. ***Journal of Homeland Security and Emergency Management*** **6 (1): 1-7.**
There is an alternative to the federal role in disaster relief as specified in the Disaster Relief Act (PL 93-288 as amended). This alternative would be infinitely more effective in reducing the costs of disasters and would be much fairer to the taxpayers. As the Federal Emergency Management Agency regional director in Chicago during the 1993 Mississippi floods, the author's mitigation division director groused over the fact that many of the same people in the lines were there after the previous floods. While FEMA shouldn't tell people where to live, they shouldn't come to the agency for money when they get hit by a predictable disaster without the necessary insurance. The requirements for making this alternative a reality are threefold: (a) Set actuarially correct premiums for individuals, municipalities and states based on the risk—an outline for how the Federal government can build a risk model is discussed; (b) have the Federal government serve as the "reinsurer" for losses that exceed those projected by its model—an approach is provided; and (c) change the legislation and insist that the Congress not bail out people who didn't get the insurance or otherwise reduce their risk by moving out of the high risk area. The point of this approach is to force individuals, municipalities and states to stop doing dumb things and accept responsibility for their decisions. The benefits to the tax payers who are subsidizing these bad decisions would be huge.

Schipper, E. Lisa F. 2009. Meeting at the crossroads? Exploring the linkages between climate change adaptation and disaster risk reduction. ***Climate and Development*** **1 (1): 16-30.**
Adaptation to climate change and disaster risk reduction both focus on society-risk dynamics. However, each field does so through different actors and institutions, and with different time horizons, policy frameworks, and patterns in mind. Recently, dialogue between the adaptation and disaster risk-reduction communities has focused on creating stronger links between the two by putting greater effort into learning from each other and collaborating conceptually and practically. In part, this common interest has come from a simultaneous recognition that risk reduction requires a far more holistic approach than has previously been applied. Both adaptation and disaster risk reduction require the same underlying aims, namely, to reduce vulnerability and create sustainable and flexible long-term strategies to reduce the risk of adverse impacts. However, neither is able to address these single-handedly. In both adaptation and disaster risk reduction, there is an implicit acknowledgement that risk is part of everyday life, and thus social development plays a vital role. An outstanding question for these communities to address is whether a convergence of the two tracks is desirable. If such a convergence were to occur, what forms would it take and what outcomes could be expected?

Schoennagela, Tania, Cara R. Nelson, David M. Theobald, Gunnar C. Carnwath, and Teresa B. Chapman. 2009. Implementation of National Fire Plan treatments near the wildland-urban interface in the western United States. ***Proceedings of the National Academy of Sciences (Early Edition):*** **e-Pub.**
Because of increasing concern about the effects of catastrophic wildland fires throughout the western United States, federal land managers have been engaged in efforts to restore historical fire behavior and mitigate wildfire risk. During the last five years (2004-2008), 44,000 fuels treatments were implemented across the western United States under the National Fire Plan. The authors assessed the extent to which these treatments were conducted in and near the wildland-urban interface, where they would have the greatest potential to reduce fire risk in neighboring homes and communities. Although federal policies stipulate that significant resources should be invested in the WUI, researchers found that only three percent of the area treated was within the WUI, and another eight percent was in an additional 2.5-km buffer around the WUI, totaling 11 percent. Only 17 percent of this buffered WUI is under federal ownership, which significantly limits the ability of federal agencies to implement fire-risk reduction treatments near communities. Although treatments far from the WUI may have some fire mitigation benefits, the findings suggest that greater priority must be given

to locating treatments in and near the WUI, rather than in more remote settings, to satisfy NFP goals of reducing fire risk to communities. However, this may require shifting management and policy emphasis from public to private lands.

Singh, Ashish Kumar. 2009. Causes of slope instability in the Himalayas. *Disaster Prevention and Management* 18 (3): 283-298.
Landslides occur frequently and without any appreciable warning, often causing insurmountable damage to life and property. Despite the uncertainties, causative factors and indicators of slope instability are well known. The magnitude of these events, susceptible areas, the timing, and their potential impact can be analyzed on the basis of past occurrences and existing knowledge to mitigate their impact. This paper generates a better systematic and scientific understanding of the reasons behind slope instability to help develop the basic principles of landslide hazard zonation, monitoring, and forecasting. Based on extensive field observations and intensive reviews of literature from secondary sources, the paper presents valuable insights into the basic reasons behind a landslide. The results should increase awareness, educate, and sensitize people toward effective landslide hazard mitigation, thereby ensuring people's participation in disaster management. It also aims to encourage research in the field of landslide management. The real value of the study is to minimize losses due to landslides through better understanding of the phenomenon and its management by avoiding those things that could lead to slope instability problems.

Tadesse Deressa, Temesgen, Rashid M. Hassan, Claudial Ringler, Tekie Alemu, and Mahmud Yesuf. 2009. Determinants of farmers' choice of adaptation methods to climate change in the Nile Basin of Ethiopia. *Global Environmental Change* 18 (2): 248-255.
This study identifies the major methods used by farmers to adapt to climate change in the Nile Basin of Ethiopia, the factors that affect their choice of method, and the barriers to adaptation. The methods identified include use of different crop varieties, tree planting, soil conservation, early and late planting, and irrigation. Results from the discrete choice model employed indicate that the level of education, gender, age, and wealth of the head of household; access to extension and credit; information on climate, social capital, agroecological settings, and temperature all influence farmers' choices. The main barriers include lack of information on adaptation methods and financial constraints.

Talas, Risto, and David A. Menachof. 2009. The efficient trade-off between security and cost for sea ports: A conceptual model. *International Journal of Risk Assessment and Management* 13 (1): 46-59.

Terpstra, Teun, Michael K. Lindell, and Jan M. Gutteling. 2009. Does communicating (flood) risk affect (flood) risk perceptions? Results of a quasi-experimental study. *Risk Analysis* 29 (8): 1141-1155.
People's risk perceptions are generally regarded as an important determinant of their decisions to adjust to natural hazards. However, few studies have evaluated how risk communication programs affect these risk perceptions. This study evaluates the effects of a small-scale flood risk communication program in the Netherlands, consisting of workshops and focus group discussions. The effects on the workshop participants' (n=24) and focus group participants' (n=16) flood risk perceptions were evaluated in a pretest-posttest control group (n=40) design that focused on two mechanisms of attitude change, direct personal experience, and attitude polarization. We expected that (H1) workshop participants would show greater shifts in their flood risk perceptions compared with control group participants and that (H2) focus groups would rather produce the conditions for attitude polarization (shifts toward more extreme attitudinal positions after group discussion). However, the results provide only modest support for these hypotheses, perhaps because of a mismatch between the sessions' contents and the risk perception measures. An important contribution of this study is that it examined risk perception data by both conventional tests of the mean differences and tests for attitude polarization. Moreover, the possibility that attitude polarization could cause people to confirm their preexisting (hazard) beliefs could have important implications for risk communication.

Tinker, Tim L., and Gerald E. Galloway. 2009. How to communicate flood risks effectively. *Journal of Business Continuity and Emergency Planning* 3 (3): 193-200.
Communicating flood risk is a complex endeavor with multiple perspectives, approaches, and components. Each flood risk situation is unique, with numerous variables—the geographic proximity of involved parties, the type and extent of exposure, potential risks, possible actions and others. While business continuity and emergency response teams understand their technical and operational role in responding to flood hazards, many continue to struggle with their risk communication capabilities. This situation risks leaving key audiences in a precarious environment when better understanding of this communication effort could prevent ineffective and potentially damaging media and public responses. There is therefore a need, as well as an opportunity, to communicate about flood risk in a way that informs without frightening, educates without provoking alarm, and moves people to act. The seven principles described in this paper offer some first steps in ensuring that communication strategies are proven, evidence-based, and can motivate policy action and change on a public and private level. Their application will result in an informed, involved and collaborative public.

Tunstall, S., S. McCarthy, and H. Faulkner. 2009. Flood risk management and planning policy in a time of policy transition: The case of the Wapshott Road Planning Inquiry, Surrey, England. *Journal of Flood Risk Management* 2 (3): 159-160.
This paper focuses on an English case study example of decision making on development and flood risk. It was carried out through qualitative document analysis and 13 in-depth interviews with flood risk profession-

als and others in the Lower Thames Valley. It illustrates the recent shift in policy in England from flood defense to a flood risk management approach with an increased emphasis on spatial planning and development control. It shows that decision makers take time to come to terms with new government policy. Despite the more prescriptive government guidance on development and flood risk in Planning Policy Guidance 25 and later documents, there remains scope for disagreements, for example, over what constitutes "safe" development in flood risk areas. Other sustainability objectives can still weigh heavily against flood risk in local decision making. The potential contributions of modeling, and new visualization techniques in the flood risk management and planning context are considered.

Visschers , Vivianne H. M., Ree M. Meertens, Wim W.F. Passchier, and Nanne N.K. de Vries. 2009. Probability information in risk communication: A review of the research literature. *Risk Analysis* 29 (2): 267-287.
Communicating probability information about risks to the public is more difficult than might be expected. Many studies have examined this subject, so that their resulting recommendations are scattered over various publications, diverse research fields, and are about different presentation formats. An integration of empirical findings in one review would be useful therefore to describe the evidence base for communication about probability information and to present the recommendations that can be made so far. The authors categorized the studies in the following presentation formats: frequencies, percentages, base rates and proportions, absolute and relative risk reduction, cumulative probabilities, verbal probability information, numerical versus verbal probability information, graphs, and risk ladders. They suggest several recommendations for these formats. Based on the results of the review, they show that the effects of presentation format depend not only on the type of format, but also on the context in which the format is used. The authors therefore argue that the presentation format has the strongest effect when the receiver processes probability information heuristically instead of systematically. The article argues that future research and risk communication practitioners should not only concentrate on the presentation format of the probability information but also on the situation in which this message is presented, as this may predict how people process the information and how this may influence their interpretation of the risk.

Vogel, Coleen. 2009. Business and climate change: Initial explorations in South Africa. *Climate and Development* 1 (1): 82-97.
Climate change is one of a complex array of risks facing the planet and society. It is argued that adaptation to and mitigation of climate change will be required to avert or reduce adverse impacts. Governments are developing climate change adaptation (CCA) strategies. The business community is also seeing to the need to adapt to and mitigate climate change, but progress has been slow, particularly in the case of adaptation. This paper explores emerging perceptions of the need for adaptation and some initial adaptation actions within a "business as usual" economic mode of operation. It also identifies constraints to further action among a cross-section of actors in the business community in South Africa. Data from semi-structured interviews and scrutiny of reports reveals that there are a number of constraints preventing business from engaging more fully in CCA. These findings correspond with findings in other business sector and CCA studies. They include: issues of terminology (adaptation versus risk management); uncertainty over climate change projections and scenarios; and concerns about how such information can be used effectively in decision making, particularly long-term business planning. Despite these challenges, some potential synergies between policy, planning, and the business community for promoting adaptation are suggested.

Wein, Lawrence M., and Michael P. Atkinson. 2009. Assessing infection control measures for pandemic influenza. *Risk Analysis* 29 (7): 949-962.
The authors construct a mathematical model of aerosol (i.e., droplet-nuclei) transmission of influenza within a household containing one infected member and embed it into an epidemic households model in which infecteds occasionally infect someone from another household; in a companion paper, they argue that the contribution from contact transmission is trivial for influenza and the contribution from droplet transmission is likely to be small. The model predicts that the key infection control measure is the use of N95 respirators, and that the combination of respirators, humidifiers, and ventilation reduces the threshold parameter (which dictates whether or not an epidemic breaks out) by about 20 percent if 70 percent of households comply, and by about 40 percent if 70 percent of households and workplaces comply (approximately 28% reduction would have been required to control the 1918 pandemic). However, only about 30 percent of the benefits in the household are achieved if these interventions are used only after the infected develops symptoms. It is also important for people to sleep in separate bedrooms throughout the pandemic, space permitting. Surgical masks with a device (e.g., nylon hosiery) to reduce face-seal leakage are a reasonable alternative to N95 respirators if the latter are in short supply.

Wester, Misse. 2009. Cause and consequences of crises: How perception can influence communication. *Journal of Contingencies and Crisis Management* 17 (2): 118-125.
This article focuses on how different events that cause a crisis are perceived by communication officers. The aim of this paper is to investigate how the attribution of whatever has caused a crisis affects how the crisis is perceived and how this in turn affects communication efforts. Previous research indicates that people will respond differently to risks depending on the cause of the risk, even though the consequence is the same. If individuals react to a crisis differently depending on what caused it, is that also true for crisis professionals and if so, does this influence the planning and execution of crisis communication? This article presents the results from an empirical investigation of crisis communicators in Sweden. The results reveal that there are differences

within this group of professionals when they are presented with crises due to different causes. The possible implications this might have for crisis communication are discussed.

Yanhong, H.Jin, Bruce A. McCarl, and Levan Elbakidze. 2009. Risk assessment and mangement of animal disease-related biosecurity. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 186-203.**
Animal agriculture is vulnerable to both intentional and unintentional biological threats. Outbreaks, especially intentional attacks, could cause enormous consequences extending well beyond agriculture. Nations, including the United States, are consolidating and coordinating efforts to protect against these biological threats. The efforts employed largely fall into the categories of ex ante prevention/preparedness and ex post response/recovery. The optimal mix across these strategies depends on the event probability, expected economic consequences, costs and effectiveness of strategies, and disease spread rates along with other factors. This article reviews the literature discussing vulnerability and mitigation strategies and issues of relevance to agricultural analyses. These recommendations address: (1) what categories of mitigation strategies are likely to be most effective; (2) what implementation obstacles exist and how these implementation challenges could be managed or overcome; and (3) what leverages can be done on technology, scientific advancement, and education.

Ying Liu, Jun, and Sui Pheng Low. 2009. Developing an organizational learning-based model for risk management in Chinese construction firms: A research agenda. ***Disaster Prevention and Management*** **18 (2): 170-186.**
The features of construction projects, characterized by their transient nature, multiple players, and strong dependency on local natural and human environment, highlight the difficulties of risk management in construction firms. This is particularly crucial when a construction firm ventures overseas where the risk exposure is high. However, it is unclear how Chinese construction firms would behave organizationally, or if they have adopted appropriate risk management best practices, especially when they operate outside of mainland China. It is also unclear if such firms have formally documented risk management lessons for the purpose of organizational learning to share both success and failure so that similar mistakes can be avoided in the future. This paper primarily aims to establish a conceptual framework linking organizational learning with risk management, focusing on the organizational behavior of Chinese construction firms when they operate both in mainland China and overseas. The research agenda proposes the use of questionnaire surveys and in-depth case studies of Chinese contractors with operations both in mainland China and Singapore. An outcome of the study is the formulation of a research agenda that will eventually lead to the development of a knowledge-based decision support system linking organizational behavior with risk management for supporting organizational learning in Chinese construction firms. The outcomes of the research agenda can help Chinese contractors gain "sustainable competitive advantage" against contractors from other developed countries in the global market. This is possibly the first ever study to correlate organizational behavior, technical, organizational, project and external risks, CQ-SET, and mitigate, accept, avoid, or transfer within the context of Chinese construction firms operating both in mainland China and the overseas market of Singapore. As part of the research agenda, theories of organizational behavior and risk management would also be applied to the empirical findings to draw inferences.

Zhong, Ying, and Sui Pheng Low. 2009. Managing crisis response communication in construction projects from a complexity perspective. ***Disaster Prevention and Management*** **18 (3): 270-282.**
The number of crisis incidents and their severity is rising along with the growing complexity of technology and society. There are innumerable incidents that can interrupt progress in construction projects. The crisis response phase puts the project organization's established normal communication systems and processes under enormous additional pressure. This paper is links and extends the knowledge of complexity theory on communication management in the context of the crisis response. This paper proposes a conceptual framework for understanding the underlying pattern of communication behavior and decisions of human systems in response to a crisis. It also investigates how to enhance the organization's adaptability and resilience in the event of a crisis. The paper reviews, proposes, and refines a conceptual complexity-informed framework for effective crisis response communication management. Conventional crisis response communication models and management are grounded on the linear, command-and-control principles of "scientific management." They are limited in describing flexible reactions to the changing circumstances and explaining the dynamic and complex crisis response situations. This paper proposes an alternative model for crisis response communication based on complexity theory. The conceptual model suggests that while the behavior of these complex systems cannot be predicted, all the parts nevertheless self-organize, learn, and adapt to their dynamically changing environment. In terms of this proposed conceptual framework, a flexible and adaptive management approach for the construction project manager to communicate and respond quickly and effectively in the midst of a crisis is suggested.

Technological Hazards

Agrinier, Nelly, Artus Albessard, Valerie Schwoebel, Eloi Diene, and Thierry Lang. 2009. Direct assistance to victims in rescue operations as a risk factor for post-tramatic stress disorder in police officers: The experience of the Toulouse disaster in 2001. ***Journal of Emergency Management*** **7 (3): 59-67.**
The aim of this study was to describe the prevalence of symptoms consistent with post-traumatic stress disorder (S-PTSD) in police personnel involved in rescue operations after the AZF chemical plant explosion in Toulouse, France, on September 21, 2001, and the relationship between S-PTSD and the type of rescue

operations. A cross-sectional survey was performed, using a mailed questionnaire. Six hundred and thirty-five out of 1,500 rescue operations police officers participated in the study. All were involved with the explosion site after the after the event. The outcome variable was the presence of S-PTSD. The explanatory variables were the level of exposure during the rescue tasks. Logistics regression was used to calculate the adjusted odds ratios (OR). The prevalence of S-PTSD among policemen was 4.1 percent [95% CI: 2.1-6.2]. Policemen who had immediate health consequences (OR 4.6; [95% CI: 1.3-16.4]) and those who provide medical assistance to the victims (OR 5.7; [95% CI: 1.6-20.2]) had a higher prevalence of S-PTSD. Providing medical assistance to the victims was a major risk factor of S-PTSD for police officers. Training police officers to take part in medical activities at the time of the disaster might lead to a reduction of SPTSD incidence in this group.

Al-Damkhi, Ali Mohamed, Sabah Ahmed Abdul-Wahab, and Nabeel Mohamed Al-Khulaifi. 2009. Kuwait's 1991 environmental tragedy: Lessons learned. ***Disaster Prevention and Management*** **18 (3): 233-248.**

Iraq's invasion of Kuwait on August 2, 1990 precipitated an ecological tragedy in the Arabian Gulf region. During the course of the invasion Kuwait suffered severe damage to both its oil industry and its ecology. The scale was enormous, ranging from oil fires and spills to the economic deterioration of Kuwait's oil industry. This paper focuses on the lessons learned from Kuwait's oil well catastrophe in hope of preventing, or at least minimizing, future such human-caused disasters. The paper reviews and analyzes Kuwait's oil well tragedy in terms of its scope, logistical services provided to cope with the disaster, the techniques used in firefighting operations, and related political issues. The paper also discusses the need to review existing environmental laws and the concept of environmental crime in light of this catastrophe. There are many important lessons that can be drawn from this disaster, the most important of which is to ensure that dictators in the future never believe they can destroy the environment without severe repercussions from the international community. The conflagrations in Kuwait demonstrate the dangerous consequences of large-scale modern combat in an environmentally fragile area. All oil-producing nations, especially the Gulf countries, are vulnerable to this type of environmental and economic disaster. Kuwait's tragedy highlights the need for immediate consideration of possible similar disasters in the future and how the global community will deal with them. The high cost of environmental degradation only gets more expensive when left unattended. The price is paid not only in hard currency but in damage to the public's health and in other environmental problems. This paper shows that sustainable development is impossible in the presence of wars and terrorist activities.

Calixto, Eduardo, and Emilio Lebre La Rovere. 2009. Using network methodology to define emergency response team location: The Brazilian refinery case study. ***International Journal of Emergency Management*** **6 (1): 85-97.**

The main objective of this study is to define an emergency response team's location in a specific area based on the risk of refinery plants. The Center of Gravity and Hakini network methodologies are both used to define the team's location in a network based on index values and distance between locations. These methodologies are different with respect to one basic concept concerning the possibility of defining critical locations in the network. The two methodologies will be implemented and the results will be assessed. A sensitivity analysis will be carried out, looking at specific elements such as alternative routes and population dislocation in case of accidents. Furthermore, the real historical data and usual data used in Brazil for hazardous events will be assessed to check the influence on the final results. A third methodology, the Monte Carlo simulation, will be carried out to check the emergency team's availability, safety reliability and number of expected unwanted events to support the final decisions and verify if the best location takes some influence in emergency attendance efficiency. The refinery case study will be carried out to define emergency response team location in a Brazilian refinery.

Clark, Renee M., and Mary E. Besterfield-Sacre. 2009. A new approach to hazardous materials transportation risk analysis: Decision modeling to identify critical variables. ***Risk Analysis*** **29 (3): 344-354.**

The article takes a novel approach to analyzing hazardous materials transportation risk. Previous studies analyzed this risk from an operations research or quantitative risk assessment perspective by minimizing or calculating risk along a transport route. Even though the majority of incidents occur when containers are unloaded, the research has not focused on transportation-related activities, including container loading and unloading. In this work, a decision model of a hazardous materials release during unloading was developed using actual data and an exploratory data modeling approach. Previous studies have had a theoretical perspective in terms of identifying and advancing the key variables related to this risk. There hasn't been a focus on probability- and statistics-based approaches for doing this. This decision model empirically identifies the critical variables using an exploratory methodology for a large, highly categorical database involving latent class analysis, log-linear modeling, and Bayesian networking. The model identified the most influential variables and countermeasures for two consequences of a hazmat incident, dollar loss, and release quantity. It is one of the first models to do this. The most influential variables were found to be related to failure of the container. In addition to analyzing hazmat risk, this methodology can be used to develop data-driven models for strategic decision making in other domains involving risk.

Cook, Alethia H. 2009. Towards an emergency response report card: Evaluating the response to the I-35W bridge collapse. ***Journal of Homeland Security and Emergency Management*** **6 (1):1-24.**

On August 1, 2007, at about 6:05 p.m., during the height of the evening rush hour, the I-35W Bridge collapsed into the Mississippi. The collapse was unanticipated,

surprising the response community and public alike, robbing them of any warning that would have allowed for the closing of the bridge. Based on the characteristics of the collapse, the response should have been an exceptionally complicated endeavor. However, in spite of the very complicated scene confronting the response community, the response activities have been praised as being very successful. This article examines the literature on emergency response to determine what characteristics are thought to be necessary for success. It then examines the emergency response to the I-35W Bridge collapse based on those criteria. It concludes with an analysis of what failed, met expectations, and really succeeded in the response.

de Oliveira Mendes, Jose Manuel. 2009. Social vulnerability indexes as planning tools: Beyond the preparedness paradigm. ***Journal of Risk Research*** **12 (1): 43-58.**
This article draws from the experience of the ongoing drafting of the Regional Plan of the Centre Region of Portugal, and the empirical application of the Social Vulnerability Index proposed by Susan Cutter. It consists in the construction of an index of social vulnerability to natural and technological hazards and to social risks for all the municipalities of the region. Methodologically, it extends the vulnerability analysis to technological hazards and social risks, as a more encompassing view is necessary for the elaboration of prevention and civil protection policies. The results confirm the interactive nature of social vulnerability, and they also reflect the diffuse urbanization and industrialization patterns that characterize Portugal. The scattered nature of social facilities and security and health infrastructures pose specific challenges to planners concerning risk prevention and mitigation, and the elaboration of effective risk communication strategies adapted to specific hazards and risks in the studied municipalities. The article concludes with some reflections on the need to revise established paradigms of disaster analysis and emphasize the importance of pre-event planning and the social cartography of vulnerable populations for effective prevention and security policies that take into account social inequalities and citizenship rights.

Kallenberg, Kristian. 2009. Corporate risk management of chemicals: A stakeholder approach to the brominated flame retardants. ***Journal of Risk Research*** **12 (1): 75-89.**
The prerequisites for chemicals risk management within the corporate sphere have changed over the last decade. This change has been driven by a number of factors such as an increased use of the precautionary principle, the reversed burden of proof, and an increased focus on environmental and sustainable development initiatives in the European Union, among member states, and elsewhere. In Sweden, this development has been pronounced. The objectives of the present study are to: (1) explore the opinions within Swedish industry concerning items related to chemicals risk assessment and regulation; and (2) to identify and rank various stakeholders and factors perceived to have affected the companies' risk management strategies of the brominated flame retardants. The results were somewhat contradictory and indicated that the sampled companies favored precautionary measures, while they at the same time favored scientific EU risk assessments over national regulation. Furthermore, contrary to industry opinions elsewhere, they were favorably inclined to the increased burden of proof, to the novel REACH Directive, and to the Swedish government's objective of a nontoxic environment. Regarding the BFRs, the companies' risk management strategies were believed to have been mostly influenced by (1) internal policies and guidelines regarding sustainable development and corporate social responsibilities, (2) the application of the precautionary principle, (3) EU directives/risk assessments, (4) the Swedish Chemicals Agency and Swedish research, and (5) public relations and marketing considerations. Overall, the study indicated that the sampled companies displayed some inconsistencies regarding preferred approaches to regulating and managing risk. In a somewhat tentative manner, the paper ends with a discussion of possible explanations for these inconsistencies.

Mian, Saima, and Suzan Bennett. 2009. The Tasman Spirit oil spill: Implications for regulatory change in Pakistan. ***Disasters*** **33 (3): 390-411.**
An oil spill in July 2003 from the tanker Tasman Spirit attracted considerable public and media attention in Pakistan. This paper focuses on the experience of a developing country such as Pakistan in dealing with a major oil spill and its impact on bringing about change in the national regulatory framework. A major outcome has been the ratification of the International Convention on Civil Liability for Oil Pollution Damage 1992, which came into force in March 2006 in Pakistan. The convention provides a compensation mechanism for victims incurring oil pollution damages from maritime casualties involving oil laden ships. Several additional changes are still required to improve the country's ability to cope with marine oil spills. These include the development of a comprehensive domestic regulatory framework, implementation of an effective contingency plan, and capacity building of all relevant agencies.

Rosmuller, Nils. 2009. Accident scenarios for marshalling yards in the Netherlands: Private or public firefighting. ***International Journal of Emergency Management*** **5 (3/4): 284-291.**
Since the introduction of the Seveso and Seveso II directives (1996), many western European countries have had the opportunity to demand that installations processing hazardous materials have a private fire brigade decree. In the Netherlands, based on the Dutch company fire decree, certain companies can be compelled to have a private fire brigade. Hazardous materials are processed at about 40 marshalling yards (belonging to the infraprovider ProRail) and therefore a company fire brigade might be compulsory. In the Rotterdam harbor area, for several years, a (juridical) discussion has been going on between the Rotterdam municipality and ProRail concerning the marshalling yards in this area. In August 2007, this dispute was brought to the highest court for such affairs in the Netherlands, the Administrative Jurisdiction Division of the Council of State. To provide input for this juridical process, an analysis was made for six ProRail marshalling yards, each processing

hazardous materials. The results indicate that accident scenarios involving toxic and flammable substances are possible. Based upon the type, development, and extent of the accidents, some of these credible scenarios determine the fire fighting quality and quantity—the so-called design scenarios. The Council of State related the fire brigade capacity to the credible scenarios and not to the design scenarios. The result is that ProRail might be responsible for organizing and financing private fire brigades at about 40 marshalling yards.

Tuler, Seth, and Thomas Webler. 2009. Stakeholder perspectives about marine oil spill response objectives: A comparative Q study of four regions. *Journal of Contingencies and Crisis Management* 17 (2): 95-107.

Marine oil spills can cause major social, economic, and ecological disruptions. Spill response managers must weigh different options and objectives when deciding what to do. We investigated the ways in which preferences for spill response objectives vary among those who are responsible for oil spill contingency planning and response in Buzzards Bay, Delaware Bay, San Francisco Bay, and Washington state regions. The authors begin this paper with a discussion of the research method used in the study: the Q method. In Buzzards Bay, Delaware Bay, and San Francisco Bay three perspectives were identified in each case. In Washington state, two perspectives were identified. An analysis of the 11 case-specific perspectives reveals that they can be described by four "composite" perspectives that describe how different stakeholders prioritize spill response objectives. These four perspectives are compared on several themes, including the emphasis they placed on mitigating economic impacts, protecting health and safety, mitigating ecological impacts, implementing a coordinated and timely response, addressing the needs and concerns of the affected public/communities, gaining public support for the response, mitigating cultural impacts, and mitigating social nuisance impacts. The implications for spill response planning and spill response evaluation are discussed.

Whitfiled, Stephen C., Eugene A. Rosa, Amy Dan, and Thomas Dietz. 2009. The future of nuclear power: Value orientations and risk perception. *Risk Analysis* 29 (3): 425-437.

Since the turn of the 21st century, there has been a revival of interest in nuclear power. Two decades ago, the expansion of nuclear power in the United States was halted by widespread public opposition as well as rising costs and lower than projected increases in demand for electricity. Can the renewed enthusiasm for nuclear power overcome its history of public resistance that has persisted for decades? This article proposes that attitudes toward nuclear power are a function of perceived risk, and that both attitudes and risk perceptions are a function of values, beliefs, and trust in the institutions that influence nuclear policy. Applying structural equation models to data from a U.S. national survey, the authors find that increased trust in the nuclear governance institutions reduces perceived risk of nuclear power and together higher trust and lower risk perceptions predict positive attitudes toward nuclear power. Trust in environmental institutions and perceived risks from global environmental problems do not predict attitudes toward nuclear power. Values do predict attitudes: individuals with traditional values have greater support for, while those with altruistic values have greater opposition to, nuclear power. Nuclear attitudes do not vary by gender, age, education, income, or political orientation, though non-whites are more supportive than whites. These findings are consistent with, and provide an explanation for, a long series of public opinion polls showing public ambivalence toward nuclear power that persists even in the face of renewed interest for nuclear power in policy circles.

Widener, Patricia. 2009. Oil tourism: Disasters and destinations in Ecuador and the Philippines. *Sociological Inquiry* 79 (3): 266-288.

This article examines the links between the petroleum and tourism industries by analyzing how an oil disaster, whether actual or perceived, may attract nature-based tourism interests. To better understand the role of communities, local governments, and the media in establishing links between the petroleum and tourism industries, this article explores how the construction of an oil pipeline in Ecuador and an oil spill in the Philippines created opportunities for tourism. Each case contributes to our understanding of how an oil disaster supports nature-based tourism and how both industries supply a resource or an experience to non-local consumers, while converging to alter local communities, economies, and ecosystems. Indeed, tourism investments following a disaster may become a sideshow to the disaster that shifts attention from the disaster to participation in new economic opportunities. In addition, tourism may represent ecological alterations, which are more subtle, yet as damaging, as an oil disaster. The proposed model is then applied to two additional cases, the Exxon Valdez oil spill and Hurricane Katrina, to test its use in understanding other postdisaster developments.

Tornado

Schmidlin, Thomas W. 2009. Human fatalities from wind-related tree failures in the United States, 1995–2007. *Natural Hazards* 50 (1): 13-25.

There were 407 deaths from wind-related tree failures in the United States between 1995 and 2007. The most common cause of the deadly fallen tree was a thunderstorm (41%), followed by nonconvective high winds (35%), tropical cyclones (14%), tornadoes (7%), and snow and ice (3%). Most (62%) of the deaths were males while the median age was 44 years. The most common location of the fatality was in a vehicle struck by the tree or a vehicle that crashed into a downed tree on the road (44%), followed by persons outdoors (38%), in mobile homes (9%), and in frame houses (9%). Persons killed by wind-related tree failures during tropical cyclones and tornadoes were more commonly at home (40%) when struck than those killed at home by thunderstorm and nonconvective high winds (13%). Seasonality of the deaths varied by weather type with deaths in thunderstorms clustered during May–August, nonconvective high winds October–April, tropical cyclones August–

October, tornadoes in April and November, and snow and ice December–April. Regional patterns result from frequency of the wind events, population density, and tree cover. Suggestions are made for hazard reductions.

Tsunami

Achuthan, Nisha Sahai. 2009. Four years beyond tsunami: Contours of a roadmap for a coordinated "multi-hazard (including tsunami) risk management action plan for tsunami-affected villages in Tamil Nadu": Overview of ongoing/projected initiatives. ***Disaster Prevention and Management*** **18 (3): 249-269.**

This research, undertaken in a June 2005 field trip and updated with online work, looks at the tsunami-affected villages in Tamil Nadu. It provides an overview of discrete, ongoing initiatives by different stakeholders—nongovernmental organizations, government, and UNDP—and the government's plan to have a tsunami early warning system for the Indian Ocean in place by mid-2007, paralleled by a partnership of different stakeholders to launch a pan-India village-info-kiosk movement in July 2005. The first step in the study was to identify existing reports or programs on disaster preparedness and mitigation, and then track the progress of the implementation of initiatives by different stakeholders. While highlighting the need for coordinated action, the author also proposed initiating a pilot project in preselected village-sites, which in turn could be upgraded to make them "multihazard-ready." While the initiatives by different stakeholders were aimed at covering the targeted villages, as per their respective plans, there was as yet little visible attempt to privilege the tsunami-affected villages, as was being done with their recovery efforts. Significantly, there was no mention of the proposed post-tsunami Central Recovery Resource Center (CRRC) at Chennai "to meet the need for a coordinated action by all stakeholders" in the course of the discussions of early June, nor a reference to the potential for such a forum to deliberate on a coordinated multihazard, early warning action plan along the lines highlighted through vertical and horizontal linkages. While the above activities were not part of a grand design conceptualized, implemented, and overseen by an overarching coordinating agency, together they add up to a broad based comprehensive disaster management resource base upon which an agency like the INCOIS in coordination with different stakeholders—possibly under the aegis of the Chennai CRRC—could build up its mandated tsunami multihazard early warning system and its dissemination to the village-level in Tamil Nadu. The paper serves as a "one window resource guide" to provide the contours of a road map pointing to one of ways to go about a risk management plan in a coordinated and focused mode.

Beresford, Anthony, and Stephen Pettit. 2009. Emergency logistics and risk mitigation in Thailand following the Asian tsunami. ***International Journal of Risk Assessment and Management*** **13 (1): 7-21.**

A series of recent natural disasters (earthquakes, floods, droughts) and man-made crises (civil unrest, war, political disturbances) have highlighted the vulnerability of communities to unstable conditions. Reaching displaced people in crisis conditions is heavily dependent on the effectiveness of the supply chain and its management systems. Disaster responses have been modeled into, for example, three stages: preparedness, response, and recovery. In the case of the Asian tsunami, one of the principal weaknesses was the absence of such events from existing government response plans. There was therefore no top-down strategy and no implementation mechanisms on the ground. Whatever communications networks were in place were quickly overwhelmed. They became the subject of a major review in the months following the disaster. This paper highlights the fact that disaster preparedness in the manner suggested by W.N. Carter is shown to be less appropriate than the "soft approach" taken by the Thai government post-tsunami, whereby emphasis is on well-organized local communication networks, early warning systems, and danger mitigation rather than accumulation and management of large scale emergency stocks of, for example, food, tents, and equipment.

Johnstone, W.M., and B.J. Lence. 2009. Assessing the value of mitigation strategies in reducing the impacts of rapid onset, catastrophic floods. ***Journal of Flood Risk Management*** **2 (3): 209-221.**

Communities worldwide face dangers from floods induced by natural events or technical failures. These vulnerabilities are increasing because of continued settlement along coastlines and in floodplains They may be further exacerbated by future climate change. Flood losses can be mitigated via structural and nonstructural (or community based) means. Risk analysis can be undertaken on behalf of different stakeholders including: policy makers or regulatory bodies; asset owners; the local community; and individuals who live, work, or recreate in the hazard impact zones. While methods exist for assessing the risks associated with water impoundment and control structures, less effort has been devoted to developing methods that can assess the merits of community-based preparation and response activities such as evacuation and sheltering in place. There is a need to identify the best approaches for undertaking assessments of proposed plans, and to explore opportunities for adapting existing models to provide these capabilities. This paper posits the challenge of assessing nonstructural approaches in the context of existing risk analysis methods, proposes a possible direction for developing new methods of analysis, and then demonstrates the application of the proposed methods in support of planning for near-field tsunami hazards along the Pacific coast of North America.

Khasalamwa, Sarah. 2009. Is 'build back better' a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. ***Norwegian Journal of Geography*** **63 (1): 73-88.**

Post-crisis situations represent a high level of demanding and complex needs. The longer term goal of recovery should address vulnerabilities to future disasters that are likely to occur with increasing frequency and often in the same places. Post-crisis recovery should not be merely a return to the status quo ante but an attainment of a "new normalcy." "Build back better,"

as advocated by President Bill Clinton after the 2004 tsunami, underlines the need for quality in the recovery efforts. In this paper, recovery is interpreted as addressing the root causes of vulnerability and the pre-existing processes and conditions from which they stem. The paper explores how the narrative "build back better" is perceived by different actors and how these perceptions are manifested in their operational priorities and programs. An attempt is also made to examine the outcomes. This is discussed in relation to the post-tsunami recovery in Sri Lanka, specifically examining the interventions of selected humanitarian organizations visited during the research. The paper argues that despite the engaging mantra "build back better," the tsunami response has not lived up to expectations, nor has it significantly altered the existing structural vulnerabilities.

Kurita, Tetsushi, Makota Ikeda, Koji Suzuki, and Sisira R.N Colombage. 2009. Promotion of community-based disaster reduction activity through hands-on training in Sri Lanka. ***Journal of Natural Disaster Science*** **29 (2): 45-51.**

The number of natural disasters in Sri Lanka has increased over the last two decades. In particular, the Indian Ocean Tsunami had a disastrous impact on communities in Sri Lanka, with 4,330 deaths and 564 persons reported missing (as of April 5, 2005) in Galle District. In order to raise public awareness of various categories of citizens on disaster reduction, the capacity building project at all community levels starting from the grassroots level was carried out in Galle District. The initial process started from the process of trainers' training, the so-called District Workshop, and the outcome made the participants trainers in their localities. They then repeated the same exercise to educate their communities in community workshops. The progress of the project was followed up by Japanese experts. A total of 102 community workshops were held in the immediate phase after the district workshop. The practical session consists of a community-based hazard mapping program. The results were used to identify disaster vulnerable areas in community neighborhoods by the participants.

Nakazato, Hideaki, and Osamu Murao. 2009. Study on regional differences in permanent housing reconstruction process in Sri Lanka after the 2004 Indian Ocean Tsunami. ***Journal of Natural Disaster Science*** **29 (2).**

The Sumatra Tsunami crossed the Indian Ocean on 26th of December 2004 and damaged more than 90,000 houses in Sri Lanka. Following the tsunami, the government decided to provide three types of houses for the victims—temporary shelters, transitional houses, or permanent houses—according to the stage of reconstruction. Most permanent houses were donated by nongovernmental organizations on sites supplied by the government. However, there are regional differences among the affected areas. This paper presents the results of a field survey and interviews in the damaged area in November 2005 and in March 2006 in the period when the permanent houses were under construction. It describes the reconstruction status, regional differences, and problems with regards to the reconstruction process in Sri Lanka.

Ruwanpura, Kanchana N. 2009. Putting houses in place: Rebuilding communities in post-tsunami Sri Lanka. ***Disasters*** **33 (3): 436-456.**

This paper examines the social and political geographies of resettlement and reconstruction of temporary and permanent shelters, which are fundamental to rebuilding tsunami-affected communities. War and ethnic cleavages are an endemic feature of Sri Lanka's social polity, and uneven development processes in the country are clearly visible. This paper draws attention to these inequalities by drawing on in-depth interviews and participant observation carried out in eastern and southern Sri Lanka. It argues that communities' concerns and anxieties regarding displacement and resettlement have tended to be articulated against prevailing fault lines of war and inequality. This is the backdrop against which communities negotiated the recovery process. The author's fieldwork shows that it is critical to understand that disaster and development relief are ingrained within context. Relief efforts therefore need to recognize that the process of "putting houses in place" should be embedded within local social relations.

Takahashi, Makoto, Shigeyoshi Tanaka, Reo Kimura, Masatomo Umitsu, Rokuro Tabuchi, Tatsuaki Kuroda, Mastaka Ando, and Fumiaki Kimata. 2009. Restoration after the Sumatra Earthquake Tsunami in Banda Aceh: Based on the results of interdisciplinary research by Nagoya University. ***Journal of Natural Disaster Science*** **29 (2): 53-61.**

This paper is based on the results of research by the Sumatra Earthquake Interdisciplinary or Integrated Research Team, Graduate School of Environmental Studies, Nagoya University. This research shows: (1) the Sumatra Earthquake tsunami disaster damage in Banda Aceh can be divided into four areas; (2) the tsunami action was directed left and right by the Banda Aceh topography; (3) within which District I saw total destruction of housing, a high death rate, and the collapse of families; (4) with the high death rate due to a lack of earthquake-tsunami association; (5) that even in the core of housing reconstruction, the pace is slow; (6) there are four main obstacles to housing reconstruction; (7) the slow pace of the reconstruction is a function of social causes related to the size of the tsunami, the lack of established adjustment mechanisms for aid groups, the slow pace of the reconstruction in society overall, and the failure of market functions; (8) that in the case of large scale disasters, with the loss of life and home, as well as infrastructure, the collapse of society as an entity occurs as well.

Thoreson, Siri, Arnfinn Tonnessen, Camilla Vibe Lindgaard, Anne Lie Andreassen, and Lars Weisaeth. 2009. Stressful but rewarding: Norwegian personnel mobilized for the 2004 tsunami disaster. ***Disasters*** **33 (3): 353-368.**

Adequate responses to disasters and emergency situations rely, among other factors, on coping abilities in disaster workers and emergency personnel. In this study, different aspects of disaster-related stressors and training/experience were investigated in Norwegian

personnel (n=581) mobilized for the 2004 Indian Ocean tsunami disaster. The level of stress reactions, measured nine to ten months after the tsunami, was relatively low in this sample, indicating that the personnel coped well with the challenges of the disaster. The level of intrusive memories was higher in disaster-area personnel (n=335) than in home-base personnel (n=246). Stress reactions were significantly associated with witnessing experiences (disaster-area group) and with having to reject victims in need of help (both groups). Specific preparation for the mission was associated with a lower level of stress reactions in disaster-area personnel. Such factors may be considered in training and preparation programs for disaster workers.

Tudor Silva, Kalinga. 2009. 'Tsunami third wave' and the politics of disaster management in Sri Lanka. ***Norwegian Journal of Geography*** **63 (1): 61-72.**
The paper compares the social and political consequences of two disasters that struck Sri Lanka 70 years apart, the 1934-1935 malaria epidemic that killed over 100,000 people and the tsunami of December 26, 2004. The main argument is that while the state and civil society responses to the malaria epidemic of 1930s in many ways led to the establishment and development of the Sri Lankan welfare state and the related outcomes—including rapid advances in quality of life particularly in the rural sector—the more elaborate and well-funded tsunami response driven by the international humanitarian industry failed to facilitate speedy recovery, failed to galvanize the peace process, and even added to the vulnerability of some of the affected people due to the rapid exodus of many newly arrived nongovernmental organizations before completing their humanitarian mission. While the relative failure of the tsunami response may be partly attributed to the persistent conflict between the Government of Sri Lanka and the Liberation Tigers of Tamil Eelaam, it also exposes some of the key weaknesses of humanitarian aid in the modern world. A more historically grounded and conflict-sensitive approach is necessary along with greater coordination among agencies involved.

Wickramasinghe, Vasantha, and Shin-ei Takano. 2009. Revival of tourism in Sri Lanka following the December 2004 Indian Ocean Tsunami. ***Journal of Natural Disaster Science*** **29 (2): 83-95.**
Tourism, the fourth largest contributor of Sri Lanka's foreign exchange, was soon brought to halt with the December 2004 Indian Ocean Tsunami. An estimated damage of US$250 million to tourist assets and a loss of over 27,000 livelihoods almost ruined the tourist industry of Sri Lanka. An revival process was executed in two phases—immediate relief phase and rapid recovery phase. The immediate relief phase included provision of reassuring measures for tourist victims and notifying the mass media with the up-to-the-minute tourism situation. The rapid recovery phase was incorporated with a short-term recovery process and long-term rehabilitation and reconstruction process aimed at recapturing tourist interest, and reestablishing the affected tourist communities and the tourist infrastructure respectively. The lack of an a priori disaster management framework and the prevailing security condition of the country impeded the revival process. This paper documents the impact of the December 2004 Indian Ocean Tsunami on tourism in Sri Lanka with a detailed overview of the recovery strategies adopted in the aftermath of the disaster. Furthermore, it assesses the challenges and progress providing guidance to formulate a comprehensive disaster management framework for the tourism sector through the influence of the recovery process.

Wyss, Max, and Marine Zibzibadze. 2009. Delay times of worldwide global earthquake alerts. ***Natural Hazards*** **50 (1): 279-387.**
Quantitative estimates of earthquake losses are needed as soon as possible after an event. A majority of earthquake-prone countries lack the necessary dense seismograph networks, modern communication, and—in some places—the experts to assess losses immediately, so the earliest possible warnings must come from global information and international experts. Earthquakes of interest to us are in most areas of the world M6 or greater. In this article, the authors have analyzed the response time for distributing source parameter estimates from: National Earthquake Information Center of the US Geological Survey, the European Mediterranean Seismological Center, and Geophysical Institute-Russian Academy of Science, Obninsk. In terms of earthquake consequences, the Pacific Tsunami Warning Center issues assessments of the likelihood of tsunamis, the Joint Research Laboratory in Ispra, Italy issues alerts listing sociological aspects of the affected region, and we distribute loss estimates. Recently the USGS has started posting impact assessment information on their PAGER web page. Two years ago, the USGS reduced its median delay of distributing earthquake source parameters by a factor of two to the currently observed 26 minutes, and they distribute information for 99 percent of the events of interest to us. The median delay of EMSC is 41 minutes, with 30 percent of our target events reported. RAS reports after 81 minutes and 30 percent of the target events. The first tsunami assessments by TWC reached us in 18 minutes (median) after large earthquakes in the Pacific area. The median delay of alerts by the JRC is 44 minutes (36 minutes recently). The World Agency for Planetary Monitoring and Earthquake Risk Reduction distributes detailed loss estimates in 41 minutes (median). Moment tensor solutions of the USGS, which can be helpful for refining loss estimates, reach us in 78 minutes (median) for 58 percent of the earthquakes of interest.

Warnings & Evacuation

Achuthan, Nisha Sahai. 2009. Four years beyond tsunami: Contours of a roadmap for a coordinated "multi-hazard (including tsunami) risk management action plan for tsunami-affected villages in Tamil Nadu": Overview of ongoing/projected initiatives. ***Disaster Prevention and Management*** **18 (3): 249-269.**
This research, undertaken in a June 2005 field trip and updated with online work, looks at the tsunami-affected villages in Tamil Nadu. It provides an overview of discrete, ongoing initiatives by different stakeholders—

nongovernmental organizations, government, and UNDP—and the government's plan to have a tsunami early warning system for the Indian Ocean in place by mid-2007, paralleled by a partnership of different stakeholders to launch a pan-India village-info-kiosk movement in July 2005. The first step in the study was to identify existing reports or programs on disaster preparedness and mitigation, and then track the progress of the implementation of initiatives by different stakeholders. While highlighting the need for coordinated action, the author also proposed initiating a pilot project in preselected village-sites, which in turn could be upgraded to make them "multihazard-ready." While the initiatives by different stakeholders were aimed at covering the targeted villages, as per their respective plans, there was as yet little visible attempt to privilege the tsunami-affected villages, as was being done with their recovery efforts. Significantly, there was no mention of the proposed post-tsunami Central Recovery Resource Center (CRRC) at Chennai "to meet the need for a coordinated action by all stakeholders" in the course of the discussions of early June, nor a reference to the potential for such a forum to deliberate on a coordinated multihazard, early warning action plan along the lines highlighted through vertical and horizontal linkages. While the above activities were not part of a grand design conceptualized, implemented, and overseen by an overarching coordinating agency, together they add up to a broad based comprehensive disaster management resource base upon which an agency like the INCOIS in coordination with different stakeholders—possibly under the aegis of the Chennai CRRC—could build up its mandated tsunami multihazard early warning system and its dissemination to the village-level in Tamil Nadu. The paper serves as a "one window resource guide" to provide the contours of a road map pointing to one of ways to go about a risk management plan in a coordinated and focused mode.

Adeola, Francis O. 2009. Katrina cataclysm: Does duration of residency and prior experience affect impacts, evacuation, and adaptation behavior among survivors? ***Environment and Behavior*** **41 (4): 459-489.**
This study explores the extent to which people's prior experience of a natural disaster influenced subsequent behavior concerning the threats of a hydrometeorological disaster and if duration of residency in a disaster-prone landscape affects the extent of preparedness for an impending disaster. Mixed methods research strategies involving survey, field observation, and participant observations at several locations including rescue and evacuation centers in New Orleans, Louisiana, Austin, Texas, and Lawrenceville, Georgia, were used, during the immediate impact phase, emergency shelter phase, and post-impact and recovery phase of the Katrina catastrophe. For the survey, a sample of 598 subjects completed a 15-page, 54-item questionnaire addressing various aspects of the Katrina flood in the New Orleans Metropolitan Area. The qualitative aspect consists of field observations of the event, interviews, and direct comments by the victims dispersed across the South. In the regression analysis performed, prior experience was found to be less important than friends' and family members' influence in determining evacuation behavior. However, duration of residency and prior experience were found to be slightly significant in predicting the odds of evacuation.

Atlas, Ronald M., Richard D. Clover, and W. Paul McKinney. 2009. Enhancing biosecurity through early recognition and reporting of public health risks: Meeting the challenges of the revised international health regulations. ***International Journal of Risk Assessment and Management*** **12 (2/3/4): 280-289.**
The revised international health regulations recognize the importance of shortening the time from a disease outbreak to its detection and notification to the international public health community so that effective responses that enhance global security can be taken. The new international health regulations aim at requiring countries to issue alerts early enough that responses can be initiated in a timely manner. But these regulations represent a real challenge for achieving early detection and translating notification into effective public health actions that reduce the risks of mass casualties from emerging infectious disease and bioterrorism. Coordinated early warning mechanisms to facilitate rapid recognition of a disease outbreak are needed so that an effective response within the medical and public health communities can be initiated. Effective training is essential for early recognition of rare biothreat diseases. Such training must be realistic to achieve an effective response. Responder and system capabilities should be verified periodically through the use of full-scale exercises or virtual drills. Such training and skills are critical for achieving biosecurity.

Burke, Jennifer A., Patric R. Spence, Kenneth A. Lachlan, and Matthew W. Seeger. 2009. Sex and age differences in use and perceptions of emergency messages during Katrina. ***Louisiana Journal of Communication*** **10: 19-33.**
This study investigated the relationship between gender, age, media use, and the perceived adequacy of mediated messages associated with Hurricane Katrina. Surveys were collected from evacuated residents of the New Orleans metropolitan area. Results indicated that men had a better understanding of mediated instructions than women. Differences for age were also found for importance of television and radio messages. As age increased so did the importance of television and radio as a desired medium. These findngs are discussed, along with limitations of the study and suggestions for future research.

Chen, Yi-Ming, Dachrahn Wu, and Cheng-Kuang Wu. 2009. A game theory approach for evaluating terrorist threats and deploying response agents in urban environments. ***Journal of Homeland Security and Emergency Management*** **6 (1): 27.**
The Homeland Security Advisory System lacks specific measures for rational decision making. Mathematical modeling has not been applied to capture the interaction between defender and attacker in terrorist attacks. An efficient emergency response system must determine how and when to alert and advise the critical and appropriate response agents to the danger of terrorist attacks, particularly when available resources are lim-

ited in an urban environment. This article proposes a framework for HSAS that incorporates two game theory models designed to advise response agents when raising the threat advisory level. In the first step, the interactive behaviors between the elements or participants of the multi-emergency event and the district response agent are modeled and analyzed as a noncooperative game, after which the terrorist threat value (TTV) is derived from the mixed strategy Nash equilibrium. In the second step, the TTV is used to compute the Shapley value of all district response agents for five different threat levels; a fair allocation of response agents based on the Shapley value creates a minimum set of resource deployment costs. Simulation results show that the emergency manager can use this framework to quantitatively evaluate the terrorist threat to each response agent and easily discover where response agents are most at risk within the five threat levels.

Falconer, R.H., D. Cobby, P. Smyth, G. Astle, J. Dent, and B. Golding. 2009. Pluvial flooding: New approaches in flood warning, mapping and risk management. ***Journal of Flood Risk Management*** **2 (3): 198-208.**
In response to Defra's First Government Response to the Making Space for Water consultation, the feasibility study into expanding flood warning to cover other flood risks has investigated the technical feasibility of providing warning services for sources of flooding other than from rivers and the sea. Following a review of all nonfluvial and noncoastal sources of flooding perceived as significant, it was concluded that it is currently technically feasible to consider providing some form of warning service for pluvial and three forms of groundwater flooding. Although a warning service for pluvial flooding is considered less advanced than that for groundwater, a trigger rainfall forecast and a method for identifying locations most susceptible to pluvial flooding has been proposed. This form of service could provide responding organizations with more warning of possible flooding than is currently available.

Gittens, Anton, and Boppana V. Chowdary. 2009. A CAD-based feature recognition system for escape route planning. ***Disaster Prevention and Management*** **18 (2): 108-116.**
This paper shows how legacy drawings from various CAD systems may be reused to plan escape routes, rather than creating new drawings for the same purpose. This is useful to those in escape route planning, since the redrawing of plans using custom software is inefficient. It introduces the development of a novel feature recognition system for escape route planning. A computer-aided design (CAD) system is proposed to help to predict the best escape route. The system is based on a feature recognition process, which will scan a CAD drawing to determine the centroid points of corridors, and determine the best escape route with the help of genetic algorithms. The feature recognition system provides a quick method of determining the available pathways for use in escape route planning. The system is limited to perpendicular walls, which should be of the same thickness. Doorways should also be a constant size. Thus the system will be useful in determining where escape routes exist, and attempt to determine the best route based on that information. Factors such as multiple story buildings, number of occupants, or fire spread are not considered. Thus the system will be useful in the initial stages of escape route planning.

Jenkins, J Lee, Edbert B. Hsu, Lauren M. Sauer, Yu-Hsiang Hsieh, and Thomas D. Kirsch. 2009. Prevalence of unmet health care needs and description of health care: Seeking behavior among displaced people after the 2007 California wildfires. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S24-S28.**
The southern California wildfires in autumn 2007 resulted in widespread disruption and one of the largest evacuations in the state's history. This study identifies unmet medical needs and health care-seeking patterns as well as prevalence of acute and chronic disease among displaced people following fires. These data can increase the accuracy, and therefore capacity, of the medical response. A team of emergency physicians, nurses, and epidemiologists conducted surveys of heads of households at shelters and local assistance centers in San Diego and Riverside counties for three days beginning 10 days post-disaster. All households present in shelters on the day of the survey were interviewed, and at the local assistance centers, a two-stage sampling method was used that included selecting a sample size proportionate to the number of registered visits to that site compared with all sites followed by a convenience sampling of people who were not actively being aided by local assistance center personnel. The survey covered demographics; needs following the wildfires (shelter, food, water, and health care); acute health symptoms; chronic health conditions; access to health care; and access to prescription medications. Among the 175 households eligible, 161 (92.0%) participated. Within the 47 households that reported a health care need since evacuation, 13 (27.7%) did not receive care that met their perceived need. Need for prescription medication was reported by 47 (29.2%) households, and 20 (42.6%) of those households did not feel that their need for prescription medication had been met. Mental health needs were reported by 14 (8.7%) households with seven of these (50.0%) reporting unmet needs. At least one family member per household left prescription medications behind during evacuation in 46 households (28.6%), and one family member in 48 households (29.8%) had seen a health care provider since their evacuation. Most people sought care at a clinic (24, 50.0%) or private doctor (11, 22.9%) as opposed to an emergency department (six, 12.5%). A significant portion of the households reported unmet health care needs during the evacuations of the southern California wildfires. The provision of prescription medication and mental health services were the most common unmet need. In addition, postdisaster disease surveillance should include outpatient and community clinics, given that these were the most common treatment centers for the displaced population.

Johnstone, W.M., and B.J. Lence. 2009. Assessing the value of mitigation strategies in reducing the impacts of rapid onset, catastrophic floods. ***Journal of Flood Risk Management*** **2 (3): 209-221.**
Communities worldwide face dangers from floods

induced by natural events or technical failures. These vulnerabilities are increasing because of continued settlement along coastlines and in floodplains They may be further exacerbated by future climate change. Flood losses can be mitigated via structural and nonstructural (or community based) means. Risk analysis can be undertaken on behalf of different stakeholders including: policy makers or regulatory bodies; asset owners; the local community; and individuals who live, work, or recreate in the hazard impact zones. While methods exist for assessing the risks associated with water impoundment and control structures, less effort has been devoted to developing methods that can assess the merits of community-based preparation and response activities such as evacuation and sheltering in place. There is a need to identify the best approaches for undertaking assessments of proposed plans, and to explore opportunities for adapting existing models to provide these capabilities. This paper posits the challenge of assessing nonstructural approaches in the context of existing risk analysis methods, proposes a possible direction for developing new methods of analysis, and then demonstrates the application of the proposed methods in support of planning for near-field tsunami hazards along the Pacific coast of North America.

Keys, C., and M. Cawood. 2009. Identifying and reducing inadequacies in flood warning processes: An Australian perspective. ***Journal of Flood Risk Management*** **2 (3): 190-197.**

Floods are a serious threat to life, property, and infrastructure in Australia. Accordingly there has been a strong focus on the development of flood warning services. These are provided by the Australian Government Bureau of Meteorology in conjunction with emergency management agencies and councils of local government. Often there are performance shortfalls in the provision of warnings of impending floods. Community criticism is common. This paper argues that most of the weaknesses in Australian flood warning practice are "cultural" (that is, pertaining to the ways in which agencies operate) rather than "technical" (resulting from deficiencies in data management or analysis). The paper makes a number of suggestions designed to overcome these deficiencies.

Kirsch, Thomas D., Jennifer Lee Jenkins, Lauren M. Sauer, Yu-Hsiang Hsieh, Emile Calvello, and Edbert Hsu. 2009. Sheltering patterns and utilization following the 2007 southern California wildfires. ***American Journal of Disaster Medicine*** **4 (2): 113-119.**

The 2007 southern California wildfires resulted in over 500,000 residents being displaced. A team from Johns Hopkins University and the American Red Cross surveyed 163 families at shelters and local assistance centers during the disaster. The responses were used to evaluate the needs and movement patterns of a displaced population. The data were also used to determine the risk factors associated with needing sheltering. There is a lower than expected reliance on public shelters, and displaced persons move frequently.

Moynihan, Gary P., Daniel J. Fonseca, Terry Brumback, and Huston Fernandes. 2009. Evacuation decision support system for road incident detection and characterization. ***Journal of Homeland Security and Emergency Management*** **6 (1): 18 pp.**

This research effort focused on the development of an automatic road incident detection and characterization system which will lead to the reduction of nonrecurrent traffic congestion on freeways. An algorithmic methodology was developed for incorporation and enhancement of the existing South Carolina Department of Transportation evacuation analysis system. Analysis of the existing system's input data helped determine the specific model needed. Investigation included a series of traffic analysis algorithms that consider: (1) identification of prevalent traffic flow conditions during a predetermined time window; (2) recognition of incident occurrence; (3) incident characterization; and (4) subsequent routing. The algorithmic methodology initially developed by Sheu was considerably expanded and adapted to the available SCDOT traffic data. This modified approach was then incorporated into a general system design document to establish definitions and descriptions of the proposed enhanced system. This initiative will provide traffic officials with relevant insights and expertise to detect and characterize emergency situations. It represents a significant improvement over the labor-intensive traffic monitoring systems currently used by many state DOTs, which lack automated capabilities for incident detection and characterization.

Paul, Bimal Paul. 2009. Why relatively fewer people died: The case of Bangladesh's Cyclone Sidr. ***Natural Hazards*** **50 (1): 289-304.**

Cyclone Sidr, a Category IV storm, struck the southwestern coast of Bangladesh on November 15, 2007 killing 3,406 people. Despite a similar magnitude, Sidr claimed far fewer lives than Cyclone Gorky, also a Category IV storm, which struck Bangladesh in 1991, causing an estimated 140,000 fatalities. The relatively low number of deaths experienced with Sidr is widely considered the result of the Bangladesh government's efforts to provide timely cyclone forecasting and early warnings, and successful evacuation of coastal residents from the projected path of Cyclone Sidr. Using information collected from both primary and secondary sources, this study identified several other reasons for the unexpectedly lower mortality associated with Cyclone Sidr relative to Cyclone Gorky. Fewer casualties may be attributed to a number of physical characteristics of Cyclone Sidr, such as duration of the storm and storm surge, landfall time and site, varied coastal ecology, and coastal embankment. This article recommends improvements to the cyclone warning systems, establishment of more public cyclone shelters, and implementation of an education campaign in coastal areas to increase the utilization of public shelters for future cyclone events.

Faulkner, Hilary, Bonita L. McFarlane, and Tara K. Mcgee. 2009. Comparison of homeowner response to wildfire risk among towns with and without wildfire management. ***Environmental Hazards Human and Policy Dimensions*** **8 (1): 38-51.**

Few studies have examined the relationship between wildfire and management by government agencies and homeowner wildfire risk mitigation. The goal of this paper is to compare perception of the wildfire risk, attribution of responsibility for mitigation, awareness of wildfire and mitigation, and adoption of wildfire mitigation activities among homeowners in towns where wildfire management activities have been completed by government (management group) and towns where no activities have been completed (no management group). Data were collected by mail survey of homeowners in six communities in Alberta, Canada, during 2007. Results showed that those in the management group expressed higher levels of perceived risk and greater awareness of wildfire and mitigation that those in the no management, but they did not attribute greater responsibility for mitigation to the homeowner nor complete more mitigation activities on their properties.

Flannigan, Mike D., Meg A. Krawchuk, William J. De Groot, Mike B. Wotton, and Lynn M. Gowman. 2009. Implications of changing climate for global wildland fire. ***International Journal of Wildland Fire*** **18 (5): 483-507.**

Wildland fire is a global phenomenon, a result of interactions among climate, weather, fuels, and people. Our climate is changing rapidly, primarily through the release of greenhouse gases that may have profound and unexpected impacts on global fire activity. The present paper reviews the current understanding of what the future may bring with respect to wildland fire and discusses future options for research and management. To date, research suggests a general increase in area burned and fire occurrence but there is a lot of spatial variability, with some areas of no change or even decreases in area burned and occurrence. Fire seasons are lengthening for temperate and boreal regions and this trend should continue in a warmer world. Future trends of fire severity and intensity are difficult to determine owing to the complex and nonlinear interactions among weather, vegetation, and people. Improved fire data are required, along with continued global studies that dynamically include weather, vegetation, people, and other disturbances. Lastly, we need more research on the role of policy, practices, and human behavior. Most global fire activity is directly attributable to people.

Jenkins, J Lee, Edbert B. Hsu, Lauren M. Sauer, Yu-Hsiang Hsieh, and Thomas D. Kirsch. 2009. Prevalence of unmet health care needs and description of health care: Seeking behavior among displaced people after the 2007 California wildfires. ***Disaster Medicine and Public Health Preparedness*** **3 (Suppl 1): S24-S28.**

The southern California wildfires in autumn 2007 resulted in widespread disruption and one of the largest evacuations in the state's history. This study identifies unmet medical needs and health care-seeking patterns as well as prevalence of acute and chronic disease among displaced people following fires. These data can increase the accuracy, and therefore capacity, of the medical response. A team of emergency physicians, nurses, and epidemiologists conducted surveys of heads of households at shelters and local assistance centers in San Diego and Riverside counties for three days beginning 10 days post-disaster. All households present in shelters on the day of the survey were interviewed, and at the local assistance centers, a two-stage sampling method was used that included selecting a sample size proportionate to the number of registered visits to that site compared with all sites followed by a convenience sampling of people who were not actively being aided by local assistance center personnel. The survey covered demographics; needs following the wildfires (shelter, food, water, and health care); acute health symptoms; chronic health conditions; access to health care; and access to prescription medications. Among the 175 households eligible, 161 (92.0%) participated. Within the 47 households that reported a health care need since evacuation, 13 (27.7%) did not receive care that met their perceived need. Need for prescription medication was reported by 47 (29.2%) households, and 20 (42.6%) of those households did not feel that their need for prescription medication had been met. Mental health needs were reported by 14 (8.7%) households with seven of these (50.0%) reporting unmet needs. At least one family member per household left prescription medications behind during evacuation in 46 households (28.6%), and one family member in 48 households (29.8%) had seen a health care provider since their evacuation. Most people sought care at a clinic (24, 50.0%) or private doctor (11, 22.9%) as opposed to an emergency department (six, 12.5%). A significant portion of the households reported unmet health care needs during the evacuations of the southern California wildfires. The provision of prescription medication and mental health services were the most common unmet need. In addition, postdisaster disease surveillance should include outpatient and community clinics, given that these were the most common treatment centers for the displaced population.

Kirsch, Thomas D., Jennifer Lee Jenkins, Lauren M. Sauer, Yu-Hsiang Hsieh, Emile Calvello, and Edbert Hsu. 2009. Sheltering patterns and utilization following the 2007 southern California wildfires. ***American Journal of Disaster Medicine*** **4 (2): 113-119.**

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Kulig, Judith C., Dana Edge, William Reimer, Ivan Townshend, and Nancy Lightfoot. 2009. Levels of risk: Perspectives from the Lost Creek Fire. ***Australian Journal of***

Emergency Management **24 (2): 33-39.**
Risk has been considered as the probability of experiencing adverse events. Understanding risk and vulnerability is essential to disaster management and recovery. Through qualitative interviews in a community that experienced a wildfire, "at-risk" and "feeling at-risk" themes were identified for both the individuals and community in this study. Internal and external circumstances along with varying levels of dependence influenced the reports of risk. Individual and community risk during a major wildfire is discussed in order to explain links to community resiliency. Such understandings can aid in the development of appropriate measures to reduce short- and long-term impacts from natural disasters.

Mclennan, Jim, Adrian Birch, Sean Cowlishaw, and Peter Hayes. 2009. Maintaining volunteer firefighter numbers: Adding value to the retention coin. ***Australian Journal of Emergency Management*** **24 (2): 40-47.**
Annual resignation rates for Australian volunteer-based fire agencies range from about 6.7 percent to 8.3 percent of total volunteer firefighter memberships. This article reports two studies investigating aspects of volunteer retention. (1) Analysis of 396 exit survey returns from former volunteers found that reasons contributing to resigning were: Work/Family needs, 51 percent; moved from the area, 38 percent; age/health issues, 28 percent; dissatisfaction with the volunteer role, 25 percent. A major contributor to dissatisfaction was poor brigade leadership. (2) A survey of 514 second-year volunteers found that higher levels of volunteer satisfaction, and thus intention to remain, were associated strongly with being a member of a well-led, inclusive, and harmonious brigade. Overall, the findings indicated the need for agencies to: (a) Distinguish unavoidable reasons for resigning (moved; age/health issues) from potentially avoidable reasons (work/family needs; dissatisfaction); (b) endeavor to balance the demands on volunteers and the needs of their volunteers' work and family life; and (c) enhance the quality of brigade leadership and management.

Schoennagela, Tania, Cara R. Nelson, David M. Theobald, Gunnar C. Carnwath, and Teresa B. Chapman. 2009. Implementation of National Fire Plan treatments near the wildland-urban interface in the western United States. ***Proceedings of the National Academy of Sciences (Early Edition):*** **e-Pub.**
Because of increasing concern about the effects of catastrophic wildland fires throughout the western United States, federal land managers have been engaged in efforts to restore historical fire behavior and mitigate wildfire risk. During the last five years (2004-2008), 44,000 fuels treatments were implemented across the western United States under the National Fire Plan. The authors assessed the extent to which these treatments were conducted in and near the wildland-urban interface, where they would have the greatest potential to reduce fire risk in neighboring homes and communities. Although federal policies stipulate that significant resources should be invested in the WUI, researchers found that only three percent of the area treated was within the WUI, and another eight percent was in an additional 2.5-km buffer around the WUI, totaling 11 percent. Only 17 percent of this buffered WUI is under federal ownership, which significantly limits the ability of federal agencies to implement fire-risk reduction treatments near communities. Although treatments far from the WUI may have some fire mitigation benefits, the findings suggest that greater priority must be given to locating treatments in and near the WUI, rather than in more remote settings, to satisfy NFP goals of reducing fire risk to communities. However, this may require shifting management and policy emphasis from public to private lands.

Vasilakos, Christos, Kostas Kalabokidis, John Hatzopoulos, and Ioannis Matsinos. 2009. Identifying wildland fire ignition factors through sensitivity analysis of a neural network. ***Natural Hazards*** **50 (1): 125-143.**
Artificial neural networks (ANNs) show a significant ability to discover patterns in data that are too obscure to get through standard statistical methods. Data on natural phenomena usually exhibit significantly unpredictable non-linearity, but the robust behavior of a neural network makes it perfectly adaptable to environmental models such as a wildland fire danger rating system. These systems have been adopted by many developed countries that have invested in wildland fire prevention. Civil protection agencies are able to identify areas with high probabilities of fire ignition and resort to necessary actions. Since one of the drawbacks of ANNs is the interpretation of the final model in terms of the importance of variables, this article presents the results of sensitivity analysis performed in a back-propagation neural network (BPN) to distinguish the influence of each variable in a fire ignition risk scheme developed for Lesvos Island in Greece. Four different methods were utilized to evaluate the three fire danger indices developed within the above scheme. Three of the methods are based on network's weights after the training procedure (i.e., the percentage of influence-PI, the weight product-WP, and the partial derivatives-PD methods), and one is based on the logistic regression model between BPN inputs and observed outputs. Results showed that the occurrence of rainfall, the 10-h fuel moisture content, and the month of the year parameter are the most significant variables of the fire weather, fire hazard, and fire risk indices, respectively. Relative humidity, elevation, and day of the week have a small contribution to fire ignitions in the study area. The PD method showed the best performance in ranking variables' importance, while performance of the rest of the methods was influenced by the number of input parameters and the magnitude of their importance. The results can be used by local forest managers and other decision makers dealing with wildland fires to take the appropriate preventive measures by emphasizing on the important factors of fire occurrence.

Winksworth, Gail, Chris Healy, Merrilyn Woodward, and Peter Camilleri. 2009. Community capacity building: Learning from the 2003 Canberra bushfires. ***Australian Journal of Emergency Management*** **24 (2): 5-12.**
Research into what happens to communities after

disasters is one way of understanding the elements of community capacity building and the actions that help and hinder these processes. In recent years a number of large scale disasters both onshore and offshore have become the focus of Australian State and Commonwealth disaster recovery efforts. These have provided opportunities to reflect on successful elements of "community recovery" including what communities do themselves to assist recovery and what governments can do to enable and actively facilitate the recovery process. Through an examination of a recent study on the recovery of people affected by the Australian Capital Territory bushfires (known as the Canberra Bushfires), this paper examines what helps and what hinders community capacity building, including the role of social networks and supports and community engagement activities. It also contributes to a broader knowledge base about the importance of governments recognizing and enabling the development of social networks which help people "get by," and "get ahead," and which foster a sense of control over their lives. This knowledge can usefully frame actions used in the pursuit of many other desired policy outcomes linked to community capacity building.

Wind Storm, Winter Storm, Lightning, Other Severe Storms

Changnon, Stanley A., and David Changnon. 2009. Assessment of a method used to time adjust past storm losses. ***Natural Hazards*** **50 (1): 5-12.**

A widely used method for adjusting past annual storm losses to present day values, needed to address the ever-changing socio-economic conditions, was assessed. The property insurance industry developed a comprehensive method for adjusting losses in past years to current year loss values. Characteristics of hurricanes occurring 50 or more years ago and those in the recent years were examined to find similar early and recent pairs of storms for a comparative evaluation of their property losses. One pair found was hurricanes Hazel (1954) and Hugo (1989), and another pair with similar features was Hhurricanes Carol (1954) and Bob (1991). The insurance-based adjusted property loss values for these two pairs of storms were compared to determine if the early year values were comparable to the recent year values. The adjusted losses of the two pairs of hurricanes were found to have small differences of 7.8 percent and 8.1 percent. These differences were due to somewhat different storm paths and slightly higher wind speeds in the two storms with higher losses. The adjustment method appears to adequately capture time differences in storm losses due to changes in population, wealth, inflation, structural density, and insurance coverage.

Dabral, Apoorv, and Ewing Bradley. 2009. Analysis of wind-induced economic losses resulting from roof damage to a metal building. ***Journal of Business Valuation and Economic Loss Analysis - Special Issue: Hurricane Katrina and Economic Loss*** **4 (2): 1-20.**

Metal roofs are highly susceptible to hurricane wind damage. Roof damage is a particularly important element in the estimation of economic losses as even minor roof damage can augment the total loss due to entrance of rain and subsequent interior and content loss. Dabral developed a probabilistic damage model to predict the physical damage in a metal roof due to wind. This study estimates economic losses associated with high wind, hurricane events that cause roof damage to metal buildings using Hurricane Katrina data and a hurricane simulation data set. A cost benefit study is also performed to establish the cost effectiveness of mitigation.

Enander, Ann, Susanne Hede, and Orjan Lajksjo. 2009. One crisis after another: Municipal experiences of severe storm in the shadow of the tsunami. ***Disaster Prevention and Management*** **18 (2): 137-149.**

The purpose of this paper is to develop a theoretical understanding of experiences of crisis management among municipal leaders. It provides a theoretical model highlighting the complex evaluations underlying managers' decisions and actions in real-life situations. A total of 16 chief officers and three politicians from three different municipalities were interviewed concerning experiences of dealing with a severe storm. Data were analyzed by a grounded theory approach. Data analysis generated a model. Central to the model is an evaluation sphere, which reflects tension between everyday circumstances and crisis needs, between assessments of legislation and practices as a support or hindrance, and assessments of human vulnerability versus coping resources. Manager characteristics, the societal context within which the event occurred, and crisis characteristics all influence this evaluation sphere. Particular stressors include the fact that the leaders themselves were personally affected by the storm, the difficult decisions and assessments that had to be made, the uncertainty of the situation and the timing, soon after the tsunami. Crisis management, decisions and actions can be seen as formed from the evaluation sphere and the influencing factors. The paper has a small sample and limited representativeness so generalizability of the model should be tested in other crisis events. The model can be used as a tool to design exercises and as a guideline for authorities, in providing preparedness and crisis support.

Eriksson, Kerstin. 2009. Knowledge transfer between preparedness and emergency response: A case study. ***Disaster Prevention and Management*** **18 (2): 162-169.**

This paper looks at the transfer of knowledge between preparedness activities and emergency response at the municipal level to improve emergency response. A case study was carried out in the municipality of Ljungby, Sweden, using prewritten questions to analyze the collected empirical material. This material consisted of both municipality documents and interviews. The investigation involved municipal units that participate in emergency preparedness activities and those involved in the emergency response to the violent storm, Gudrun, that took place in 2005. Findings show that the people

in charge of the immediate response to the storm did not effectively use the analytic preparations created by those responsible for planning and preparations. Indeed to a great extent they used general response patterns and functions discovered from their own earlier experiences. These findings led to the development of a preliminary draft of requirements for a well-functioning knowledge transfer from emergency preparedness work to response. The paper demonstrates a need for municipalities to develop methods to increase transfer of knowledge of preparedness plans and analyses to improve response. It also shows that there is a potential to improve the preparedness process to reduce the gap between preparedness planning and its use in emergency response. The paper suggests a preliminary proposal for developing preparedness activities (in particular risk and vulnerability analyses) more suitable for emergency response.

Nielsen-Arnbjerg, K., and H.S. Fleischer. 2009. Feasible adaptation strategies for increased risk of flooding in cities due to climate change. ***Water Science & Technology*** **60 (2): 273-281.**

Northern Europe is one of the regions where more frequent and more severe storms and storm surges are expected due to climatic changes. In order to maintain an acceptable risk of flooding, suitable adaptation strategies must be defined and implemented. Optimum solutions demand collaboration of different professionals and thus simple graphical means must be employed to illustrate the economic impacts of the change in risk of flooding. A case study indicates that urban drainage infrastructure capacity should be upgraded while there is currently no economic incentive to improve protection against sea surges.

Schmidlin, Thomas W. 2009. Human fatalities from wind-related tree failures in the United States, 1995–2007. ***Natural Hazards*** **50 (1): 13-25.**

There were 407 deaths from wind-related tree failures in the United States between 1995 and 2007. The most common cause of the deadly fallen tree was a thunderstorm (41%), followed by nonconvective high winds (35%), tropical cyclones (14%), tornadoes (7%), and snow and ice (3%). Most (62%) of the deaths were males while the median age was 44 years. The most common location of the fatality was in a vehicle struck by the tree or a vehicle that crashed into a downed tree on the road (44%), followed by persons outdoors (38%), in mobile homes (9%), and in frame houses (9%). Persons killed by wind-related tree failures during tropical cyclones and tornadoes were more commonly at home (40%) when struck than those killed at home by thunderstorm and nonconvective high winds (13%). Seasonality of the deaths varied by weather type with deaths in thunderstorms clustered during May–August, nonconvective high winds October–April, tropical cyclones August–October, tornadoes in April and November, and snow and ice December–April. Regional patterns result from frequency of the wind events, population density, and tree cover. Suggestions are made for hazard reductions.

Wernstedt, Kris, Patrick Roberts, and Matthew Dull. 2009. Can climate signals inform emergency management? Preliminary evidence. ***Journal of Homeland Security and Emergency Management*** **6 (1): ePub.**

The emergency management community has widely discussed the long-term implications of global climate change for weather-related hazards such as floods, hurricanes, and droughts, but the community has paid relatively little attention to the connection between these hazards and shorter-term seasonal climate fluctuations (e.g., El Niño). This paper explores the potential for applying recent scientific and technical advances in the use of seasonal climate information to improve how emergency managers address such hazards risks and their associated disaster losses. The preliminary analysis presented here begins with a brief review of evidence from the research literature linking mid- and long-term forecasts to flood planning and management. The authors report on a small telephone survey of emergency managers involved in flood planning and management in 26 Oregon and Washington counties that experience interannual climate variation that can increase the frequency or intensity of flooding. Survey findings help illuminate the opportunities and obstacles for using climate science to inform emergency management. The authors then present results of a 2008 survey of emergency managers and educators that asks about the use of climate information for a wider range of weather-related hazards. They conclude by summarizing the opportunities for and obstacles to the use of climate information in emergency management.

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