

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

Brown, Peter J. 2008. Expanding role of satellites in preparedness, surveillance, and response. *Disaster Medicine and Public Health Preparedness* 2(3): 200-203.

Satellite technology plays a vital role in proactive global disease surveillance and detection. When hurricanes, cyclones, tornadoes, earthquakes, and tsunamis strike, first responders, National Guard, and emergency management personnel benefit greatly from satellite-enabled voice communications, satellite-based Global Positioning System location data, and geographic information system (GIS) data, including updated imagery provided by satellites, along with streams of satellite-delivered broadband data.

Buscher, Monika, Margit Kristensen, and Preben H. Mogensen. 2008. Making the future palpable: Notes from a major incidents future laboratory. *International Journal of Emergency Management* 5(1/2): 145-163.

In this paper, the authors describe experiences from a future laboratory. Future laboratories allow users to experiment with prototypes of future technologies in as realistic conditions as possible. The authors have devised this method because, to realize the potential of advanced ubiquitous computing technologies, it is essential to anticipate and design for future practices. But for prospective users, it is often difficult to imagine and articulate future practices and provide design specifications. However, they readily invent new ways of working in engagement with new technologies. By facilitating the realistic use of prototype technologies in future laboratories, designers and users can define and study both the opportunities and constraints for design. Presented are 11 scenes from a major incidents future laboratory held in September 2005. Many raise tough questions rather than provide quick answers. Many also bring desirable and realizable socio-technical futures

into relief, illustrating the value of the future laboratory approach.

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

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

Fielding Smith, James, Sandra Sue Waggoner, Arthur Rabjohn, and Avi Bachar. 2008. Protecting the functionality of airports during disaster responses: Solutions. *Journal of Emergency Management* 6(4): 57-64.

Issues in protecting the functionality of airports involved in response for nearby or distant disasters are examined for unintentional incidents such as natural disasters, accidents and pandemics and for humanitarian relief efforts during intentional incidents such as terrorism, war, civil war, and riots. Proposed solutions focus on promoting airport continuity of business and continuity of operations while optimizing airports as sustainable assets during all phases of the response. The most significant recommendations involve policy, organizational, operational, physical,

and defensive measures based on sound incident management systems, interoperability, national and international standards for airport use during disaster response, and new national funding sources for incremental improvements to airport capabilities in these areas.

Fendler, Roland. 2008. Floods and safety of establishments and installations containing hazardous substances. *Natural Hazards* 46(2): 257-263.

As a consequence of the floods in Germany in August 2002, the *Umweltbundesamt* (German Environment Agency) set up a research project on natural hazards and their relevance for the safety of establishments and installations containing hazardous substances, i.e. the prevention of "Natechs" (natural hazards triggering technological accidents). The scope of the project included hazards by earthquakes and storms but the main focus was on floods. Subject of the project was the safety of establishments, installations containing substances hazardous to water according to the German Federal Water Act (e.g. chemical plants, tank farms, filling stations, heating oil tanks) and vessels for storage of extremely flammable gases (mainly LPG). The project included a survey of the flood risk management at establishments and installations in the catchment areas of the Rhine and the Elbe, a description of available flood protection and safety technology and a discussion of emergency planning requirements. Gaps in flood risk management at industrial sites and installations were identified and recommendations on policy, regulations, standards, and safety management made.

Ghosh, A. K. 2008. Assessment of earthquake-induced tsunami hazard at a power plant site. *Nuclear Engineering and Design* 238(7): 1743-1749.

This paper presents a study of the tsunami hazard due to submarine earthquakes at a power plant site on the east coast of India. The paper considers various sources of earthquakes from the tectonic information, and records of past earthquakes and tsunamis. Magnitude frequency relationship for earthquake occurrence rate and a simplified model for tsunami run-up height as a function of earthquake magnitude and the distance between the source and site have been developed. Finally, considering equal likelihood of generation of earthquakes anywhere on each of the faults, the tsunami hazard has been evaluated and presented as a relationship between tsunami height and its mean recurrence interval (MRI). Probability of exceedence of a certain

wave height in a given period of time is also presented. These studies will be helpful in making an estimate of the tsunami-induced flooding potential at the site.

Iuchi, Kanako, and Ann-Margaret Esnard. 2008.

Earthquake impact mitigation in poor urban areas: The case of Metropolitan Manila. *Disaster Prevention and Management* 17(4): 454-469.

The Philippines is often described as the melting pot of natural disasters (typhoons, floods and torrential rains). As part of the Pacific ring of fire, the Philippines is also prone to earthquakes and volcanic eruptions. In the current disaster management scheme, the poor are likely to be put last. Conventional risk reduction mitigation methods (such as land use and building codes) are failing. A paradigm shift is needed, one that enables poor communities to maximize their limited resources and contribute to risk reduction. Interviews and field investigations were conducted between 2001 and 2006 in three case study neighborhoods in metropolitan Manila to understand the risk components that exist and the resources (or lack therefore) for dealing with them. Field surveys highlighted three major risk components: liquefied petroleum gas (LPG), illegal electrical connections, and residential buildings. Mitigation efforts must be implemented by: developing hybrid community organizations; minimizing direct physical damage; developing neighborhood cooperatives through microfinance schemes; and developing an in-kind community insurance system. While this research focused on earthquake impact mitigation, the inquiry and findings with respect to the urban poor in high risk areas, have applicability to other localities in the developing world. Furthermore, Manila's situation is not unique. Disaster threats, rapid substandard urban development, growth in the number of the poor, and degradation of social capital, are phenomena present in other parts of the developing world. In such settings, traditional mitigation approaches are difficult to carry out effectively.

Lind, Benjamin E., Miguel Tirado, Carter T. Butts, and Miruna Petrescu-Prahova. 2008. Brokerage roles in disaster response: Organizational mediation in the wake of Hurricane Katrina. *International Journal of Emergency Management* 5(1/2): 75-99.

When one organization serves as an intermediary for two other organizations which are not in direct contact, that organization is said to engage in brokerage behavior. Using the case of the Hurricane

Katrina disaster, this study demonstrates the use of formal brokerage measures to study communication among the responding organizations. The authors apply the brokerage role typology put forth by Gould and Fernandez (1989) to communication networks among the responding organizations in two communities: Saint Bernard Parish, Louisiana, and Bay Saint Louis, Mississippi. The authors find that relatively few organizations perform most of the brokerage; primarily, these brokering organizations were locally based. The implications for predisaster planning are discussed.

Reibestein, Jeffrey L. 2008. Capabilities-based planning: A framework for local planning success. *Journal of Emergency Management* 6(4): 11-16.

In September 2007, the United States Department of Homeland Security (DHS) published the National Preparedness Guidelines which advocate a capabilities-based planning (CBP) approach to preparedness for state, local, and tribal governments. This article provides an overview of capabilities-based planning and a more specific focus on the aims, objectives, and components of the DHS CBP model. The article summarizes what scholars have previously suggested are fundamental elements for successful emergency and disaster planning focusing specifically on Quarantelli's 10 research-based principles. The article evaluates the effectiveness of the DHS CBP model in helping local governments incorporate these fundamental elements into their planning efforts and concludes with an overall assessment of the DHS CBP model as a framework for local planning success.

Business Continuity

Durukal, Eser, and Mustafa Erdik. 2008. Physical and economic losses sustained by the industry in the 1999 Kocaeli, Turkey earthquake. *Natural Hazards* 46(2): 153-178.

The aim of this article is to contribute with first-hand data on damage and failure modes at industrial facilities subject to earthquakes. Physical and economic losses faced by the industry in the 1999 Kocaeli earthquake are summarized. Industrial-sector based, as well as component-based descriptions of earthquake performance and damage are provided. The results of the post-earthquake questionnaire survey designed and executed with the aim of gathering factual data from industrial facilities that experienced physical damages, as well as suffered from business interruption losses are presented.

Generalized-intensity-based mean damage ratios for industrial facilities in Turkey are given. The information provided in this article can be used for the first order estimation of building, machinery, and equipment losses, as well as stock and business interruptions, associated with industry during earthquakes in Turkey.

Fielding Smith, James, Sandra Sue Waggoner, Arthur Rabjohn, and Avi Bachar. 2008. Protecting the functionality of airports during disaster responses: Solutions. *Journal of Emergency Management* 6(4): 57-64.

Issues in protecting the functionality of airports involved in response for nearby or distant disasters are examined for unintentional incidents such as natural disasters, accidents, and pandemics and for humanitarian relief efforts during intentional incidents such as terrorism, war, civil war, and riots. Proposed solutions focus on promoting airport continuity of business and continuity of operations while optimizing airports as sustainable assets during all phases of the response. The most significant recommendations involve policy, organizational, operational, physical, and defensive measures based on sound incident management systems, interoperability, national and international standards for airport use during disaster response, and new national funding sources for incremental improvements to airport capabilities in these areas.

Gonzalez-Herrero, Alfonso, and Suzanne Smith. 2008. Crisis communications management on the web: How Internet-based technologies are changing the way public relations professionals handle business crises. *Journal of Contingencies and Crisis Management* 16(3): 143-153.

This article analyzes how Internet-based technologies can help companies monitor their business environment for potential issues that need management; prepare a crisis communication plan that considers the Internet in business; respond adequately to crises using available online tools; and establish appropriate Internet-based actions after the crisis. The article also questions whether the traditional, one-way corporate approach is suitable in the new, more interactive online business environment or whether companies should use a different tone, language, and attitude when in online crisis situation communications.

Climate Change, Drought and El Nino

Bushnell, James, Carla Peterman, and Catherine Wolfman. 2008. Local solutions to global problems: Climate change policies and regulatory jurisdiction. *Review of Environmental Economics and Policy* 2(2): 175-193.

This article considers the effectiveness of various types of environmental regulations when they are applied locally to pollutants whose damages extend beyond the jurisdiction of the local regulator. For example, within the United States, many of the efforts to adopt policies to mitigate climate change are taking place at the local level. A number of states have adopted various controls to address climate change while, at the same time, many U.S. cities have adopted climate change policies (as evidenced by the over 700 mayors who have signed the U.S. Conference of Mayors Climate Protection Agreement). This article discusses these issues as well as various regulatory tools, the vulnerability of these regulatory tools to the issues of leakage and reshuffling, and issues of leakage and reshuffling. It also presents numerical analyses demonstrating that several proposed policies to limit greenhouse gas emissions from the California electricity sector may have very little effect on carbon emissions if they are applied only within that state. The last section of this article summarizes findings.

Campbell, D., M. Stafford Smith, J. Davies, P. Kuipers, J. Wakerman, and M. J. McGregor. 2008. Responding to health impacts of climate change in the Australian desert. *Rural and Remote Health (ePub)* 8(1008).

Climate change is likely to have a significant effect on the health of those living in the 70 percent of Australia that is desert. The direct impacts on health, such as increased temperature, are important. But so too are the secondary impacts that will occur as a result of the impact of climate change on an uncertain and highly variable natural environment and on the interlinking social and economic systems. The consequence of these secondary impacts will appear as changes in the incidence of disease and infections, and on the psychosocial determinants of health. Responding to the impacts of climate change on health in desert Australia will involve the active participation of a variety of interest groups ranging from local to state and federal governments and a range of public and private agencies, including those not traditionally defined as within the health sector. The modes of engagement required for this process

need to be innovative, and will differ among regions on different trajectories. To this end, a first classification of these trajectories is proposed.

Do O, Afonso, and Maria J. Roxo. 2008. Drought events in Southern Portugal from the 12th to the 19th centuries: Integrated research from descriptive sources. *Natural Hazards* 47(1): 55-63.

Historical research of extreme climate events, such as droughts, that occurred before the quantitative period initiated with the installation of weather station networks, is dependent on the availability of descriptive sources such as newspapers, archives, memories or other written reports. This study is based on a thorough survey and analysis of available sources of information, reporting drought events and impacts occurring in the southern Portuguese region of Algarve since medieval times. Most sources were compiled from published references, coupled with a thorough research of periodic newspapers published during the 19th century, which significantly increased the volume of available information. Results were validated by comparison whenever multiple sources were available, including early instrumental records and a study using a similar methodology for the neighboring region of Inner Lower Alentejo. This study concludes that frequent drought events occurred in the Algarve during the period covered. The same applies to the Alentejo, but many of the identified periods differed, exposing different climatic genesis of most events between the two neighboring regions. Comparison with instrumental records show that much of the data collected in 19th century newspapers may refer to dry spells rather than long-term droughts. Finally, the study concludes that descriptive sources have, in general, a large information potential where no quantitative sources are available, but lack complementary methods both for validating collected data, and for reducing subjective and arbitrary criteria that lead to perception-based description of such extreme events.

Grundstein, Andrew. 2008. Assessing climate change in the contiguous United States using a modified Thornthwaite climate classification scheme. *The Professional Geographer* 60(3): 398-412.

Climate change across the contiguous United States is investigated using a modified version of Thornthwaite's climate classification scheme. This approach allows both moisture and thermal conditions to be examined simultaneously for a better assessment of multivariate climate change. Changes

in area of different climate change types over time is determined using the climate year approach and the spatial nature of climate change is examined by computing climate types based on averages from three thirty-year periods over the twentieth century. Over the study period from 1895 to 2005, statistically significant changes in areal coverage of different climate types have occurred. In the eastern half of the country, climate divisions have become wetter and changed to moister climate categories. The most prominent change has occurred in the Deep South, where the climate has changed to both a lower thermal category and a wetter moisture category. Much of the country has experienced positive temperature trends, but only climate divisions in the Southwest and Upper Midwest show changes to higher thermal categories.

Mace, M. J. 2008. The Bali Road Map: Can it deliver an equitable post-2012 climate agreement for small island states? *Review of European Community & International Environmental Law* 17(2): 183-195.

The ambition and architecture of the post-2012 climate change regime will be critical to the survival of small island developing nations, many of which are low-lying, vulnerable to the impacts of sea-level rise, and exposed to increasingly frequent severe extreme weather events. This paper highlights the key outcomes sought by the Alliance of Small Island States in the international negotiating process on the post-2012 regime and compares these calls with what has been achieved thus far. The paper concludes that while little progress has been made to date, useful avenues for progress do exist if only the political will can be found.

Shahid, Shamsuddin, and Houshang Behrawan. 2008. Drought risk assessment in the western part of Bangladesh. *Natural Hazards* 46(3): 391-413.

Though drought is a recurrent phenomenon in Bangladesh, very little attention has been so far paid to the mitigation of and preparedness for droughts. This article presents a method for spatial assessment of drought risk in Bangladesh. A conceptual framework, which emphasizes the combined role of hazard and vulnerability in defining risk, is used for the study. Standardized precipitation index method in a GIS environment is used to map the spatial extents of drought hazards in different time steps. The key social and physical factors that define drought vulnerability in the context of Bangladesh are identified and corresponding thematic maps at the district level are prepared. A composite drought vulnerability

ty map is developed through the integration of those thematic maps. The risk is computed as the product of the hazard and vulnerability. The result shows that droughts pose highest risk to the northern and northwestern districts of Bangladesh.

Spence, Chris, Kati Kulovesi, Maria Gutierrez, and Miquel Munoz. 2008. Great expectations: Understanding Bali and the climate change negotiations process. *Review of European Community & International Environmental Law* 17(2): 142-153.

This article reviews the December 2007 United Nations Climate Change Conference in Bali. It considers expectations for the meeting and whether the event delivered on these expectations. It also evaluates the long-term context of the meeting and examines the discussions in Bali on the post-2012 period, when the Kyoto Protocol's first "commitment period" expires. The article finds that the Bali meeting did not necessarily meet public expectations or respond directly to the latest scientific assessments calling for urgent action. However, the article also finds that Bali was successful in the context of the prevailing political and diplomatic realities and the immense complexity of the climate change challenge—a problem that does not lend itself to a "quick fix" solution. The article concludes that Bali produced a solid outcome that gives direction to future talks and sets a clear deadline for their completion. It argues that, contrary to some experts' opinion, the lack of detail in the Bali outcome may prove to be a strength rather than a weakness, since it provides flexibility to negotiators as they try to craft a consensus by the end of 2009.

Wheaton, Elaine, Suren Kulshreshtha, Virginia Wittrock, and Grace Koshida. 2008. Dry times: Hard lessons from the Canadian drought of 2001 and 2002. *Canadian Geographer* 52(2): 241-262.

Droughts are one of the world's most significant natural hazards. They have major impacts on the economy, environment, health, and society. In 2001 and 2002, many regions within Canada experienced unprecedented drought conditions, or conditions unseen for at least 100 years in some regions. This article draws upon a national assessment of this drought with particular attention to its implications for the agriculture and water sectors, although some attention is also devoted to other sectors. The study's methodology involves a comprehensive interdisciplinary, cause-and-effect integrated framework as a basis to explore the characteristics of drought and the associated biological and physical impacts and

socioeconomic consequences. Numerous primary and secondary sources of data were used, including public and semi-public sources such as Agriculture and Agri-Food Canada, Environment Canada, Statistics Canada, Crop Insurance Corporations and provincial governments, as well as phone interviews, focus groups, print media surveys.

Critical Infrastructure

Chai, Choon-Lee, X. Liu, W. J. Zhang, Ralph Deters, D. Liu, Dmytro Dyachuk, Y. L. Tu, and Zaheer Baber. 2008. Social network analysis of the vulnerabilities of interdependent critical infrastructures. *International Journal of Critical Infrastructures* 4(3): 256-73.

Interdependency among critical infrastructures contributes to vulnerabilities of those infrastructures. In this paper, the vulnerabilities of critical infrastructures are identified and analyzed using social network analysis. In the analysis of network centrality, the importance of each critical infrastructure, in terms of its contribution to infrastructure interdependency, is ranked. The findings show that electricity and telecommunication are the two most important critical infrastructures that contribute to infrastructure interdependency, which further render the infrastructure network vulnerable to cascading damage. An example system is given to illustrate the ideas and results presented in this paper.

Fielding Smith, James, Sandra Sue Waggoner, Arthur Rabjohn, and Avi Bachar. 2008. Protecting the functionality of airports during disaster responses: Solutions. *Journal of Emergency Management* 6(4): 57-64.

Issues in protecting the functionality of airports involved in response for nearby or distant disasters are examined for unintentional incidents such as natural disasters, accidents, and pandemics and for humanitarian relief efforts during intentional incidents such as terrorism, war, civil war, and riots. Proposed solutions focus on promoting airport continuity of business and continuity of operations while optimizing airports as sustainable assets during all phases of the response. The most significant recommendations involve policy, organizational, operational, physical, and defensive measures based on sound incident management systems, interoperability, national and international standards for airport use during disaster response, and new national funding sources for incremental improvements to airport capabilities in these areas.

Liu, X., Y. L. Tu, W. J. Zhang, W. Li, C-L. Chai, and R. Deters. 2008. A disaster response management system based on the control systems technology. *International Journal of Critical Infrastructures* 4(3): 274-95.

A networked Critical Infrastructure (CI) system performs functions critical to national economy and security. It is a complex system in the sense of a social-technical system with time-varying boundary and topology, and there are dynamic, uncertain, and stochastic factors throughout a whole disaster management process. In this paper, the authors first present a study aimed at developing a general methodology for disaster response management to view the response management as a process and production control problem. Based on this point of view the control system technology is employed to develop a general framework for the disaster response management system, which also incorporates an adaptive decision system. Finally, a case study is presented with networked CI systems to validate the proposed model.

Disaster and Emergency Management

Bertsch, Valentin, and Jutta Geldermann. 2008.

Preference elicitation and sensitivity analysis in multicriteria group decision support for industrial risk and emergency management. *International Journal of Emergency Management* 5(1/2): 7-24.

The resolution of complex decision situations in crisis and remediation management following an industrial emergency requires input from different disciplines. Contributing to the transparency and traceability of decisions and taking subjective preferences into account, multi-criteria decision analysis (MCDA) is suitable for involving various stakeholder and expert groups process with diverse background knowledge and different views in the decision making. The focus of this paper is to highlight the role of MCDA in risk and emergency management in the nuclear power generation sector on the basis of a hypothetical case study. Special emphasis is placed on the modeling of the decision makers' preferences. The paper explores the sensitivity of decision making processes to simultaneous variations of the preference parameters and consequently to contribute to a facilitation of the preference modeling process by comprehensibly visualizing and communicating the impact of these preferential uncertainties on the results of the analysis.

Birkland, Thomas, and Sarah Watermant. 2008. Is federalism the reason for policy failure in Hurricane Katrina? *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 692-714.

Governmental responses to Hurricane Katrina are generally cited as policy failures. Media and popular analyses focus on the federal government's policy failures in hazard preparedness, response, and recovery. Meanwhile, disaster experts realize that disaster response is a shared intergovernmental responsibility. The article examines the federal nature of natural disaster policy in the US to consider whether federalism, or other factors, had the greatest influence on the failures in Katrina. The authors find that some policy failures are related to policy design considerations based in federalism, but that the national focus on "homeland security" and the concomitant reduction in attention to natural hazards and disasters, are equally, if not more, complicit in the erosion of government disaster management capacity that was revealed in Hurricane Katrina.

Brown, Kelly L., and Christina Scheungrab. 2008.

Emergency preparedness: Using the Internet to educate the public. *Journal of Emergency Management* 6(4): 17-23.

This research examines the use of the Internet to educate the public on emergency management and homeland security issues. Despite the fact that disasters, when they occur, happen at the local level and directly impact the general public, the public is conspicuously absent from emergency management planning and training activities at all levels. This is true despite research which suggests that the public, given accurate and relevant information, can respond well to disasters. Educating the public on possible disasters, response scenarios, and other key emergency management issues is a critical first step to engaging the public in emergency management. The current research investigates the use of one means of educating the public, the Internet, on emergency management and homeland security issues. Content analysis of the 50 largest cities in one mid-western state was conducted to determine whether the Internet is used to educate the public; the types of homeland security and emergency management information available to the public on city Web sites; and how difficult the existing information is to access. Results show that few cities are using the Internet as a means of educating the public on emergency management issues. Future research should investigate other means by which the general public

should be educated and engaged in emergency management and how the public is using the emergency management information available to them.

Castro, Carmen, Diane Persson, Nancy Bergstrom, and Stanley Cron. 2008. Surviving the storms: Emergency preparedness in Texas nursing facilities and assisted living facilities. *Journal of Gerontological Nursing* 34(8): 9-16.

This study assesses the preparedness of long-term care facilities in Texas responding to Hurricanes Katrina and Rita. A 41-item questionnaire was mailed to facilities; the response rate was 42 percent. Among responding facilities, 4,513 residents were evacuated, and six percent of respondents reported resident death. Financial losses were reported by eight percent of nursing facilities and 45 percent of assisted living facilities because of transportation expenses and staff overtime. Respondents indicated the need for improved disaster preparedness training, better coordination, and transportation. Changes in policy and practice will lead to better trained staff who will provide the care residents need for improved health outcomes during future public health disasters.

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

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

presents an original contribution to the analysis of risk of low probability, high consequence natural disasters in that it is shown that the commonly used frequency interpretation of probability can prove to be flawed in such cases. An alternative approach is provided.

Fitriani, Siska, and Leon J. M. Rothkrantz. 2008. An automated online crisis dispatcher. *International Journal of Emergency Management* 5(1/2): 123-144. During crisis events, human operators in a crisis center will be overloaded with information. The stress of dealing with crisis situations can have a significant impact on the certainty of the information. The need for a system that is able to handle information calls automatically may then become apparent. This research examines a dialogue system that can serve as a crisis hotline dispatcher. The system offers a natural user interaction through its ability to start a user-friendly dialogue taking care of the content, context and user's emotion. It retrieves information about crisis situations from users while controlling the communication flow. The system is able to recognize the emotion loading of the user's linguistic content. The recognizer uses a database that contains selected keywords on a two dimensional "arousal" and "valence" scale. Its output includes an indication of the urgency of the information regarding the crisis.

Franco, Zeno E., Nina Zumel, Kathy Blau, Knute Ayhens-Johnson, and Larry E. Beutler. 2008. Causality, covariates and consensus in ISCRAM research: Towards a more robust study design in a transdisciplinary community. *International Journal of Emergency Management* 5(1/2): 100-122.

Research in disaster management encompasses a variety of academic disciplines. Yet, despite calls to expand the range of methodologies used and elaborate a nascent theory of disaster management, progress towards a transdisciplinary framework is slow. Some reasons for this are explored by focusing on the research efforts of the international community for Information Systems in Crisis Response and Management (ISCRAM). Similar to the primary disciplines it draws from, ISCRAM research is typified by case study evaluations. As a result of poorly articulated case study methodologies and the lack of alternative methods, the confidence in causal and generalization claims remains questionable. Performance evaluation techniques may close these gaps, but several limiting factors must first be addressed in particular, parameterizing and control-

ling for context variables must receive more attention. The need for well-explicated covariates, such as a disaster severity index that describes the relative impact between incident types, is explored in some detail. The relationship connecting the context and performance assessment variables is briefly considered. Finally, the authors suggest that the quality of research and theory building is contingent on a deeper, transdisciplinary dialogue about the nature of scientific evidence within ISCRAM a discussion that may also gradually inform a general theory of disaster management.

Gouman, Rianne, Masja Kempen, Eddy van der Heijden, Niek Wijngaards, Philip de Vree, and Toon Capello. 2008. The Borsele files: The challenge of acquiring usable data under chaotic circumstances. *International Journal of Emergency Management* 5(1/2): 57-74.

Conducting empirical research involves a balancing act between scientific rigor and real-life pragmatics. The Delft Co-operation on Intelligent Systems (D-CIS) laboratory researches systems-of-systems consisting of the human and artificial systems involved in collaborative decision-making under chaotic circumstances. An important objective is the usefulness of the results in their major application domain: crisis management. The D-CIS lab was involved in setting up a crisis management exercise experiment and the according measurements regarding an improvement in internal communication at Gemeente (Municipality) Borsele. In this paper, the empirical research regarding this experiment, the methodology and its results are briefly outlined. The main lessons learned concern the interrelationship between the scenario, experiment and measurements, the acquisition of usable data, and conducting grounded research.

Ha, Kyoo-Man, and Ji-Young Ahn. 2008. Developing voluntary agencies in emergency management: The United States and Korea. *Journal of Emergency Management* 6(4): 39-50.

The purpose of this article is to develop policy implications after comparing the roles of voluntary agencies in the United States and Korea with the ultimate goal of contributing to emergency management in both countries. The stipulation is that voluntary agencies can substitute for the lack of government roles. Also, the underlying driver of the U.S. voluntary response is more for monetary contributions, whereas Korean voluntary response is more altruistic in nature as a product of Korean culture. After

comparing each country's volunteers, organizations, strategy, and other issues, the article found that the two national voluntary systems have developed very different approaches to voluntary promotion in emergency management. In short, the major tenet of this article is that U.S. voluntary agencies have relied on a bottom-to-top approach, while Korean voluntary agencies have relied on a top-to-bottom approach in emergency management.

Iuchi, Kanako, and Ann-Margaret Esnard. 2008. Earthquake impact mitigation in poor urban areas: The case of metropolitan Manila. *Disaster Prevention and Management* 17(4): 454-469.

The Philippines is often described as the melting pot of natural disasters (typhoons, floods and torrential rains). As part of the Pacific ring of fire, the Philippines is also prone to earthquakes and volcanic eruptions. In the current disaster management scheme, the poor are likely to be put last. Conventional risk reduction mitigation methods (such as land use and building codes) are failing. A paradigm shift is needed, one that enables poor communities to maximize their limited resources and contribute to risk reduction. Interviews and field investigations were conducted between 2001 and 2006 in three case study neighborhoods in metropolitan Manila to understand the risk components that exist and the resources (or lack of) for dealing with them. Field surveys highlighted three major risk components: liquefied petroleum gas (LPG), illegal electrical connections, and residential buildings. Mitigation efforts must be implemented by: developing hybrid community organizations; minimizing direct physical damage; developing neighborhood cooperatives through microfinance schemes; and developing an in-kind community insurance system. While this research focused on earthquake impact mitigation, the inquiry and findings with respect to the urban poor in high risk areas, have applicability to other localities in the developing world. Furthermore, Manila's situation is not unique. Disaster threats, rapid substandard urban development, growth in the number of the poor, and degradation of social capital are phenomena present in other parts of the developing world. In such settings, traditional mitigation approaches are difficult to carry out effectively.

Kade, Kristy A., Kathryn H. Brinsfield, Richard A. Serino, Elena Savoia, and Howard K. Koh. 2008. Emergency medical consequence planning and management for national special security events

after September 11: Boston 2004. *Disaster Medicine and Public Health Preparedness* 2(3): 166-173.

The post-September 11 era has prompted unprecedented attention to medical preparations for national special security events (NSSE), requiring extraordinary planning and coordination among federal, state, and local agencies. During the 2004 Democratic National Convention (DNC), a designated NSSE, the Boston Emergency Medical Services (BEMS), was tasked with the design and implementation of convention-related health services. In this article, the authors describe the planning and development of BEMS' 2004 DNC Medical Consequence Management Plan that addressed public health surveillance, on-site medical care, mass casualty surge capacity, and federal response asset management. Lessons learned from enhanced medical planning for the 2004 DNC could serve as an effective model for future mass gathering events.

Kapucu, Naim. 2008. Culture of preparedness: Household disaster preparedness. *Disaster Prevention and Management* 17(4): 526-535.

This paper examines household preparedness in response to disasters and the role of nonprofit organizations in the public's preparedness. The study uses the context of hurricane preparedness of central Florida residents, using the mail survey method as a data collection tool. The findings of the study emphasize the importance of household and individual preparedness in response to natural disasters, specifically to hurricanes. If individuals are not ready, then nobody is ready. The paper finds that households, even with significant experience of disasters, can be complacent in response to disasters.

Kendra, James, Jack Rozdilsky, and David A. McEntire. 2008. Evacuating large urban areas: Challenges for emergency management policies and concepts. *Journal of Homeland Security and Emergency Management (ePub)* 5(1).

This article presents several policy observations regarding evacuation planning and disaster mitigation in large urban areas. The article provides background information about and lessons learned from Hurricanes Katrina and Rita in 2005 and Hurricane Dean in 2007. The often-erroneous planning assumptions in emergency management are then explored along with a discussion about future policy and management implications. Three themes are identified in this research, including: 1) public officials must anticipate a much broader scope of issues when issuing evacuation requests, 2) they must do more to prepare for disasters than write "fantasy" emergency operations plans, and 3) they

must adjust development activities that have a negative impact upon disaster mitigation.

Kingma, Sytze F. 2008. The risk paradigm, organizations and crisis management. *Journal of Contingencies and Crisis Management* 16(3): 164-68.

Kruchten, Philippe, Carson Woo, Kafui Monu, and Mandana Sotoodeh. 2008. A conceptual model of disasters encompassing multiple stakeholder domains. *International Journal of Emergency Management* 5(1/2): 25-56.

Understanding the interdependencies of critical infrastructures (power, transport, communication, etc.) is essential in emergency preparedness and response in the face of disasters. Unfortunately, many factors (e.g., the unwillingness to disclose or share critical data) prohibited the complete development of such an understanding. As an alternative solution, this paper presents a conceptual model of an ontology of disasters affecting critical infrastructures. The authors bring humans into the loop and distinguish between the physical and social interdependencies between infrastructures, where the social layer deals with communication and coordination among the representatives (either humans or intelligent agents) of the various critical infrastructures. The conceptual model was validated with the people responsible for disaster management from several different critical infrastructures and through a case study. Tools are derived from the model to provide decision support. The authors expect that this conceptual model can later be used by people as a common language to communicate, analyze and simulate their interdependencies without having to disclose all critical and confidential data.

Lagmay, Alfredo Mahar A., Arlene Mae P. Tengonciang, Raymond S. Rodolfo, Janneli Lea A. Soria, Eden G. Baliatan, Engielle R. Paguican, John Burtkenley, T. Ong, Mark R. Lapus, Dan Ferdinand D. Fernandez, Zareth P. Quimba, and Christopher L. Uichanco. 2008. Science guides search and rescue after the 2006 Philippine landslide. *Disasters* 32(3): 416-433.

A rockslide-debris avalanche destroyed the remote village of Guinsaigon in Southern Leyte, Philippines, on February 17, 2006. Although search and rescue procedures were implemented immediately, the scale of the landslide and a lack of information about its nature resulted in unfocused and imprecise efforts in the early days of the operation. Technical support was only introduced five days after the event, provided by a team of volunteer geologists, geophysicists, and meteorologists. By the time search and rescue operations were

transferred to specific target sites, however, the chances of finding survivors trapped under the rubble had diminished. In such critical situations, speed, accuracy, and the maximum appropriation of resources are crucial. We emphasize here the need for a systematic and technically informed approach to search and rescue missions in large-scale landslide disaster contexts, and the formulation of better disaster management policies in general. Standard procedures must be developed and enforced to improve how civil authorities respond to natural calamities.

Nilsson, Jerry, and Kerstin Eriksson. 2008. The role of the individual: A key to learning in preparedness organizations. *Journal of Contingencies and Crisis Management* 16(3): 135-42.

A functioning societal response to crises is improved when individuals have adequate skills and knowledge. From a municipal perspective this requires the creation of a learning organization. The objective of this study is to determine whether individual municipal employees, who have the responsibility for preparedness planning, reason and act in ways that promote learning about crises and preparedness issues throughout the municipal organization. Analysis of interviews with preparedness planners in six Swedish municipalities on their strategies for preparedness planning reveal that preparedness planning too often becomes a demarcated activity, restricted to not more than a handful of individuals. This study indicates that one reason preparedness work becomes demarcated is that individuals central to preparedness planning are acting in ways necessary for a learning organization to be established.

Pennings, Joost M. E., and Daniel B. Grossman. 2008. Responding to crises and disasters: The role of risk attitudes and risk perceptions. *Disasters* 32(3): 434-448.

Discussions are taking place both in the United States and in Europe about how governments should respond to both disasters and crises, and how citizens' undesirable behavior might be managed with respect to such disasters. The authors examine the role that risk attitudes and risk perceptions play in decision making behavior of individuals in times of crises and disasters and how knowledge about individual behavior and its drivers may be helpful when developing policy. The proposed framework complements the existing literature, thereby further enriching the knowledge of crises and disaster management.

Perez Mendez, Jesse, Judith K. Mathers, and David M. Neal. 2008. After the storm: K-12 education response

to Hurricane Katrina at the state level. *Journal of Emergency Management* 6(4): 32-38.

This article addresses the policy reaction of 13 high impact states in addressing the kindergarten through 12th grade student diaspora that followed Hurricane Katrina. This disaster displaced approximately 372,000 K-12 Louisiana and Mississippi students. After examining various legislative policy responses and administrative management of displacement accommodations, the authors identified various patterns that suggest states resorted to ad hoc policy to address the massive influx of displaced students. The authors recommend that governmental agencies consider the utilization of protective planning procedures to address educational concerns in further disasters.

Rebmann, Terri, Ruth Carrico, and Judith F. English. 2008. Lessons public health professionals learned from past disasters. *Public Health Nursing* 25(4): 344-352.

This article seeks to delineate the lessons that public health professionals learned during past disasters, as well as the information/resources that were lacking. Disasters can result in public health crises if infection prevention/control interventions are not implemented rapidly and appropriately. Gaps in past public health disaster response include infection prevention/control in mass casualty incidents, public education, internal and external communication, mental health, physical plant, and partnerships with outside agencies. Participants emphasized the need to provide consistent messages to the public, communicate between agencies, and provide public education on disaster preparedness. These tasks can be challenging during infectious disease emergencies when recommendations change. Effective communication is necessary to maintain public trust. Infection control issues in shelters, such as hand hygiene products/facilities, sanitation, outbreaks of unusual infectious diseases, overcrowded conditions, and poor environmental decontamination, were identified as critical to prevent secondary disease transmission. Public health and infection control nurses must partner and continue to address gaps in disaster planning.

Reibestein, Jeffrey L. 2008. Capabilities-based planning: A framework for local planning success. *Journal of Emergency Management* 6(4): 11-16.

In September 2007, the United States Department of Homeland Security (DHS) published the National Preparedness Guidelines which advocate a capabilities-based planning (CBP) approach to preparedness for state, local, and tribal governments. This article provides an overview of capabilities-based planning

and a more specific focus on the aims, objectives, and components of the DHS CBP model. The article summarizes what scholars have previously suggested are fundamental elements for successful emergency and disaster planning focusing specifically on Quarantelli's 10 research-based principles. The article evaluates the effectiveness of the DHS CBP model in helping local governments incorporate these fundamental elements into their planning efforts and concludes with an overall assessment of the DHS CBP model as a framework for local planning success.

Schneider, Sandra. 2008. Who's to blame? (Mis) perceptions of the intergovernmental response to disasters. *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 715-738.

This analysis shows that the intergovernmental response to Hurricane Katrina collapsed because those involved in the process did not have a clear understanding of their own roles and responsibilities or how the entire governmental response system should operate. New data are presented which demonstrate that citizens' attitudes about intergovernmental responsibilities coincide quite closely with how the disaster response system is designed to function, but they differ from the way public officials involved in the Hurricane Katrina relief efforts thought the process should work. This mismatch between what various levels of government are expected to do and what activities they actually perform in emergency situations has contributed to extremely negative impressions within the American public about governmental performance during natural disasters.

Simmons, Kevin M., and Daniel Sutter. 2008. Manufactured home building regulations and the February 2, 2007 Florida tornadoes. *Natural Hazards* 46(3): 415-425.

The Department of Housing and Urban Development (HUD) and the state of Florida implemented new wind load and tie-down regulations for manufactured homes following Hurricane Andrew. This article examines the effect of the new regulations on the likelihood that occupants of mobile homes would survive a tornado. On February 2, 2007, three tornadoes struck central Florida, resulting in 21 deaths in Lake County, all in manufactured homes. The deaths occurred almost exclusively in homes rated as leveled by the county tax appraiser. Manufactured homes built to the new regulations, however, were significantly less likely to be leveled. Regression analysis finds that manufactured homes built to the post-Andrew requirements were 79 percent less likely to be leveled than homes built prior

to the HUD Code in 1976, and 68 percent less likely to be leveled than homes built after 1976 but before the 1994 wind load regulations. Construction of all manufactured homes in the tornado paths to the wind load and tie-down requirements could have reduced fatalities by 70 percent.

Socher, M., and G. Böhme-Korn. 2008. Central European floods 2002: Lessons learned in Saxony. *Journal of Floodplain Management* 1(2): 123-129.

In August 2002, Germany and particularly Saxony were hit by a severe flood affecting more than two-thirds of Saxony's territory. This disastrous flood event gave rise to reconsideration and redirection of flood protection and related disaster management in Saxony. A comprehensive strategic approach was developed. Primarily, any reconstruction and flood protection measure is based on Flood Protection Concepts, which have been developed for all relevant rivers until 2005. In these concepts, more than 1,600 individual flood protection measures are proposed and 548 flood risk maps for all communities at risk are available. With a new methodology specially developed for this task, all measures were prioritized, and a Flood Protection Investment Program with considerable financial resources was put into operation. Furthermore, the new state flood center Landeshochwasserzentrum has been set up and became operational in 2004. It established an advanced full coverage forecast and alert system that has already demonstrated its reliable performance during recent floods.

Temple, Bethany J., Mark E. Milliron, Calixto Vazquez, Michael D. Packard, and Bruce S. Rudy. 2008. The lack of disaster preparedness by the public and it's affect on communities. *Internet Journal of Rescue & Disaster Medicine* 7(2).

Disaster management involves preparing, supporting, and rebuilding society when natural or man-made disasters occur. Emergency management depends highly upon the local economic and social conditions within the disaster region and involves four phases: mitigation, preparedness, response, and recovery. This article will focus on the personal activities of citizens throughout each phase and discuss responsibilities of the general public as well as local, state, and federal governments before, during, and after a disaster. Through a review of available literature, this article attempts to expose why some citizens and/or communities are ill-prepared and rely upon government assistance to protect them from disasters. The net result is that personal safety and welfare are entrusted to

large agencies, unable or unlikely to best serve in the community's best interests.

Westley, Christopher, Robert P. Murphy, and William L. Anderson. 2008. Institutions, incentives, and disaster relief: The case of the Federal Emergency Management Agency following Hurricane Katrina. *International Journal of Social Economics* 35(7): 501-511.

This paper highlights the importance of property rights institutions to disaster relief efforts, with a focus on the U.S. Federal Emergency Management Agency in the aftermath of Hurricane Katrina in New Orleans, Louisiana. It utilizes public choice, Austrian, and new institutional analyses of bureaucracy. It discusses private and public sector responses to the situation in New Orleans following Katrina and to disasters in general, and compares the institutional frameworks that develop over time in both sectors. The paper finds that a large and bureaucratized response to disasters hinders economic calculation, incentive structure, and property rights institutions, all of which are crucial for rapid disaster response, the relief of human suffering, the minimization of knowledge problems, and the promotion of an efficient allocation of resources. This research suggests that the role of the price system in allocating resources is especially important following disasters and that in order to ensure relief efforts are as efficient as possible, public-sector actors should do nothing to impede them. It also suggests that the incentives to prepare an efficient emergency preparedness program are greater when those most affected by potential disasters are held responsible for their implementation. The paper provides a critical evaluation of the role of highly centralized approaches to disaster relief.

Wood, J. Stuart. 2008. The finance of Katrina. *International Journal of Social Economics* 35(8): 579-589.

This is an interdisciplinary analysis of events using several different theoretical tools combined in an innovative way to examine why systematic errors were made and are continuing, and how errors can be stopped. The paper is of greatest value to those repairing the damaged infrastructure of southeast Louisiana and Mississippi. The paper's purpose is to discover the causes of the devastation of New Orleans and the Mississippi Gulf Coast and how it may be ameliorated. Economic analysis of the prior conditions causing susceptibility to flooding and of the subsequent events involving long-term assets; how assets had been selected; and what changes have occurred in the evaluation

and selection process. The devastation caused by the hurricanes was far exceeded by: the prior governmental misleading of entrepreneurs and property owners regarding the actual level of flood protection provided to New Orleans by the bureaucratic Army Corps of Engineers' "flood protection system;" the resulting Rothbardian "cluster of entrepreneurial error" which allowed the devastation of New Orleans capital goods; the Hayekian unintended consequences of government actions and pronouncements following the storm, which interfered with market signals, increased subjective risk, reduced return expectations of entrepreneurs for capital assets, reducing net present values below zero; and the Misesian bureaucratic inefficiency of the corps and other governmental agents both before and after the storm. A sharp increase in their perception of flooding risk caused market participants to see that no improvement in flood control can be achieved under the present bureaucratic structure. They have permanently increased their perceived risk and discount rates, thereby reducing the pace of asset emplacement. Replacing the system of Lachmanian heterogeneous capital assets and their communications connections destroyed by Katrina cannot be accomplished in the present situation. New government actions and regulations are continually changing, noisy, and have altered property rights. The interactive efficiency of the asset system has been decreased. Incorrect assets are being built, necessary assets are being neglected, and the communications network between assets is not being replaced. A finer level of detail could be investigated, focusing on smaller sub-systems and interactions. The greatest improvement in asset rebuilding would follow the elimination of all government regulations and regulatory agencies impeding the decision process, and private companies should be contracted to replace the destroyed wetlands and emplace flood controls.

Wood, Karen, and Stanley B. Supinski. 2008. Pandemic influenza tabletop exercises: A primer for the classroom and beyond. *Journal of Homeland Security and Emergency Management* 5(1).

An influenza pandemic has been at the forefront of the homeland security and emergency management concerns for the past several years. The U.S. Department of Health and Human Services has led federal efforts to address the threat, including establishing operational plans and training and developing a template for tabletop exercises—Tabletop Exercise for Pandemic Influenza Preparedness in Local Public Health Agencies—that can serve as a model for every jurisdiction. The exercise is valuable for public health planning, but neglects some of the broader implica-

tions of the planning and coordination required of the first response community. This paper is designed as an educational tool to prepare emergency management and homeland security students for complex pandemic realities and the experience of a tabletop exercise. Beyond the classroom, it focuses on pandemic issues that exceed the scope of the Health and Human Services tabletop by discussing the role of the exercises in emergency management planning, providing an overview of the present threat, outlining special considerations and assumptions relevant to that threat, and reviewing the foundations of existing pandemic influenza planning and response materials. It also offers an adapted version of the tabletop that addresses problematic planning areas for public safety and emergency management professionals and can facilitate pandemic problem solving for public and private organizations.

Zevenbergen, C., W. Veerbeek, B. Gersonius, and S. van Herk. 2008. Challenges in urban flood management: Traveling across spatial and temporal scales. *Journal of Flooplain Management* 1(2): 81-88.

Urban floods cannot be managed in isolation at the city scale. Responses to potential flood impacts are complicated by interlinked political, socioeconomic, and environmental changes. To understand the unique features of urban flood management, a framework should be developed in which spatio-temporal relations are further defined and investigated. This should provide clarity regarding both the feedback loops that cause vulnerability as well as those that build resilience, and how they interact across differing spatial scales. Various insights and methods from system and complexity theory could provide hands-on methods to create such a framework. Yet the transition towards system-based approaches is still surrounded by many unknown factors; more effort should be put into developing a roadmap towards this transition. It is argued that local-scale pioneering and experimentation are essential in this process to encourage the cultivation of resilience through bottom-up initiatives to shape strategy and policy development.

Disaster Relief

Strinham, Edward P., and Nicholas A. Cnow. 2008. The broken trailer fallacy: Seeing the unseen effects of government policies in post-Katrina New Orleans. *International Journal of Social Economics* 35(7): 480-489.

This paper analyzes some of the unseen negative effects of the post-Katrina government policies dealing with housing in New Orleans. Since Hurricane

Katrina, the government, along with private for-profit and not-for-profit organizations, has worked to rebuild the city of New Orleans. This effort is most evident in the response to the housing crisis that followed the storm. The government has spent billions of dollars and brought thousands of people in to rebuild homes and other infrastructure in the long run and to provide stopgap measures in the short run. The approximately 120,000 Federal Emergency Management Agency (FEMA) trailers in the region are one of the most visible examples of government efforts. This article finds that while the trailers did provide benefits to those who received them, it could be argued that the government's policies aimed toward solving the housing crisis suffer from Frederic Bastiat's broken window fallacy. FEMA trailers and the multitude of workers brought in are examples of what is seen, and, as Bastiat showed, we must also look at what is unseen. The paper shows the trailer problem, among others, has weakened the relief effort.

Westley, Christopher, Robert P. Murphy, and William L. Anderson. 2008. Institutions, incentives, and disaster relief: The case of the Federal Emergency Management Agency following Hurricane Katrina. *International Journal of Social Economics* 35(7): 501-511.

This paper highlights the importance of property rights institutions to disaster relief efforts, with a focus on the U.S. Federal Emergency Management Agency in the aftermath of Hurricane Katrina in New Orleans, Louisiana. It utilizes public choice, Austrian, and new institutional analyses of bureaucracy. It discusses private and public sector responses to the situation in New Orleans following Katrina and to disasters in general, and compares the institutional frameworks that develop over time in both sectors. The paper finds that a large and bureaucratized response to disasters hinders economic calculation, incentive structure, and property rights institutions, all of which are crucial for rapid disaster response, the relief of human suffering, the minimization of knowledge problems, and the promotion of an efficient allocation of resources. This research suggests that the role of the price system in allocating resources is especially important following disasters and that in order to ensure relief efforts are as efficient as possible, public-sector actors should do nothing to impede them. It also suggests that the incentives to prepare an efficient emergency preparedness program are greater when those most affected by potential disasters are held responsible for their implementation. The paper provides a critical evaluation of

the role of highly centralized approaches to disaster relief.

Earthquakes

Asef, M. R. 2008. Modeling the elements of country vulnerability to earthquake disasters. *Disasters* 32(3): 480-498.

Earthquakes have probably been the most deadly form of natural disaster in the past century. Diversity of earthquake specifications in terms of magnitude, intensity, and frequency at the semi-continental scale has initiated various kinds of disasters at a regional scale. Additionally, diverse characteristics of countries in terms of population size, disaster preparedness, economic strength, and building construction often cause an earthquake of a certain characteristic to have different impacts on the affected region. This research focuses on the appropriate criteria for identifying the severity of major earthquake disasters based on some key observed symptoms. Accordingly, the article presents a methodology for identification and relative quantification of severity of earthquake disasters. This has led to an earthquake disaster vulnerability model at the country scale. Data analysis based on this model suggested a quantitative, comparative and meaningful interpretation of the vulnerability of concerned countries, and successfully explained which countries are more vulnerable to major disasters.

Beem, H., R. Fendler, and W. B. Kratzig. 2008. Impact of storms and earthquakes on industrial installations: New risk control approaches required? *Natural Hazards* 46(2): 243-256.

As a consequence of heavy floods in Germany in August, 2002, the Umweltbundesamt UBA—German Environmental Protection Agency—started a research project on the safety of industrial installations related to technical as well as natural risks. Although the main focus of this research was on floods, risks from storms and earthquakes were also studied. The present paper offers a brief survey of the storm and earthquake regulations for all built environment in Germany, including industrial plants. It further shows how these natural hazardous risks are treated in national building standards, and how they are transformed into residual failure risks of buildings. Based on this knowledge, the manuscript then elucidates safety gaps in combination with technical risks in industrial plants under operation.

Bird, Deanne, Matthew J. Roberts, and Dale Dominey-Howes. 2008. Usage of an early warning and infor-

mation system Web site for real-time seismicity in Iceland. *Natural Hazards* 47(1): 75-94.

Iceland has been subjected to destructive earthquakes and volcanic eruptions throughout its history. These events are often preceded by changes in earthquake activity over varying timescales. Although most seismicity is confined to micro-earthquakes, large earthquakes have occurred within populated regions. Following the most recent hazardous earthquakes in 2000, the Icelandic Meteorological Office (IMO) developed an early warning and information system (EWIS) Web site for viewing near-real-time seismicity in Iceland. Here the authors assess Web site usage data in relation to earthquake activity, as recorded by the South Iceland Lowland (SIL) seismic network. Between March 2005 and May 2006 the SIL seismic network recorded 12,583 earthquakes. During this period, the EWIS Web site logged a daily median of 91 visits. The largest onshore event struck 20 km from Reykjavík on March 6, 2006 and was followed by an immediate upsurge in usage resulting in a total of 1,173 unique visits to the Web site. The greatest cluster of large events occurred 300 kilometers (180 miles) offshore from Reykjavík in May 2005. Within this swarm, nine earthquakes were detected on May 11, 2005, resulting in the release of a media bulletin by IMO. During the swarm, and following the media bulletin, the EWIS Web site logged 1,234 unique visits gradually throughout the day. In summary, the data reveal a spatial and temporal relationship between Web site usage and earthquake activity. The EWIS Web site is accessed immediately after the occurrence of a local earthquake, whereas distant, unfelt earthquakes generate gradual interest prompted by media bulletins and, possibly, other contributing factors. The authors conclude that the Internet is a useful tool for displaying seismic information in near-real-time, which has the capacity to help increase public awareness of natural hazards.

Campedel, Michela, Valerio Cozzani, Anita Garcia-Agreda, and Ernesto Salzano. 2008. Extending the quantitative assessment of industrial risks to earthquake effects. *Risk Analysis* 28(4): 1-16.

In the general framework of quantitative methods for natural-technological risk analysis, a specific methodology was developed for assessing risks caused by hazardous substances released as a result of earthquakes. The contribution of accidental scenarios initiated by seismic events to the overall industrial risk was assessed in three case studies derived from the actual plant layout of existing oil refineries. Several specific vulnerability models for different equipment classes were compared and assessed. The effect of differing

structural resistances for process equipment on the final risk results was also investigated. The main factors influencing the final risk values resulted from the models for equipment vulnerability and the assumptions for the reference damage states of the process equipment. The analysis of case studies showed, in seismic zones, the additional risk deriving from damage caused by earthquakes may be up to more than one order of magnitude higher than that associated with internal failure causes. Critical equipment was determined to be mainly pressurized tanks, even though atmospheric tanks were more vulnerable to containment loss. Failure of minor process equipment having a limited hold-up of hazardous substances (such as pumps) was shown to have limited influence on the final values of the risk increase caused by earthquakes.

Chan, Emily. 2008. The untold stories of the Sichuan earthquake. *The Lancet* 372(9636): 359-362.

The article presents an overview of the short-term needs of people affected by the 2008 earthquake in Sichuan province in China, and of the medical and public health challenges faced by the Chinese population as reconstruction efforts in the province continue. A discussion of the mental health needs of people in the province who were affected by the earthquake, and of a lack of preparedness which was seen in the province despite knowledge that it was in an at-risk area, is presented.

Chester, David K. 2008. The effects of the 1755 Lisbon earthquake and tsunami on the Algarve region, southern Portugal. *Geography* 93(2): 78-90.

The 1755 Lisbon earthquake (magnitude c. 8.5Mw) killed between 15,000 and 20,000 people, of whom an estimated 1,020 lived in the Algarve. The earthquake cost Portugal between 32 percent and 48 percent of its Gross Domestic Product, probably making it financially the greatest natural catastrophe to have affected western Europe. Using a combination of archival information and data collected in the field, this article discusses the devastating effects of the earthquake and tsunami on the economy, society and major settlements in the Algarve, and the recovery of the region in the years that followed. Today the Algarve is one of Europe's principal tourist destinations and a region vital to the Portuguese economy. The 1755 earthquake was not a single event and the Algarve, which now houses a resident population of over 400,000—a figure that more than doubles with tourists in the summer months—is highly exposed to earthquakes and tsunamis. An earthquake of similar size (minimum estimated recurrence 614±105 years), is viewed as a worst-case

future scenario. Although strict building codes which apply to the whole country were pioneered in Portugal following the 1755 earthquake, and have been revised on many occasions, there is a recognized need for more detailed hazard maps and emergency plans for the Algarve. In the Algarve a start has been made, where a tsunami risk map has recently been completed for Portimão concelho (county).

Cruz, Ana Maria, and Norio Okada. 2008. Methodology for preliminary assessment of natech risk in urban areas. *Natural Hazards* 46(2): 199-220.

Concern for natural hazard-triggered technological disasters (natech disasters) in densely populated and industrialized areas is growing. Residents living in urban areas subject to high natural hazard risk are often unaware of the potential for secondary disasters such as hazardous materials releases from neighboring industrial facilities, chemical storage warehouses, or other establishments housing hazardous materials. Lessons from previous disasters, such as the natech disaster during the Kocaeli earthquake in Turkey in 1999 call for the need to manage low frequency/high consequence events, particularly in today's densely populated areas. However, there is little guidance available on how local governments and communities can assess natech risk. To add to the problem, local governments often do not have the human or economic resources or expertise to carry out detailed risk assessments. In this article, the authors propose a methodology for preliminary assessment of natech risk in urban areas. The proposed methodology is intended for use by local government officials in consultation with the public. The methodology considers possible interactions between the various systems in the urban environment: the physical infrastructure (e.g., industrial plants, lifeline systems, critical facilities), the community (e.g., population exposed), the natural environment (e.g., delicate ecosystems, river basins), and the risk and emergency management systems (e.g., structural and nonstructural measures). Factors related to vulnerability and hazard are analyzed and qualitative measures are recommended. Data from hazardous materials releases during the Kocaeli, Turkey, earthquake of August 17, 1999 are used as a case study to demonstrate the applicability of the methodology. Limitations of the proposed methodology are discussed as well as future research needs.

Durukal, Eser, and Mustafa Erdik. 2008. Physical and economic losses sustained by the industry in the 1999 Kocaeli, Turkey earthquake. *Natural Hazards* 46(2): 153-178.

The aim of this article is to contribute with first-hand data on damage and failure modes at industrial facilities subject to earthquakes. Physical and economic losses faced by the industry in the 1999 Kocaeli earthquake are summarized. Industrial-sector based, as well as component-based descriptions of earthquake performance and damage are provided. The results of the post-earthquake questionnaire survey designed and executed with the aim of gathering factual data from industrial facilities that experienced physical damages, as well as suffered from business interruption losses are presented. Generalized-intensity-based mean damage ratios for industrial facilities in Turkey are given. The information provided in this article can be used for the first order estimation of building, machinery and equipment losses, as well as stock and business interruptions, associated with industry during earthquakes in Turkey.

Fendler, Roland. 2008. Floods and safety of establishments and installations containing hazardous substances. *Natural Hazards* 46(2): 257-263.

As a consequence of the floods in Germany in August 2002 the Umweltbundesamt (German Environment Agency) set up a research project on natural hazards and their relevance for the safety of establishments and installations containing hazardous substances, i.e. the prevention of "Natechs" (natural hazards triggering technological accidents). The scope of the project included hazards by earthquakes and storms but the main focus was on floods. Subject of the project was the safety of establishments, installations containing substances hazardous to water according to the German Federal Water Act (e.g. chemical plants, tank farms, filling stations, heating oil tanks) and vessels for storage of extremely flammable gases (mainly LPG). The project included a survey of the flood risk management at establishments and installations in the catchment areas of the Rhine and the Elbe, a description of available flood protection and safety technology and a discussion of emergency planning requirements. Gaps in flood risk management at industrial sites and installations were identified and recommendations on policy, regulations, standards and safety management made.

Ghosh, A. K. 2008. Assessment of earthquake-induced tsunami hazard at a power plant site. *Nuclear Engineering and Design* 238(7): 1743-1749.

This paper presents a study of the tsunami hazard due to submarine earthquakes at a power plant site on the east coast of India. The paper considers various sources of earthquakes from the tectonic information, and records of past earthquakes and tsunamis. Magnitude

frequency relationship for earthquake occurrence rate and a simplified model for tsunami run-up height as a function of earthquake magnitude and the distance between the source and site have been developed. Finally, considering equal likelihood of generation of earthquakes anywhere on each of the faults, the tsunami hazard has been evaluated and presented as a relationship between tsunami height and its mean recurrence interval (MRI). Probability of exceedence of a certain wave height in a given period of time is also presented. These studies will be helpful in making an estimate of the tsunami-induced flooding potential at the site.

Green, Rebekah A. 2008. Unauthorized development and seismic hazard vulnerability: A study of squatters and engineers in Istanbul, Turkey. *Disasters* 32(3): 358-376.

Many cities in developing nations have experienced an influx of poor migrants in search of work. This population influx has often been accommodated through land squatting, irregular construction, and unauthorized housing. For the urban poor, this has resulted in immediate affordable housing. This housing frequently has long-term vulnerability to natural hazards, however. This article examines the ways in which squatters in Istanbul, Turkey, understand the seismic vulnerability of their unauthorized housing. Distrust of professional engineers and contractors has led Istanbul squatters to believe that self-built housing will not only be less costly but also safer than commercially built housing. The impact of residents' risk perceptions on their vulnerability to natural hazards is examined through a comparison of social attitudes regarding safe housing and the quality of unauthorized construction. This comparison highlights how squatters' risk perceptions necessitate innovative means of reducing vulnerability in unauthorized neighborhoods of developing cities.

Iuchi, Kanako, and Ann-Margaret Esnard. 2008. Earthquake impact mitigation in poor urban areas: The case of Metropolitan Manila. *Disaster Prevention and Management* 17(4): 454-469.

The Philippines is often described as the melting pot of natural disasters (typhoons, floods and torrential rains). As part of the Pacific ring of fire, the Philippines are also prone to earthquakes and volcanic eruptions. In the current disaster management scheme, the poor are likely to be put last. Conventional risk reduction mitigation methods (such as land use and building codes) are failing. A paradigm shift is needed, one that enables poor communities to maximize their limited resources and contribute to risk reduction. Interviews and field investigations were conducted between 2001

and 2006 in three case study neighborhoods in metropolitan Manila to understand the risk components that exist and the resources (or lack of) for dealing with them. Field surveys highlighted three major risk components: liquefied petroleum gas (LPG), illegal electrical connections, and residential buildings. Mitigation efforts must be implemented by: developing hybrid community organizations; minimizing direct physical damage; developing neighborhood cooperatives through microfinance schemes; and developing an in-kind community insurance system. While this research focused on earthquake impact mitigation, the inquiry and findings with respect to the urban poor in high risk areas have applicability to other localities in the developing world. Furthermore, Manila's situation is not unique. Disaster threats, rapid substandard urban development, growth in the number of the poor, and degradation of social capital are phenomena present in other parts of the developing world. In such settings, traditional mitigation approaches are difficult to carry out effectively.

Kuwabara, Hideki, Toshiki Shioiri, Shin-Ichi Toyabe, Tsuyoshi Kawamura, Masataka Koizumi, Miki Ito-Sawamura, Kouhei Akazawa, and Toshiyuki Someya. 2008. Factors impacting on psychological distress and recovery after the 2004 Niigata-Chuetsu earthquake, Japan: Community-based study. *Psychiatry & Clinical Neurosciences* 62(5): 503-507.

This study was undertaken five months after the 2004 Niigata-Chuetsu earthquake in Japan to assess factors that impacted psychological distress and recovery. Three thousand and twenty-six adult victims who lived in temporary shelter and in seriously damaged areas were evaluated by questionnaire. The questionnaire queried subject profile, degree of house damage, health status, and psychological distress using a five-point scale before, immediately after, and five months after the earthquake. Immediately after the earthquake, 59.3 percent of the subjects had psychological distress. At five months after the earthquake, however, this percentage decreased to 21.8 percent. The psychological distress immediately after the earthquake was serious in victims who: (i) were female; (ii) felt stronger fear of the earthquake and the aftershocks; (iii) lived at home or office after the earthquake; and (iv) were injured due to the earthquake or suffered from sickness after the earthquake. In contrast, the factors impairing psychological recovery five months after the earthquake were as follows: (i) being with unfamiliar people during the night after the earthquake; (ii) serious house damage; (iii) living in temporary shelter or at a relative's home after the earthquake; and (iv) physical illness after the

earthquake. Despite differences between disasters, these results were consistent with those in some previous studies and may be useful for long-term mental care support.

Mohanty, William K., and M. Yanger Walling. 2008. Seismic hazard in mega city Kolkata, India. *Natural Hazards* 47(1): 39-54.

The damage caused by recent earthquakes in India have been a wake-up call for people to take proper mitigation measures, especially in the major cities that lie in the high seismic hazard zones. Kolkata City, with thick sediment deposits (~12 km), one of the earliest cities of India, is an area of great concern. It lies over the Bengal Basin at the boundary of the seismic zones III and IV of the zonation map of India. Kolkata has been affected by the 1897 Shillong earthquake, the 1906 Calcutta earthquake, and the 1964 Calcutta earthquake. An analysis on the maximum magnitude and b-value for Kolkata City region is carried out after the preparation of earthquake catalog from various sources. Based on the tectonic set-up and seismicity of the region, five seismic zones are delineated, which can pose a threat to Kolkata in the event of an earthquake. They are broadly classified as: Zone 1, Arakan-Yoma Zone; Zone 2, Himalayan Zone; Zone 3, Shillong Plateau Zone; Zone 4, Bay of Bengal Zone; and Zone 5, Shield Zone. The maximum magnitude for zones 1, 2, 3, 4, and 5 are 8.30 ± 0.51 , 9.09 ± 0.58 , 9.20 ± 0.51 , 6.62 ± 0.43 and 6.61 ± 0.43 , respectively. A probability of 10 percent exceedence value in 50 years is used for each zone. The probabilities of occurrences of earthquakes of different magnitudes for return periods of 50 and 100 years are computed for the five seismic zones. The peak ground acceleration (PGA) obtained for Kolkata City varies from 0.34 to 0.10 g.

Saraf, Arun K., Vineeta Rawat, Priyanka Banjeree, Swapnamita Choudhury, Santosh K. Panda, Sudipta Dasgupta, and J. D. Das. 2008. Satellite detection of earthquake thermal infrared precursors in Iran. *Natural Hazards* 47(1): 119-135.

Stress accumulated in rocks in tectonically active areas may manifest itself as electromagnetic radiation emission and temperature variation through a process of energy transformation. Land surface temperature (LST) changes before an impending earthquake can be detected with thermal infrared (TIR) sensors such as NOAA-AVHRR, Terra/Aqua-MODIS, etc. TIR anomalies produced by 10 recent earthquakes in Iran during the period of June, 2002 to June, 2006 in the tectonically active belt have been studied using pre- and post-earthquake NOAA-AVHRR datasets. Data analysis revealed

a transient TIR rise in LST ranging 2–13°C in and around epicentral areas. The thermal anomalies started developing about one to 10 days prior to the main event depending upon the magnitude and focal depth, and disappeared after the main shock. In the case of moderate earthquakes (<6 magnitude) a dual thermal peak instead of the single rise has been observed. This may lead us to understand that perhaps pre-event sporadic release of energy from stressed rocks leads to a reduction in magnitude of the main shock. This TIR temperature increment prior to an impending earthquake can be attributed to degassing from rocks under stress or to p-hole activation in the stressed rock volume and their further recombination at the rock–air interface. A precise correlation of LST maps of Bam and Zarand with InSAR-generated deformation maps also provides evidence that the thermal anomaly is a ground-related phenomenon, not an atmospheric one.

Floods

Beem, H., R. Fendler, and W. B. Kratzig. 2008. Impact of storms and earthquakes on industrial installations: New risk control approaches required? *Natural Hazards* 46(2): 243-256.

As a consequence of heavy floods in Germany in August, 2002, the Umweltbundesamt UBA—German Environmental Protection Agency—started a research project on the safety of industrial installations related to technical as well as natural risks. Although the main focus of this research was on floods, risks from storms and earthquakes were also studied. The present paper offers a brief survey of the storm and earthquake regulations for all built environment in Germany, including industrial plants. It further shows how these natural hazardous risks are treated in national building standards, and how they are transformed into residual failure risks of buildings. Based on this knowledge, the manuscript then elucidates safety gaps in combination with technical risks in industrial plants under operation.

Convery, I., and C. Bailey. 2008. After the flood: The health and social consequences of the 2005 Carlisle flood event. *Journal of Floodplain Management* 1(2): 100-109.

This paper considers the health and social impacts that the flooding caused to a number of Carlisle households following the January 2005 floods and storms. In so doing the authors consider such impacts from a “lived, local experience” perspective. They reflect on the need for both informal support and locally accessible and ongoing, post-flood information and support centers.

Such centers can provide one point of contact for multiple emotional and practical problems. The authors suggest that these centers require both strong multi-partnership and multi-agency working and highly skilled support center personnel who have local knowledge and understanding of the affected community. In this way, local post-disaster needs may be contextualized and responded to in a way that both draws on existing local expertise and strengthens long-term community-based support.

Dirmeyer, Jennifer. 2008. The futile fight against (human) nature: A public choice analysis of the US Army Corps of Engineers special focus on Hurricane Katrina. *International Journal of Social Economics* 35(8): 627-638.

This paper discusses bureaucratic management, scientific overconfidence, information distortion and lack of coordination with a particular focus on the post-Hurricane Katrina situation. It examines efficiency arguments for centralized control and the potential for government failure. It also analyzes the disaster with these problems in mind. The Flood Act of 1928 officially transferred the responsibility of flood protection along the Mississippi River to the federal government. While it is true that local provision failed to eliminate the problem of flooding, the problems caused by federal provision have not been fully appreciated. The specific characteristics of flood protection as well as the general problems caused by bureaucratic management and the absence of market mechanisms suggest that local provision of flood protection is a more efficient solution. The paper suggests the previous faith in centralized flood management was unfounded.

Fendler, Roland. 2008. Floods and safety of establishments and installations containing hazardous substances. *Natural Hazards* 46(2): 257-263.

As a consequence of the floods in Germany in August 2002 the Umweltbundesamt (German Environment Agency) set up a research project on natural hazards and their relevance for the safety of establishments and installations containing hazardous substances, i.e. the prevention of “Natechs” (natural hazards triggering technological accidents). The scope of the project included hazards by earthquakes and storms but the main focus was on floods. Subject of the project was the safety of establishments, installations containing substances hazardous to water according to the German Federal Water Act (e.g. chemical plants, tank farms, filling stations, heating oil tanks) and vessels for storage of extremely flammable gases (mainly LPG). The project included a survey of the flood risk manage-

ment at establishments and installations in the catchment areas of the Rhine and the Elbe, a description of available flood protection and safety technology and a discussion of emergency planning requirements. Gaps in flood risk management at industrial sites and installations were identified and recommendations on policy, regulations, standards, and safety management made.

Huang, Xin, Hongshuan Tan, Jia Zhou, Tubao Yang, Abuaku Benjamin, Shi Wu Wen, Shuoqi Li, Aizhong Liu, Xinhua Li, Shudidong Fen, and Xinli Li. 2008. Flood hazard in Hunan province of China: An economic loss analysis. *Natural Hazards* 47(1): 65-73. Natural and man-made disasters have been increasing, affecting millions of people throughout the world. Floods are the most common natural disasters, affecting more people across the globe than all other natural or technological disasters. They also are the most costly in terms of human hardship and economic loss. In order to explore the total economic loss, components of economic loss, and factors influencing economic loss during flooding, a retrospective study was carried out in year 2000 in areas that suffered floods in 1998 in Hunan province, China. A total of 10,722 families were investigated using a multistage sampling method. The authors found that the total economic loss to the 10,722 families investigated was US\$8.925 million; translating into an average economic loss of US\$832.45 per family and US\$216.75 per person. Economic loss related to property loss, income loss, and increased medical cost accounted for 57.4 percent, 40.0 percent, and 2.6 percent of the total economic loss, respectively. Economic loss was significantly related to a family's pre-flood income; duration of the flood; severity of flood; and type of flood. River floods yielded the highest economic loss and drainage problem floods yielded the lowest loss. The authors recommended that flood-related preventive measures should focus on the prevention of river floods and shortening the duration of floods with the view of significantly minimizing economic losses associated with floods.

Jackson, B. M., H. S. Wheeler, N. R. McIntyre, J. Chell, O. J. Francis, Z. Frogbrook, M. Marshall, B. Reynolds, and I. Solloway. 2008. The impact of upland land management on flooding: Insights from a multiscale experimental and modeling program. *Journal of Floodplain Management* 1(2): 71-80.

A program of field experiments at the Pontbren catchment in Wales has, since autumn 2004, been examining the effects of land use change on flooding. The Pontbren catchment possesses a long history of artificial drainage of its clay soils and intensification of

sheep farming. Increased flood runoff has been noted within the last decades, as has the mitigating effect of trees at field scale. To examine the local and catchment-scale effects of land management within the catchment, including the potential advantages of planting additional trees, a multidimensional, physically based model has been developed and conditioned on data from an intensely instrumented slope. The model is used to examine the effects of planting a small strip of trees within a slope. Results demonstrate that careful placement of such interventions can reduce magnitudes of flood peaks by 40 percent at the field scale. The challenges associated with scaling up these results to the Pontbren and Upper Severn catchments are discussed.

Jonkman, Sebastiaan N., Matthijs Kok, and Johannes K. Vrijling. 2008. Flood risk assessment in the Netherlands: A case study for Dike Ring South Holland. *Risk Analysis* 28(5): 1357-1373. Large parts of the Netherlands are below sea level. Therefore, it is important to have insight into the possible consequences and risks of flooding. In this article, an analysis of the risks due to flooding of the dike ring area South Holland in the Netherlands is presented. For different flood scenarios the potential number of fatalities is estimated. Results indicate that a flood scenario event in this area can expose large and densely populated areas and result in hundreds to thousands of fatalities. Evacuation of South Holland before a coastal flood will be difficult due to the large amount of time required for evacuation and the limited time available. By combination with available information regarding the probability of occurrence of different flood scenarios, the flood risks have been quantified. The probability of death for a person in South Holland due to flooding, the so-called individual risk, is small. The probability of a flood disaster with many fatalities, the so-called societal risk, is relatively large in comparison with the societal risks in other sectors in the Netherlands, such as the chemical sector and aviation. The societal risk of flooding appears to be unacceptable according to some of the existing risk limits that have been proposed in literature. These results indicate the necessity of a further societal discussion on the acceptable level of flood risk in the Netherlands and the need for additional risk reducing measures.

Raaijmakers, Ruud, Jorg Krywkow, and Anne van der Veen. 2008. Flood risk perceptions and spatial multi-criteria analysis: An exploratory research for hazard mitigation. *Natural Hazards* 46(3): 307-322.

The conventional method of risk analysis (with risk as a product of probability and consequences) does not allow for a pluralistic approach that includes the various risk perceptions of stakeholders or lay people within a given social system. This article introduces a methodology that combines the virtues of three different methods: the quantifiable conventional approach to risk; the taxonomic analysis of perceived risk; and the analytical framework of a spatial multi-criteria analysis. This combination of methods is applied to the case study "Ebro Delta" in Spain as part of the European sixth framework project "Floodsite." First, a typology for flood hazards is developed based on individual and/or stakeholders' judgments. Awareness, worry, and preparedness are the three characteristics that typify a community to reflect various levels of ignorance, perceived security, perceived control, or desired risk reduction. Applying 'worry' as the central characteristic, a trade-off is hypothesized between worry and the benefits groups in society receive from a risky situation. Second, this trade-off is applied in Spatial Multi-Criteria Analysis (SMCA). MCA is the vehicle that often accompanies participatory processes, where governmental bodies have to decide on issues in which local stakeholders have a say. By using risk perception-scores as weights in a standard MCA procedure a new decision framework for risk assessment is developed. Finally, the case of sea-level rise in the Ebro Delta in Spain serves as an illustration of the applied methodology. Risk perception information has been collected with help of an on-site survey. Risk perception enters the multi-criteria analysis as complementary weights for the criteria risk and benefit. The results of the survey are applied to a set of scenarios representing both sealevel rise and land subsidence for a time span of 50 years. Land use alternatives have been presented to stakeholders in order to provide the regional decision maker with societal preferences for handling risk. Even with limited resources a characteristic risk profile could be drawn that enables the decision maker to develop a suitable land use policy.

Socher, M., and G. Böhme-Korn. 2008. Central European floods 2002: Lessons learned in Saxony. *Journal of Floodplain Management* 1(2): 123-129.

In August 2002, Germany and particularly Saxony were hit by a severe flood affecting more than two-thirds of Saxony's territory. This disastrous flood event gave rise to reconsideration and redirection of flood protection and related disaster management in Saxony. A comprehensive strategic approach was developed. Primarily, any reconstruction and flood protection measure is based on Flood Protection Concepts, which have been

developed for all relevant rivers until 2005. In these concepts, more than 1,600 individual flood protection measures are proposed and 548 flood risk maps for all communities at risk are available. With a new methodology specially developed for this task, all measures were prioritized, and a Flood Protection Investment Program with considerable financial resources was put into operation. Furthermore, the new state flood center Landeshochwasserzentrum has been set up and became operational in 2004. It established an advanced full coverage forecast and alert system that has already demonstrated its reliable performance during recent floods.

Steinberg, Laura J., Hatice Sengul, and Ana Maria Cruz. 2008. Natech risk and management: An assessment of the state of the art. *Natural Hazards* 46(2): 143-152.

The present state-of-the-art for natech risk and management is discussed. Examples of recent natechs include catastrophic oil spills associated with Hurricane Katrina and hazardous chemical releases in Europe during the heavy floods of 2002. Natechs create difficult challenges for emergency responders due to the geographical extent of the natural disaster, the likelihood of simultaneous releases, emergency personnel being preoccupied with response to the natural disaster, mitigation measures failing due to the effects of the natural disaster, and others. Recovery from natechs may be much more difficult than for "normal" chemical accidents, as the economic and social conditions of the industrial facility and the surrounding community may have been drastically altered by the natural disaster. Potential safeguards against natechs include adoption of stricter design criteria, chemical process safeguards, community land use planning, disaster mitigation and response planning, and sustainable industrial processes, but these safeguards are only sporadically applied. Ultimately, the public must engage in a comprehensive discussion of acceptable risks for natechs.

Tsu, Timothy Yun Hui. 2008. Making virtues of disaster: "Beautiful Tales" from the Kobe flood of 1938. *Asian Studies Review* 32(2): 197-214.

The article discusses the tales from the Kobe flood of 1938 in Japan. The flood occurred on July 5, 1938, causing severe damage to the city. There were many tales of bravery, of lives saved, and kindness that sustained needy survivors. Moreover, the tales taken together constitute a larger narrative that transforms an otherwise horrific event into a self-affirming experience for the city and the nation. In addition, these stories extol

moral actions that took place in concrete social, economic, and political situations.

Wood, J. Stuart. 2008. The finance of Katrina.

International Journal of Social Economics 35(8): 579-589.

This is an interdisciplinary analysis of events using several different theoretical tools combined in an innovative way to examine why systematic errors were made and are continuing, and how errors can be stopped. The paper is of greatest value to those repairing the damaged infrastructure of southeast Louisiana and Mississippi. The paper's purpose is to discover the causes of the devastation of New Orleans and the Mississippi Gulf Coast and how it may be ameliorated. Economic analysis of the prior conditions causing susceptibility to flooding and of the subsequent events involving long-term assets; how assets had been selected; and what changes have occurred in the evaluation and selection process. The devastation caused by the hurricanes was far exceeded by: the prior governmental misleading of entrepreneurs and property owners regarding the actual level of flood protection provided to New Orleans by the bureaucratic Army Corps of Engineers' "flood protection system;" the resulting Rothbardian "cluster of entrepreneurial error" which allowed the devastation of New Orleans capital goods; the Hayekian unintended consequences of government actions and pronouncements following the storm, which interfered with market signals, increased subjective risk, reduced return expectations of entrepreneurs for capital assets, reducing net present values below zero; and the Misesian bureaucratic inefficiency of the corps and other governmental agents both before and after the storm. A sharp increase in their perception of flooding risk caused market participants to see that no improvement in flood control can be achieved under the present bureaucratic structure. They have permanently increased their perceived risk and discount rates, thereby reducing the pace of asset emplacement. Replacing the system of Lachmanian heterogeneous capital assets and their communications connections destroyed by Katrina cannot be accomplished in the present situation. New government actions and regulations are continually changing, noisy, and have altered property rights. The interactive efficiency of the asset system has been decreased. Incorrect assets are being built, necessary assets are being neglected, and the communications network between assets is not being replaced. A finer level of detail could be investigated, focusing on smaller sub-systems and interactions. The greatest improvement in asset rebuilding would follow the elimination of all government regulations and

regulatory agencies impeding the decision process, and private companies should be contracted to replace the destroyed wetlands and emplace flood controls.

Zevenbergen, C., W. Veerbeek, B. Gersonius, and S. van Herk. 2008. Challenges in urban flood management: Traveling across spatial and temporal scales. *Journal of Flooplain Management* 1(2): 81-88.

Urban floods cannot be managed in isolation at the city scale. Responses to potential flood impacts are complicated by interlinked political, socioeconomic, and environmental changes. To understand the unique features of urban flood management, a framework should be developed in which spatio-temporal relations are further defined and investigated. This should provide clarity regarding both the feedback loops that cause vulnerability as well as those that build resilience, and how they interact across differing spatial scales. Various insights and methods from system and complexity theory could provide hands-on methods to create such a framework. Yet the transition towards system-based approaches is still surrounded by many unknown factors; more effort should be put into developing a roadmap towards this transition. It is argued that local-scale pioneering and experimentation are essential in this process to encourage the cultivation of resilience through bottom-up initiatives to shape strategy and policy development.

Gender and Vulnerable Populations

Castro, Carmen, Diane Persson, Nancy Bergstrom, and Stanley Cron. 2008. Surviving the storms: Emergency preparedness in Texas nursing facilities and assisted living facilities. *Journal of Gerontological Nursing* 34(8): 9-16.

This study assesses the preparedness of long-term care facilities in Texas responding to Hurricanes Katrina and Rita. A 41-item questionnaire was mailed to facilities; the response rate was 42 percent. Among responding facilities, 4,513 residents were evacuated, and six percent of respondents reported resident death. Financial losses were reported by eight percent of nursing facilities and 45 percent of assisted living facilities because of transportation expenses and staff overtime. Respondents indicated the need for improved disaster preparedness training, better coordination, and transportation. Changes in policy and practice will lead to better trained staff who will provide the care residents need for improved health outcomes during future public health disasters.

Collins, Robert Keith. 2008. Missed by the mass media: The Houma, Pointe-au-Chien, and Hurricanes Katrina and Rita. *American Indian Culture and Research Journal* 32(2): 43-53.

This article looks at the lack of mainstream media coverage into the experiences of Native American populations in southeastern Louisiana following hurricanes Katrina and Rita. Using the Houma and Pointe-au-Chien tribes as a case study, it identifies political, social and cultural factors that were behind the media's focus on the black-white paradigm and the resulting lack of attention paid to the difficulties facing tribal populations in their efforts to recover from the storms.

Deng, Luka Biong. 2008. Are non-poor households always less vulnerable? The case of households exposed to protected civil war in Southern Sudan. *Disasters* 32(3): 377-398.

Civil wars in Africa are now the leading cause contributing to rural community vulnerability. Understanding vulnerability during civil war is critical for humanitarian response and post-conflict rehabilitation planning. Lack of vulnerability understanding has led existing studies to make sweeping generalizations, either by equating the dynamics of vulnerability during civil wars with vulnerability in other risk events or by projecting people in the "war zones" as unable to cope and subsequently becoming vulnerable. This paper is an attempt to gain a more nuanced understanding of the dynamics of vulnerability during protracted civil war. It shows that, during civil war, those who are not poor are not necessarily less vulnerable than those who are. The idea that all people caught in a civil war are vulnerable is not supported by the findings. It shows the "standard" pattern of vulnerability to drought is similar to exogenous counter-insurgency warfare, while a different pattern of vulnerability to endogenous shocks is identified.

de Vos, Hugo, Joost Jongerden, and Jacob van Etten. 2008. Images of war: Using satellite images for human rights monitoring in Turkish Kurdistan. *Disasters* 32(3): 449-466.

In areas of war and armed conflict, it is difficult to get trustworthy and coherent information. Civil society and human rights groups often face problems of dealing with fragmented witness reports, war propaganda, and difficulty in directly accessing these areas. Turkish Kurdistan was used as a case study of armed conflict to evaluate the potential use of satellite images to verify witness reports collected by human rights groups. The Turkish army was reported to be burning forests, fields, and villages as a strategy against guerrilla upris-

ing. This paper concludes satellite images are useful to validate witness reports of forest fires. Even though the use of this technology for human rights groups will depend on factors such as prices, access, and expertise, the images proved to be key for analysis of spatial aspects of conflict and valuable for reconstructing a more trustworthy picture.

Forgette, Richard, Marvin King, and Bryan Dettrey. 2008. Race, Hurricane Katrina, and government satisfaction: Examining the role of race in assessing blame. *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 671-691.

Are there clear racial differences in government satisfaction across levels of government? And, if so, how do we explain this racial gap? Race was one of the prevailing cleavages in public attitudes toward Hurricane Katrina recovery and response. This article proposes and tests contending explanations for racial differences in local, state, and national government satisfaction among Hurricane Katrina survivors. The first is an environmental vulnerability (racism) theory suggesting that minority populations are more vulnerable in their housing quality, location, and level of insurance compared to others. A second explanation relates to the role of informal or social networks in disaster recovery. The article assesses whether racial differences in perceptions of disaster response may be partly due to weaker informal social networks among minorities. A third explanation is that these differing explanations are largely a function of partisanship. Findings indicate that the role of race in government evaluation was largely mediated through the greater environmental vulnerability and Democratic party identification of minorities.

Green, Rebekah A. 2008. Unauthorized development and seismic hazard vulnerability: A study of squatters and engineers in Istanbul, Turkey. *Disasters* 32(3): 358-376.

Many cities in developing nations have experienced an influx of poor migrants in search of work. This population influx has often been accommodated through land squatting, irregular construction, and unauthorized housing. For the urban poor, this has resulted in immediate affordable housing. This housing frequently has long-term vulnerability to natural hazards, however. This article examines the ways in which squatters in Istanbul, Turkey, understand the seismic vulnerability of their unauthorized housing. Distrust of professional engineers and contractors has led Istanbul squatters to believe that self-built housing will not only be less costly but also safer than commercially built hous-

ing. The impact of residents' risk perceptions on their vulnerability to natural hazards is examined through a comparison of social attitudes regarding safe housing and the quality of unauthorized construction. This comparison highlights how squatters' risk perceptions necessitate innovative means of reducing vulnerability in unauthorized neighborhoods of developing cities.

Kaiser, Cheryl R., Collette P. Eccleston, and Nao Hagiwara. 2008. Post-Hurricane Katrina racialized explanations as a system threat: Implications for Whites' and Blacks' racial attitudes. *Social Justice Research* 21(2): 192-203.

This experiment drew upon theoretical perspectives on group and system justification to examine whether exposure to media coverage arguing that racism was responsible for the ineffective Hurricane Katrina disaster response affected white and black Americans' intergroup attitudes. Consistent with a system justification perspective, whites exposed to video clips arguing that the hurricane Katrina disaster response was due to racism displayed greater racial in-group attachment and in-group love compared to whites exposed to videos conveying that the government's incompetence was to blame for the disaster response. In contrast, blacks displayed strong levels of in-group attachment and in-group love across both video conditions. This research highlights how insights from social psychology are valuable in understanding psychological responses to social justice-related events, such as the tragic response to Hurricane Katrina.

Perez Mendez, Jesse, Judith K. Mathers, and David M. Neal. 2008. After the storm: K-12 education response to Hurricane Katrina at the state level. *Journal of Emergency Management* 6(4): 32-38.

This article addresses the policy reaction of 13 high impact states in addressing the kindergarten through 12th grade student diaspora that followed Hurricane Katrina. This disaster displaced approximately 372,000 K-12 Louisiana and Mississippi students. After examining various legislative policy responses and administrative management of displacement accommodations, the authors identified various patterns that suggest states resorted to ad hoc policy to address the massive influx of displaced students. The authors recommend that governmental agencies consider the utilization of protective planning procedures to address educational concerns in further disasters.

Pina, Armondo A., Ian K. Villalta, Claudio D. Ortiz, Amanda C. Gottschall, Natalie M. Costa, and Carl F. Weems. 2008. Social support, discrimination, and

coping as predictors of posttraumatic stress reactions in youth survivors of Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 564-574.

This study examined the influence of the post-Hurricane Katrina recovery environment (i.e., discrimination, social support) and coping behaviors on children's post-traumatic stress reactions (symptoms of post-traumatic stress disorder [PTSD], anxiety, and depression). Data revealed that greater helpfulness from extra-familial sources of social support predicted lower levels of child-rated symptoms of PTSD, anxiety, and depression. A positive-predictive relation was found between helpfulness from professional support sources and PTSD, perhaps suggesting that parents whose children were experiencing higher PTSD-symptom levels sought professional support and reported it was helpful. Youths' avoidant coping behaviors predicted both PTSD and anxiety symptoms. Discrimination, active coping, and familial support did not predict any of the post-traumatic stress reactions assessed in this study.

Redlener, Irwin. 2008. Population vulnerabilities, pre-conditions, and the consequences of disasters. *Social Research* 75(3): 1-8.

The author argues that the public health consequences of a major disaster are worse when health, nutrition, and economic status are less than optimal and when conditions in the larger community lack basic levels of support. He suggests investing in community support systems, creating income stability, and improving access to necessary services should be part of overall disaster planning.

Salloum, Alison, and Stacy Overstreet. 2008. Evaluation of individual and group grief and trauma interventions for children post disaster. *Journal of Clinical Child and Adolescent Psychology* 37(3): 495-507.

This study evaluated a community-based grief and trauma intervention for children following a disaster. Fifty-six children (7 to 12 years old) who reported moderate to severe symptoms of post-traumatic stress were randomly assigned group or individual treatment consisting of a manualized 10-session grief- and trauma-focused intervention and a parent meeting. Measures of disaster-related exposure, post-traumatic stress symptoms, depression, traumatic grief, and distress were administered at pre-intervention, post-intervention, and three weeks post-intervention. There was a significant decrease in all outcome measures over time and no difference between group and individual intervention outcomes. Results suggest that intervention using either treatment modality could be effective

for addressing childhood grief and trauma following disasters.

Scaramella, Laura V., Sara L. Sohr-Preston, Kristin L. Callahan, and Scott P. Mirabile. 2008. A test of the family stress model on toddler-aged children's adjustment among Hurricane Katrina impacted and nonimpacted low-income families. *Journal of Clinical Child and Adolescent Psychology* 37(3): 530-541.

The Family Stress Model describes a process where financial strain undermines parents' mental health, the quality of family relationships, and child adjustment. Our study considered the extent to which the Family Stress Model explained toddler-aged adjustment in families affected by Hurricane Katrina-affected and those not affected. Two groups of very low income mothers and their two year-old children participated. Consistent with the Family Stress Model, financial strain and neighborhood violence were associated with higher levels of mothers' depressed mood; depressed mood was linked to less parenting efficacy. Poor parenting efficacy was associated to more internalizing and externalizing problems among children.

Scheeringa, Michael S., and Charles H. Zeanah. 2008. Reconsideration of harm's way: Onsets and co-morbidity patterns of disorders in preschool children and their caregivers following Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 508-518.

This study examined post-traumatic stress disorder (PTSD) and co-morbid disorders in 70 preschool children (ages three to six) and their caregivers following Hurricane Katrina. The children's rate of PTSD was 50 percent using age-modified criteria. The rate of PTSD was 62.5 percent for those who stayed in the city and 43.5 percent in those who evacuated. Of those with PTSD, 88.6 percent had at least one co-morbid disorder, with oppositional defiant disorder and separation anxiety disorder being most common. Caregivers' rate of PTSD was 35.6 percent, of which 47.6 percent was post-Katrina. No children and only two caregivers developed new non-PTSD disorders in the absence of new PTSD symptoms. Differences by race and gender weren't largely significant. Children's new PTSD symptoms correlated more strongly to caregivers with new symptoms compared to caregivers with old or no symptoms.

Spell, Annie W., Mary Lou Kelley, Jing Wang, Shannon Self-Brown, Karen L. Davidson, Angie Pellegrin, Jeanette L. Palcic, Kara Meyer, Valerie Paasch, and Audrey Baumeister. 2008. The moderating effects of

maternal psychopathology on children's adjustment post-Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 553-563.

This study investigated the role maternal psychopathology plays in predicting children's psychological distress in a disaster-exposed sample. Participants consisted of 260 public school children (ages 8-16) and their mothers. These families were displaced from New Orleans because of Hurricane Katrina in 2005. Assessment took place three to seven months post-disaster. Hierarchical regression analyses revealed that global maternal psychological distress and maternal post-traumatic stress disorder moderated the relation between the child's hurricane exposure and mother-reported child internalizing and externalizing symptoms.

Sprung, Manuel. 2008. Unwanted intrusive thoughts and cognitive functioning in kindergarten and young elementary school-age children following Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 575-587.

Seven months after Hurricane Katrina, 183 five to eight year-old children were surveyed about intrusive thoughts and tested on their level of cognitive functioning (knowledge about the mind and the mind's operations). Basic developmental research suggests children who lack sufficient knowledge about the mind could have difficulties answering questions about intrusive thoughts. Hurricane-affected children reported relatively more intrusive thoughts with negative content than non-affected children. An association between children's understanding of the mind and their ability to report on their intrusive thoughts supports this hypothesis. Results point to funneling of intrusive thoughts toward negative content following a traumatic event and highlight the importance of considering a child's level of understanding of the mind when investigating intrusive thoughts in young children.

Vuk, Vedran. 2008. Taking advantage of disaster: Misrepresentation of housing shortage for political gain. *International Journal of Social Economics* 38(8): 603-614.

This article explores the political benefactors of perpetuating falsehoods in order to make political gains. It explores the reports of housing shortages in post-Katrina New Orleans especially for low-income residents in the face of a returning working poor population. Despite the availability of housing vouchers by the New Orleans Housing Authority to any previous residents of New Orleans housing projects, a political uproar has claimed no homes are available and that destroying the previously failing New Orleans housing

projects would amount to “forced homelessness.” The analysis is done by reflecting on different commentary from persons claiming the housing projects must be preserved while also exploring the failed goals of the same public institutions. Further, a brief overview of the housing situation regarding availability of homes is conducted. The findings show that the poor of New Orleans are being misled about available housing, and there is a continuing process of decline in sovereignty of local public policy makers and politicians.

Homeland Security and Terrorism

Becker, Steven M., and Sarah A. Middleton. 2008.

Improving hospital preparedness for radiological terrorism: Perspectives from emergency department physicians and nurses. *Disaster Medicine and Public Health Preparedness* 2(3): 174-184.

Hospital emergency department clinicians will play a crucial role in responding to terrorist incidents involving radioactive materials. To date, however, there has been a paucity of research focused specifically on clinicians’ perspectives regarding that threat. At the request of the U.S. Centers for Disease Control and Prevention, researchers at the University of Alabama at Birmingham conducted a series of 10 focus groups (total participants, 77) with emergency physicians and nurses at hospitals in three U.S. regions. Participants considered a hypothetical “dirty bomb” scenario and discussed their perceptions, concerns, information needs, preferred information sources, and views of existing guides and informational materials. Clinicians consistently stated emergency departments and hospital facilities aren’t sufficiently prepared for a terrorist event involving radioactive materials. Participants expressed a need for additional information, strongly disagreed with aspects of current response guidance, and in some cases, indicated they would not carry out current protocols. The findings of this study—the first to examine the emergency clinicians’ views, perceptions, and information needs regarding radiological terrorism—may be useful in future efforts to improve hospital preparedness.

Brown, Kelly L., and Christina Scheungrab. 2008.

Emergency preparedness: Using the Internet to educate the public. *Journal of Emergency Management* 6(4): 17-23.

This research examines the use of the Internet to educate the public on emergency management and homeland security issues. Despite the fact that disasters, when they occur, happen at the local level and directly

impact the general public, the public is conspicuously absent from emergency management planning and training activities at all levels. This is true despite research which suggests that the public, given accurate and relevant information, can respond well to disasters. Educating the public on possible disasters, response scenarios, and other key emergency management issues is a critical first step to engaging the public in emergency management. The current research investigates the use of one means of educating the public, the Internet, on emergency management and homeland security issues. Content analysis of the 50 largest cities in one midwestern state was conducted to determine whether the Internet is used to educate the public; the types of homeland security and emergency management information available to the public on city Web sites; and how difficult the existing information is to access. Results show that few cities are using the Internet as a means of educating the public on emergency management issues. Future research should investigate other means by which the general public should be educated and engaged in emergency management and how the public is using the emergency management information available to them.

Casman, Elizabeth A., and Baruch Fischhoff. 2008. Risk communication planning for the aftermath of a plague bioattack. *Risk Analysis* 28(5): 1327-1342.

This article creates an influence diagram of how a plague bioattack could unfold and then uses it to identify factors shaping infection risks in possible scenarios. The influence diagram and associated explanations provide a compact reference that allows risk communicators to identify key messages for pre-event preparation and testing. It can also be used to answer specific questions in unique situations that consider the conditions of the attack and the properties of the attacked populations. The influence diagram allows a quick, visual check of the factors that must be covered when evaluating audience information needs. The documentation provides content for explaining the resulting advice. The article shows how these tools can help in preparing for crises and responding to them.

DiMaggio, Charles, Paula A. Madrid, George T. Loo, and Sandro Galea. 2008. The mental health consequences of terrorism: Implications for emergency medicine practitioners. *Journal of Emergency Medicine* 35(2): 139-147.

Emergency physicians are likely to be first-line responders to local or regional terrorist attacks. In addition to preparing for potential physical conditions and injuries associated with terrorism, they should be

aware of the behavioral and mental health implications, especially the characteristics that predict who may be at increased risk for mental illness after such events and how they can be identified in an emergency department setting. Although most people with behavioral conditions stemming from an attack can be expected to recover spontaneously within several months, other individuals are at risk of developing debilitating mental health conditions associated with post-terrorist and disaster environments. Screening tools are available to help emergency practitioners identify these patients and refer them for formal psychiatric evaluation and possible interventions that facilitate and speed the recovery process.

McDonough, David M., Joshua Easton, Rebecca A. Shore-Suslowitz, and Orit Zeevi. 2008. Storming the castle: Strategies for a successful Homeland Security Grant Application. *Journal of Emergency Management* 6 (4): 25-31.

The Department of Homeland Security (DHS) grant program and related homeland security grants managed by other federal departments and agencies are critical to state and local public safety agencies across the nation. State and local agencies use grant funds to purchase terrorism prevention and emergency response equipment, pay training and exercise costs, fund planning activities, and to offset limited personnel costs. Since the initial tide of money was distributed to state and local organizations in 2003, the grant application and implementation process has become increasingly complex and time consuming for emergency planners and managers. This article briefly examines the history of the contemporary Homeland Security grant program as managed by DHS and highlights the increased importance of strong grant writing. The authors then provide practical insight and strategies for those responsible for homeland security grant applications.

Tofani, Alessandro, and Massimiliano Bartolozzi. 2008. Ranking nuclear and radiological terrorism scenarios: The Italian case. *Risk Analysis* 28(5): 1431-1443.

A quantitative criterion for ranking the different scenarios of nuclear and radiological terrorism has been developed. The aim of the model is not to predict terrorist events but to indicate which scenario a terrorist organization would view as more useful in terms of balance between factors that favor and discourage the attack, respectively. These factors were quantified using a scoring system that takes into account the logarithmic relationship between perceptions and stimuli. The criterion was applied to several scenarios, each of

which was modeled in a simple, but not trivial, way to estimate the expected deaths from both radiative and nonradiative effects. The outcome from the ranking method indicates the attractive scenario appears to be the detonation of a low-yield improvised nuclear device in the metropolitan area of a major city.

Wood, Karen, and Stanley B. Supinski. 2008. Pandemic influenza tabletop exercises: A primer for the classroom and beyond. *Journal of Homeland Security and Emergency Management* 5(1).

An influenza pandemic has been at the forefront of the homeland security and emergency management concerns for the past several years. The U.S. Department of Health and Human Services has led federal efforts to address the threat, including establishing operational plans and training and developing a template for tabletop exercises—Tabletop Exercise for Pandemic Influenza Preparedness in Local Public Health Agencies—that can serve as a model for every jurisdiction. The exercise is valuable for public health planning, but neglects some of the broader implications of the planning and coordination required of the first response community. This paper is designed as an educational tool to prepare emergency management and homeland security students for complex pandemic realities and the experience of a tabletop exercise. Beyond the classroom, it focuses on pandemic issues that exceed the scope of the Health and Human Services tabletop by discussing the role of the exercises in emergency management planning, providing an overview of the present threat, outlining special considerations and assumptions relevant to that threat, and reviewing the foundations of existing pandemic influenza planning and response materials. It also offers an adapted version of the tabletop that addresses problematic planning areas for public safety and emergency management professionals and can facilitate pandemic problem solving for public and private organizations.

Hurricanes and Coastal Hazards

Anderson, William, and Scott A. Kjar. 2008. Hurricane Katrina and the levees: Taxation, calculation, and the matrix of capital. *International Journal of Social Economics* 35(8): 569-578.

The purpose of this paper is to analyze the havoc created by Hurricane Katrina from the viewpoint of Austrian Economics. The aim is to look specifically at the poorly invested capital that came about because of the construction of the complex levee system around New Orleans. Applying Austrian Economics, and especially the economic analysis of Carl Menger, the

authors found that there indeed was much bad investment in New Orleans, and the situation was made worse because the levee system upon which everything else depended was unfit to withstand a storm the size of Katrina. Research implications include the examination of other situations in which large amounts of government capital help to leverage other investments, but the original government capital itself proves to be unsustainable. The practical implications of this paper include a warning to people whom we believe should base large amounts of private investment upon government projects that have a political basis, but either cannot withstand natural forces or simply are untenable.

Birkland, Thomas, and Sarah Watermant. 2008. Is federalism the reason for policy failure in Hurricane Katrina? *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 692-714.

Governmental responses to Hurricane Katrina are generally cited as policy failures. Media and popular analyses focus on the federal government's policy failures in hazard preparedness, response, and recovery. Meanwhile, disaster experts realize that disaster response is a shared intergovernmental responsibility. The article examines the federal nature of natural disaster policy in the US to consider whether federalism, or other factors, had the greatest influence on the failures in Katrina. The authors find that some policy failures are related to policy design considerations based in federalism, but that the national focus on "homeland security" and the concomitant reduction in attention to natural hazards and disasters, are equally, if not more complicit, in the erosion of government disaster management capacity that was revealed in Hurricane Katrina.

Carden, Art. 2008. Beliefs, bias, and regime uncertainty after Hurricane Katrina. *International Journal of Social Economics* 35(7): 531-545.

This paper offers evidence of anti-market and anti-foreign bias among what might be called political first responders to Hurricane Katrina, and posits the view that interference with prices compounded the shortages facing the Gulf Coast or any other disaster-stricken area. It explores the relationship between beliefs and economic policy in the context of gasoline prices following Hurricane Katrina. It applies three contributions by North, Caplan and Higgs to the question of gasoline pricing policy; and surveys public opinion regarding interference with prices. It further identifies evidence of "anti-market bias" in polling data, press releases, and legislation, and argues that the uncertainty

emanating from statutes restricting "price gouging" may reduce investment in the provision of necessary goods and services after natural disasters.

Castro, Carmen, Diane Persson, Nancy Bergstrom, and Stanley Cron. 2008. Surviving the storms: Emergency preparedness in Texas nursing facilities and assisted living facilities. *Journal of Gerontological Nursing* 34(8): 9-16.

This study assesses the preparedness of long-term care facilities in Texas responding to Hurricanes Katrina and Rita. A 41-item questionnaire was mailed to facilities; the response rate was 42 percent. Among responding facilities, 4,513 residents were evacuated, and six percent of respondents reported resident death. Financial losses were reported by eight percent of nursing facilities and 45 percent of assisted living facilities because of transportation expenses and staff overtime. Respondents indicated the need for improved disaster preparedness training, better coordination, and transportation. Changes in policy and practice will lead to better trained staff who will provide the care residents need for improved health outcomes during future public health disasters.

Chamlee-Wright, Emily. 2008. Signaling effects of commercial and civil society in post-Katrina reconstruction. *International Journal of Social Economics* 35(8): 615-626.

This paper examines the role private action has played in overcoming the collective action problem posed by Hurricane Katrina. It analyzes the post-Hurricane Katrina situation with regard to commercial and civil society and argues that private recovery efforts within commercial and civil society challenge this assumption. Mutual assistance, commercial cooperation, and the redevelopment of key community resources help to overcome collective action problems by reducing the high costs of an early return and by signaling the potential for widespread recovery to individual actors. Most redevelopment plans assume that a large-scale government response is the only way to overcome the collective action problem. Even in the absence of a government-led reconstruction effort, the strategies described in the paper offer Gulf Coast residents tools for solving the collective action problem presented in the wake of catastrophic devastation.

Collins, Robert Keith. 2008. Missed by the mass media: The Houma, Pointe-au-Chien, and Hurricanes Katrina and Rita. *American Indian Culture and Research Journal* 32(2): 43-53.

This article looks at the lack of mainstream media coverage into the experiences of Native American popula-

tions in southeastern Louisiana following hurricanes Katrina and Rita. Using the Houma and Pointe-aux-Chien tribes as a case study, it identifies political, social and cultural factors that were behind the media's focus on the black-white paradigm and the resulting lack of attention paid to the difficulties facing tribal populations in their efforts to recover from the storms.

Constable, Mark. 2008. Disaster mythology: Looting in New Orleans. *Disaster Prevention and Management* 17(4): 519-525.

This paper examines the many reports of looting during the response operation in New Orleans following Hurricane Katrina in 2005 and assesses these reports against literature which suggests that looting during natural disasters is a myth. Media reports of looting from the days following Hurricane Katrina's landfall in New Orleans are compared with previously published evidence of disaster mythology. Questions are raised regarding the legitimacy of these reports and the role of such reports is assessed along with the role that media agencies play in disaster planning and response. Media reports of looting in New Orleans appear to be mainly repeated second-hand accounts. It is likely that there was in fact no looting in the traditional sense. The paper suggests what really happened in terms of theft and poses potential reasons as to the cause thereof. A clear definition of looting is suggested for emergency managers to use in order to separate acts of survival from pure criminal acts. The paper highlights the dangers for emergency managers in believing common disaster myths. It is a timely reminder of the existence of disaster mythology against a recent disaster in a developed country.

Cookson, Susan T., Karl Soetebier, Erin L. Murray, Geroncio Fajardo, Randy Hanzlick, Alex Cowell, and Cherie Drenzek. 2008. Internet-based morbidity and mortality surveillance among Hurricane Katrina evacuees in Georgia. *Preventing Chronic Disease: Public Health Research, Practice, and Policy* 5(4).

The Internet has revolutionized the way public health surveillance is conducted. Georgia has used it for notifiable disease reporting, electronic outbreak management, and early event detection. It was used in the public health response to the 125,000 Hurricane Katrina evacuees who came to Georgia. Researchers developed Internet-based surveillance forms for evacuation shelters and an Internet-based death registry. District epidemiologists, hospital-based physicians, and medical examiners/coroners electronically completed the forms and analyzed these data and data from emergency departments used by the evacuees. The Internet

was essential in collecting health data from multiple locations, by many different people, and for multiple types of health encounters during Georgia's Hurricane Katrina public health response.

Cox, Robert, Teresa Amundson, and Bruce Brackin. 2008. Evaluation of the patterns of potentially toxic exposures in Mississippi following Hurricane Katrina. *Clinical Toxicology* 46(8): 722-727.

The paper describes the changes in the frequency of selected toxic exposures reported to the state poison control center following Hurricane Katrina. The number of selected exposures reported to the Mississippi Poison Control Center at 0-2 weeks, 3-4 weeks, and 5-12 weeks following Hurricane Katrina were compared to those for the same time periods in the previous three years. Absolute numbers of exposures and odds ratios with confidence intervals were used for comparison. In the first two weeks following Hurricane Katrina, there were 44 reported gasoline exposures compared to seven expected, eight lamp oil exposures compared to one expected, and seven carbon monoxide exposures compared to one expected. Only gasoline exposures remained elevated in the second two-week period following the hurricane. Lamp oil exposures were elevated during the 5-12 week recovery period. There was no increase in the frequency of exposures to household cleaning agents, food poisoning, pediatric exposures, drug-related suicide events, bites and stings, or venomous snakebites. The most common toxic exposures following Hurricane Katrina were related to the lack of typical energy sources—electricity and gasoline.

Culpepper, Dreda, and Walter Block. 2008. Price gouging in the Katrina aftermath: Free markets at work. *International Journal of Social Economics* 35(7): 512-520.

The concept of "price gouging" during times of emergency, such as in the aftermath of Katrina, often evokes quite an emotional response from people who are outraged that stores and companies would increase their prices during a time of emergency. The problem is that people do not realize that, in times of emergency, the market price they knew before is no longer adequate. Government intervention is not the answer to this "problem." The purpose of this paper is to explore basic concepts of economics, to glean a better perspective of the justification for raising prices during times of emergency, as well as what would happen if there were not laws preventing this very necessary practice. The paper addresses some basic concepts of economics and applies them to emergency situations, preeminently the dire plight of New Orleans and the Gulf coast after

Katrina. It finds that a government passes legislation preventing price gouging based on the implicit premise that it can allocate resources more efficiently than the market. By doing so, it alleges that it knows what the people want better than entrepreneurs who sink or swim based on their ability to anticipate matters of this sort. The paper voices the view that government regulation is nothing short of a disaster as far as satisfying customers is concerned. During times of disaster, prices should be allowed to adjust as a signal to producers and consumers alike. Consumers will utilize less of these goods, and producers will increase their output. As the supply adjusts following the price increase, goods and services will get to those who want them the most and are willing to pay for them. This will undoubtedly be a more effective way to distribute supplies to hurricane victims price controls must be repealed. The free market must be allowed to work via the beneficent invisible hand, not by the stultifying hands of the bureaucrats and politicians.

D'Amico, Daniel J. 2008. Who's to blame for all the heartache? A response to anti-capitalistic mentalities after Katrina. *International Journal of Social Economics* 35(8): 590-602.

Claims against capitalism and market processes in the wake of natural disasters can be overstated. Markets are an integral part of people's cultures and local identities. Social commentators have often brought complaints against capitalism for promoting greed and selfishness during and after natural catastrophes. Recently academics have introduced a unique perspective in addition to the more traditional criticisms. They claim that free-market advocates have imposed capitalist theories and policies in the wake of crises to the detriment of traditional policies, preferred cultures, and democratically selected institutions. This paper investigates these claims. It argues that the left overlooks the case that capitalism and corporate businesses may be a natural part of local cultures and recovery processes. If such a claim is true, then the normative case against capitalist responses to natural disasters is weaker than has been presented. The two perspectives are speaking past one another.

Davis, Belinda Creel, and Valentina A. Bali. 2008. Examining the role of race, NIMBY, and local politics in FEMA trailer park placement. *Social Science Quarterly* 89(5): 1175-1194.

This article uses the placement of FEMA trailer parks as a vehicle for examining how siting agents and approving agents factor race, "not in my back yard" (NIMBY) attitudes, and local politics into the over-

all approval process for projects that are viewed as undesirable. Using data on where FEMA trailer parks were proposed and approved in south Louisiana after hurricanes Katrina and Rita, the authors tested a range of hypotheses about the determinants of temporary housing sites. Results revealed the need to view the consideration of potential locations and the procedure of gaining approval as two distinct stages of a process. The findings suggest FEMA placed a great deal of emphasis on displaced residents' needs, but neglected to factor in the constituent pressures and the electoral calendar that local politicians would encounter when approving the site. The racial composition of a neighborhood had a substantial effect on both the consideration and approval stages. Beyond need, politics and race can shape the governmental allocation of disaster relief solutions.

Dirmeyer, Jennifer. 2008. The futile fight against (human) nature: A public choice analysis of the US Army Corps of Engineers special focus on Hurricane Katrina. *International Journal of Social Economics* 35(8): 627-638.

This paper discusses bureaucratic management, scientific overconfidence, information distortion and lack of coordination with a particular focus on the post-Hurricane Katrina situation. It examines efficiency arguments for centralized control and the potential for government failure. It also analyzes the disaster with these problems in mind. The Flood Act of 1928 officially transferred the responsibility of flood protection along the Mississippi River to the federal government. While it is true that local provision failed to eliminate the problem of flooding, the problems caused by federal provision have not been fully appreciated. The specific characteristics of flood protection as well as the general problems caused by bureaucratic management and the absence of market mechanisms suggest that local provision of flood protection is a more efficient solution. The paper suggests the previous faith in centralized flood management was unfounded.

Dyer, Carmel B., Mor Regev, Jason Burnett, Nicolo Festa, and Beth Cloyd. 2008. SWiFT: A rapid triage tool for vulnerable older adults in disaster situations. *Disaster Medicine and Public Health Preparedness* 2(S1): S45-S50.

Hurricane Katrina caused extensive damage to parts of Mississippi, Louisiana, and Alabama, causing many people, including vulnerable older adults, to evacuate to safer surroundings. Approximately 23,000 evacuees—many of them 65 or older, frail, and lacking family to advocate for their care—arrived at the

Reliant Astrodome Complex in Houston, Texas. There was no method for assessing the immediate and long-term needs of this vulnerable population. A 13-item rapid needs assessment tool was piloted by the Seniors Without Families Team (SWiFT) on 228 evacuees to test the feasibility of triaging vulnerable older adults with medical and mental health needs, financial needs, and/or social needs. The SWiFT tool is a feasible approach for triaging vulnerable older adults and seemed to provide rapid determination of level of need necessary for this population during disaster. Further testing to determine reliability and validity of the pilot tool is still necessary. Implications for using such a tool and suggestions for disaster response and preparation related to vulnerable older adults are provided.

Forgette, Richard, Marvin King, and Bryan Dettrey. 2008. Race, Hurricane Katrina, and government satisfaction: Examining the role of race in assessing blame. *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 671-691.

Are there clear racial differences in government satisfaction across levels of government? And, if so, how do we explain this racial gap? Race was one of the prevailing cleavages in public attitudes toward Hurricane Katrina recovery and response. This article proposes and tests contending explanations for racial differences in local, state, and national government satisfaction among Hurricane Katrina survivors. The first is an environmental vulnerability (racism) theory suggesting that minority populations are more vulnerable in their housing quality, location, and level of insurance compared to others. A second explanation relates to the role of informal or social networks in disaster recovery. The article assesses whether racial differences in perceptions of disaster response may be partly due to weaker informal social networks among minorities. A third explanation is that these differing explanations are largely a function of partisanship. Findings indicate that the role of race in government evaluation was largely mediated through the greater environmental vulnerability and Democratic party identification of minorities.

Galea, Sandro, Melissa Tracy, Fran Norris, and Scott F. Coffey. 2008. Financial and social circumstances and the incidence and course of PTSD in Mississippi during the first two years after Hurricane Katrina. *Journal of Traumatic Stress* 21(4): 357-368.

Hurricane Katrina was the most devastating natural disaster to hit the United States in the past 75 years. The authors conducted interviews of 810 persons who were representative of adult residents living in the 23

southernmost counties of Mississippi before Hurricane Katrina. The prevalence of posttraumatic stress disorder (PTSD) since Hurricane Katrina was 22.5 percent. The determinants of PTSD were female gender, experience of hurricane-related financial loss, post-disaster stressors, low social support, and post-disaster traumatic events. Kaplan-Meier survival curves suggest that exposure to both hurricane-related traumatic events and to financial and social stressors influenced the duration of PTSD symptoms. Post-disaster interventions that aim to improve maneuverable stressors after these events may influence the onset and course of PTSD.

Gomez, Brad T., and Matthew Wilson. 2008. Political sophistication and attributions of blame in the wake of Hurricane Katrina. *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 633-650.

The governmental response to Hurricane Katrina was widely perceived to be flawed and inadequate. However, given the number of actors involved in coordinating relief efforts, both in the private sector and at all levels of government, attributions of responsibility vary widely. Drawing on the Theory of Heterogeneous Attribution, the article explores the relationship between political sophistication and assessments of blame for the delayed governmental response. Using data from a survey of Louisiana residents, researchers find that citizens at higher levels of sophistication are less likely to find the federal government chiefly to blame, and more likely to fault actors at the state level. Moreover, less sophisticated respondents tend to focus blame disproportionately on the president, a tendency to which the more sophisticated are not as prone.

Hensley, Lauren, and Enrique Varela. 2008. PTSD symptoms and somatic complaints following Hurricane Katrina: The roles of trait anxiety and anxiety sensitivity. *Journal of Clinical Child and Adolescent Psychology* 37(3): 542-552.

This study examined relationships between trait anxiety and anxiety sensitivity and the outcome variables post-traumatic stress disorder (PTSD) symptoms and somatic complaints following a major hurricane. Sixth- and seventh-graders in the New Orleans area were surveyed five to eight months after Hurricane Katrina. As expected, hurricane exposure was a significant predictor of PTSD symptoms and somatic symptoms. Also as hypothesized, certain factors of anxiety sensitivity interacted with trait anxiety to predict PTSD symptoms and somatic symptoms. Clinical implications of potential linkages among trait anxiety, dimensions of

anxiety sensitivity and PTSD, and somatic symptoms are discussed.

Kaiser, Cheryl R., Collette P. Eccleston, and Nao Hagiwara. 2008. Post-Hurricane Katrina racialized explanations as a system threat: Implications for Whites' and Blacks' racial attitudes. *Social Justice Research* 21(2): 192-203.

This experiment drew upon theoretical perspectives on group and system justification to examine whether exposure to media coverage arguing that racism was responsible for the ineffective Hurricane Katrina disaster response affected white and black Americans' intergroup attitudes. Consistent with a system justification perspective, whites exposed to video clips arguing that the hurricane Katrina disaster response was due to racism displayed greater racial in-group attachment and in-group love compared to whites exposed to videos conveying that the government's incompetence was to blame for the disaster response. In contrast, blacks displayed strong levels of in-group attachment and in-group love across both video conditions. This research highlights how insights from social psychology are valuable in understanding psychological responses to social justice-related events, such as the tragic response to Hurricane Katrina.

Kapucu, Naim. 2008. Culture of preparedness: Household disaster preparedness. *Disaster Prevention and Management* 17(4): 526-535.

This paper examines household preparedness in response to disasters and the role of nonprofit organizations in the public's preparedness. The study uses the context of hurricane preparedness of central Florida residents, using the mail survey method as a data collection tool. The findings of the study emphasize the importance of household and individual preparedness in response to natural disasters, specifically to hurricanes. If individuals are not ready, then nobody is ready. The paper finds that households, even with significant experience of disasters, can be complacent in response to disasters.

Kendra, James, Jack Rozdilsky, and David A. McEntire. 2008. Evacuating large urban areas: Challenges for emergency management policies and concepts. *Journal of Homeland Security and Emergency Management* (ePub) 5(1).

This article presents several policy observations regarding evacuation planning and disaster mitigation in large urban areas. The article provides background information about and lessons learned from Hurricanes Katrina and Rita in 2005 and Hurricane Dean in 2007.

The often-erroneous planning assumptions in emergency management are then explored along with a discussion about future policy and management implications. Three themes are identified in this research, including: 1) public officials must anticipate a much broader scope of issues when issuing evacuation requests, 2) they must do more to prepare for disasters than write "fantasy" emergency operations plans, and 3) they must adjust development activities that have a negative impact upon disaster mitigation.

King, C. Richard. 2008. George Bush May Not Like Black People, but No One Gives a Dam about Indigenous Peoples: Visibility and Indianness after the Hurricanes. *American Indian Culture and Research Journal* 32(2): 35-42.

Klein, Kelly R., Paul E. Pepe, Frederick M. Burkle, Nanci E. Nagel, and Raymond E. Swienton. 2008. Evolving need for alternative triage management in public health emergencies: A Hurricane Katrina case study. *Disaster Medicine and Public Health Preparedness* 2(S1): S40-S44.

In many countries, traditional medical planning for disasters were largely developed in response to battlefield and multiple casualty incidents. The mass evacuation of a metropolitan population after Hurricane Katrina evolved into life-and-death triage scenarios involving thousands of patients with non-traumatic illnesses and special medical needs. Although unprecedented in the United States, triage management needs for this disaster were similar to large-scale public health emergencies, both natural and human-generated, around the world in the past half-century. The need for alternative processes similar to global mass public health emergency methodologies is illustrated by the experience of disaster medical assistance teams in the three days following Katrina's landfall. The immediate establishment of disaster-specific, consensus-based public health triage protocols—developed with ethical and legal expertise and a renewed focus on multidimensional decision-making processes—is strongly recommended.

Kutcher, Stan, and Sonia Chehil. 2008. Application of a needs-driven, competencies-based mental health training program to a post-disaster situation: The Grenada experience. *American Journal of Disaster Medicine* 3(4): 235-240.

This report outlines an innovative approach to mental health needs following natural disasters in a region in the Caribbean. Instead of the traditional external vertical psychosocial interventions commonly used in this

region, the authors developed and implemented a mental health intervention training program in Grenada. The training is focused on enhancing local community-based health service providers' ability to provide immediate and continued mental healthcare following a natural disaster. Soon after this training, a hurricane struck Grenada. A review of the self-confidence in the application of this training and these community health providers' intervention activities demonstrated they felt able to effectively identify, intervene, and address post-disaster mental health needs and care of individuals continued beyond immediate post-disaster period. This suggests enhancing the capacity of local providers could be a useful model and might be applicable in other jurisdictions.

Lind, Benjamin E., Miguel Tirado, Carter T. Butts, and Miruna Petrescu-Prahova. 2008. Brokerage roles in disaster response: Organizational mediation in the wake of Hurricane Katrina. *International Journal of Emergency Management* 5(1/2): 75-99.

When one organization serves as an intermediary for two other organizations which are not in direct contact, that organization is said to engage in brokerage behavior. Using the case of the Hurricane Katrina disaster, this study demonstrates the use of formal brokerage measures to study communication among the responding organizations. The authors apply the brokerage role typology put forth by Gould and Fernandez (1989) to communication networks among the responding organizations in two communities: Saint Bernard Parish, Louisiana, and Bay Saint Louis, Mississippi. The authors find that relatively few organizations perform most of the brokerage; primarily, these brokering organizations were locally based. The implications for predisaster planning are discussed.

Lutz, Leslie D., and Michael K. Lindell. 2008. Incident command system as a response model within emergency operation centers during Hurricane Rita. *Journal of Contingencies and Crisis Management* 16(3): 122-134.

This study examines the degree to which the use of the Incident Command System (ICS) influenced the performance of Texas emergency operations centers (EOCs) during Hurricane Rita. Staff in evacuation, transition, and host county EOCs completed a questionnaire that assessed demographic variables, EOC physical environment, ICS experience, ICS implementation, and team climate. The results indicated that the duties each ICS section performed varied substantially from one EOC to another. Moreover, ICS experience and ICS implementation lacked statistically significant correla-

tions with team climate, even though EOCs' physical environments did. Finally, staff from emergency relevant agencies (e.g., public works and social services) seemed to have more problems with ICS than did staff from emergency mission agencies (e.g., fire and police departments). Thus, there needs to be further study of ICS application in emergencies other than structural and wildland fires, as well as the development of new ICS training materials for emergency relevant agencies to supplement the current ICS training materials for emergency mission agencies.

Maestas, Cherie D., Lonna Rae Atkeson, Thomas Croom, and Lisa A. Bryant. 2008. Shifting the blame: Federalism, media, and public assignment of blame following Hurricane Katrina. *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 609-632.

Federalism sprang to the forefront in public debates about the response to Hurricane Katrina as officials from the national, state, and local government sought to shift blame to other levels of government. The analysis shows that attempts by national political actors to frame the response as the fault of state government actions were successful, but the size of the effect was conditional on predispositions. Those who were more attentive to coverage were more likely to believe that state failure to call for help had a great effect on the length of time it took for national government to provide aid to New Orleans. The effect was strongest for Republicans, however, suggesting that predispositions mediate acceptance of elite frames that transfer blame.

Malhotra, Nell. 2008. Partisan polarization and blame attribution in a federal system: The case of Hurricane Katrina. *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 651-670.

When multiple government authorities at overlapping levels of administration fail to do their jobs properly, whom do citizens hold responsible? People can potentially make more accurate judgments by taking into account the roles and responsibilities of the officials involved. However, if party identification plays a major role in shaping Americans' attitudes on federalism, such information may potentially lead to even greater partisan polarization. This article explores these questions using a controlled experiment in which citizens were provided job titles of government officials involved in the poor response to Hurricane Katrina. Both Republican and Democratic citizens update their blame attributions in the same direction in response to new information. Despite polarized general attitudes

on federalism, partisans do not polarize further when using specific information.

Marsee, Monica A. 2008. Reactive aggression and post-traumatic stress in adolescents affected by Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 519-529.

The current study tests a theoretical model illustrating a potential pathway to reactive aggression through exposure to a traumatic event (Hurricane Katrina) in 166 adolescents recruited from high schools on the Gulf Coast of Mississippi. Results support an association between exposure to Hurricane Katrina and reactive aggression via post-traumatic stress disorder (PTSD) symptoms and poorly regulated emotion. The proposed model fits well for both boys and girls; however, results suggest minority youth in this sample were more likely to experience emotional dysregulation in relation to post-traumatic stress than Caucasian youth. Further, results indicate hurricane exposure, PTSD symptoms, and poorly regulated emotion are associated with reactive aggression even after controlling for proactive aggression. These findings have implications for post-disaster mental health services. Researchers examining mental health problems in youth after a significant disaster traditionally focus on the presence of internalizing problems such as anxiety, depression, and post-traumatic stress disorder (PTSD) symptoms, with very little empirical attention paid to the incidence of post-disaster externalizing problems such as aggression. Specific types of aggressive responses, particularly those involving poorly regulated emotion (i.e., reactive aggression), were associated with a history of trauma and, thus, may be especially common following a traumatic event such as a hurricane.

McGee, Robert W. 2008. An economic and ethical analysis of the Katrina disaster. *International Journal of Social Economics* 35(7): 546-557.

This paper combines economic and ethical analysis and includes discussions from the perspectives of both utilitarian ethics and rights-based ethics, which is not usually done in the economics literature. It applies economic and ethical analysis to natural disasters such as Hurricane Katrina to determine which approaches to disaster relief work best and which should be abandoned. It combines narrative with argument and analysis and finds that government involvement in disaster relief has proven to be economically inefficient and also violates rights. Private sector initiatives and economic and political freedom provide better solutions.

Mills, Jacqueline Warren, Andrew Curtis, John C. Pine, Barrett Kennedy, Farrell Jones, Ramesh Ramani, and Douglas Bausch. 2008. The clearinghouse concept: A model for geospatial data centralization and dissemination in a disaster. *Disasters* 32(3): 467-479.

The disaster clearinghouse concept originates with the earthquake community as an effort to coordinate research and data collection activities. Though existing earthquake clearinghouses are small in comparison to what was needed to respond to Hurricane Katrina, these seminal structures are germane to the establishment of our current model. On September 3, 2005, five days after Katrina wrought cataclysmic destruction along the Gulf Coast, FEMA and Louisiana State University personnel met to establish the LSU GIS Clearinghouse Cooperative (LGCC), a resource for centralization and dissemination of geospatial information related to Hurricane Katrina. Since its inception, the LGCC has developed into a working model for organization, dissemination, archiving, and research about geospatial information in disaster. This article outlines the formation of the LGCC, issues of data organization, and methods of data dissemination and archiving with an emphasis on implementing the clearinghouse model as a standard resource to address geospatial data needs in disaster research and management.

Mortensen, Karoline, and Zachary Dreyfuss. 2008. How many walked through the door? The effect of Hurricane Katrina evacuees on Houston emergency departments. *Medical Care* 46(9): 998-1001.

Hurricane Katrina necessitated the evacuation of over 200,000 New Orleans residents into Houston in the days after landfall. The already stressed emergency departments (EDs) were faced with a potential influx of patients suffering injuries and conditions exacerbated by the hurricane and resulting devastation. Data from total 2005 visits to 25 Houston EDs (n=875,750) were analyzed to evaluate the impact of visits by Katrina evacuees (n=8,427). ED visits by individuals with a FEMA designated disaster area zip code due to Katrina were counted. In September, immediately after Katrina, Houston-area EDs reported the lowest monthly total visits in 2005 despite treating 4,518 evacuees that month. The EDs experienced an increase in visits by Katrina evacuees in the hurricane's aftermath. However, the initial surge of visits was modest and corresponded with decreases in visits by non-evacuees and medical care provided in large shelters.

Pais, Jeremy F., and James R. Elliott. 2008. Places as recovery machines: Vulnerability and neighborhood

change after major Hurricanes. *Social Forces* 86(4): 1415-1453.

This study advances a conceptual framework for understanding the transformation of places into recovery machines after major hurricanes. This framework contends that in the years following such disasters, pro-growth coalitions take advantage of new sources of material and symbolic capital to promote further demographic growth. It also contends that the spatial nature of this growth varies significantly as a result of social inequalities among residential subpopulations, contributing to uneven transformation of local neighborhoods across affected regions. To test hypotheses derived from this framework, the authors combine innovative Geographic Information Systems data from "billion dollar" storms of the early 1990s with demographic data from local census tracts. Results support the recovery machine framework and imply that post-disaster resilience may contribute to the creation of larger, more segregated versions of affected regions that await exposure with the next major disaster.

Perez Mendez, Jesse, Judith K. Mathers, and David M. Neal. 2008. After the storm: K-12 education response to Hurricane Katrina at the state level. *Journal of Emergency Management* 6(4): 32-38.

This article addresses the policy reaction of 13 high impact states in addressing the kindergarten through 12th grade student diaspora that followed Hurricane Katrina. This disaster displaced approximately 372,000 K-12 Louisiana and Mississippi students. After examining various legislative policy responses and administrative management of displacement accommodations, the authors identified various patterns that suggest states resorted to ad hoc policy to address the massive influx of displaced students. The authors recommend that governmental agencies consider the utilization of protective planning procedures to address educational concerns in further disasters.

Pina, Armondo A., Ian K. Villalta, Claudio D. Ortiz, Amanda C. Gottschall, Natalie M. Costa, and Carl F. Weems. 2008. Social support, discrimination, and coping as predictors of posttraumatic stress reactions in youth survivors of Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 564-574.

This study examined the influence of the post-Hurricane Katrina recovery environment (i.e., discrimination, social support) and coping behaviors on children's post-traumatic stress reactions (symptoms of post-traumatic stress disorder [PTSD], anxiety, and depression). Data revealed that greater helpfulness from

extra-familial sources of social support predicted lower levels of child-rated symptoms of PTSD, anxiety, and depression. A positive-predictive relation was found between helpfulness from professional support sources and PTSD, perhaps suggesting that parents whose children were experiencing higher PTSD-symptom levels sought professional support and reported it was helpful. Youths' avoidant coping behaviors predicted both PTSD and anxiety symptoms. Discrimination, active coping, and familial support did not predict any of the post-traumatic stress reactions assessed in this study.

Raskin, Max, Scott A. Kjar, and Robert Rahm. 2008. What is seen and unseen on the Gulf Coast. *International Journal of Social Economics* 35(7): 490-500.

The paper provides an overview of lessons learned from the aftermath of the Katrina disaster by analyzing the rebuilding of the Gulf Coast. It posits that though Frederic Bastiat passed away in 1850, the beauty of his sound economic reasoning lives on and that his essay, "That which is seen, and that which is not seen," is especially insightful in analyzing the rebuilding of the Gulf Coast. The paper first expounds his lesson, then applies it to the conflict between the private and public sectors in order to attack the fallacies of government spending and vindicate the free-market approach to reconstruction. The paper finds that the areas where the government has coercively arrogated to itself a monopoly police and fire departments to protect lives and property, courts to punish rights violators, water and sewer systems to restore potable water to homes are the areas where recovery lags the most. Since government has diverted its attention from these services where competition is not allowed, and has instead become involved in the provision of goods and services otherwise provided on the free market— houses, food, and clothing—its efforts have not only not assisted the recovery, they have actually stood in its way.

Scaramella, Laura V., Sara L. Sohr-Preston, Kristin L. Callahan, and Scott P. Mirabile. 2008. A test of the family stress model on toddler-aged children's adjustment among Hurricane Katrina impacted and nonimpacted low-income families. *Journal of Clinical Child and Adolescent Psychology* 37(3): 530-541.

The Family Stress Model describes a process where financial strain undermines parents' mental health, the quality of family relationships, and child adjustment. Our study considered the extent to which the Family Stress Model explained toddler-aged adjustment in families affected by Hurricane Katrina-affected and those not affected. Two groups of very low-income mothers and their 2-year-old children participated.

Consistent with the Family Stress Model, financial strain and neighborhood violence were associated with higher levels of mothers' depressed mood; depressed mood was linked to less parenting efficacy. Poor parenting efficacy was associated to more internalizing and externalizing problems among children.

Scheeringa, Michael S., and Charles H. Zeanah. 2008. Reconsideration of harm's way: Onsets and co-morbidity patterns of disorders in preschool children and their caregivers following Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 508-518.

This study examined post-traumatic stress disorder (PTSD) and co-morbid disorders in 70 preschool children (ages 3-6) and their caregivers following Hurricane Katrina. The children's rate of PTSD was 50 percent using age-modified criteria. The rate of PTSD was 62.5 percent for those who stayed in the city and 43.5 percent in those who evacuated. Of those with PTSD, 88.6 percent had at least one co-morbid disorder, with oppositional defiant disorder and separation anxiety disorder being most common. Caregivers' rate of PTSD was 35.6 percent, of which 47.6 percent was post-Katrina. No children and only two caregivers developed new non-PTSD disorders in the absence of new PTSD symptoms. Differences by race and gender weren't largely significant. Children's new PTSD symptoms correlated more strongly to caregivers with new symptoms compared to caregivers with old or no symptoms.

Schneider, Sandra. 2008. Who's to blame? (Mis) perceptions of the intergovernmental response to disasters. *Publius - Special Issue: Attribution of Governmental Blame in Times of Disaster* 38(4): 715-738.

This analysis shows that the intergovernmental response to Hurricane Katrina collapsed because those involved in the process did not have a clear understanding of their own roles and responsibilities or how the entire governmental response system should operate. New data are presented which demonstrate that citizens' attitudes about intergovernmental responsibilities coincide quite closely with how the disaster response system is designed to function, but they differ from the way public officials involved in the Hurricane Katrina relief efforts thought the process should work. This mismatch between what various levels of government are expected to do and what activities they actually perform in emergency situations has contributed to extremely negative impressions within the American public about governmental performance during natural disasters.

Spell, Annie W., Mary Lou Kelley, Jing Wang, Shannon Self-Brown, Karen L. Davidson, Angie Pellegrin, Jeanette L. Palcic, Kara Meyer, Valerie Paasch, and Audrey Baumeister. 2008. The moderating effects of maternal psychopathology on children's adjustment post-Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 553-563.

This study investigated the role maternal psychopathology plays in predicting children's psychological distress in a disaster-exposed sample. Participants consisted of 260 public school children (ages 8-16) and their mothers. These families were displaced from New Orleans because of Hurricane Katrina in 2005. Assessment took place three to seven months post-disaster. Hierarchical regression analyses revealed that global maternal psychological distress and maternal post-traumatic stress disorder moderated the relation between the child's hurricane exposure and mother-reported child internalizing and externalizing symptoms.

Sprung, Manuel. 2008. Unwanted intrusive thoughts and cognitive functioning in kindergarten and young elementary school-age children following Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 575-587.

Seven months after Hurricane Katrina, 183 5- to 8-year-old children were surveyed about intrusive thoughts and tested on their level of cognitive functioning (knowledge about the mind and the mind's operations). Basic developmental research suggests children who lack sufficient knowledge about the mind could have difficulties answering questions about intrusive thoughts. Hurricane-affected children reported relatively more intrusive thoughts with negative content than non-affected children. An association between children's understanding of the mind and their ability to report on their intrusive thoughts supports this hypothesis. Results point to funneling of intrusive thoughts toward negative content following a traumatic event and highlight the importance of considering a child's level of understanding of the mind when investigating intrusive thoughts in young children.

Steinberg, Laura J., Hatice Sengul, and Ana Maria Cruz. 2008. Natech risk and management: An assessment of the state of the art. *Natural Hazards* 46(2): 143-152.

The present state-of-the-art for natech risk and management is discussed. Examples of recent natechs include catastrophic oil spills associated with Hurricane Katrina and hazardous chemical releases in Europe during the heavy floods of 2002. Natechs create difficult challenges for emergency responders due to the

geographical extent of the natural disaster, the likelihood of simultaneous releases, emergency personnel being preoccupied with response to the natural disaster, mitigation measures failing due to the effects of the natural disaster, and others. Recovery from natechs may be much more difficult than for “normal” chemical accidents, as the economic and social conditions of the industrial facility and the surrounding community may have been drastically altered by the natural disaster. Potential safeguards against natechs include adoption of stricter design criteria, chemical process safeguards, community land use planning, disaster mitigation and response planning, and sustainable industrial processes, but these safeguards are only sporadically applied. Ultimately, the public must engage in a comprehensive discussion of acceptable risks for natechs.

Strinham, Edward P., and Nicholas A. Cnow. 2008. The broken trailer fallacy: Seeing the unseen effects of government policies in post-Katrina New Orleans. *International Journal of Social Economics* 35(7): 480-489.

This paper analyzes some of the unseen negative effects of the post-Katrina government policies dealing with housing in New Orleans. Since Hurricane Katrina, the government, along with private for-profit and not-for-profit organizations, has worked to rebuild the city of New Orleans. This effort is most evident in the response to the housing crisis that followed the storm. The government has spent billions of dollars and brought thousands of people in to rebuild homes and other infrastructure in the long run and to provide stopgap measures in the short run. The approximately 120,000 Federal Emergency Management Agency (FEMA) trailers in the region are one of the most visible examples of government efforts. This article finds that while the trailers did provide benefits to those who received them, it could be argued that the government’s policies aimed toward solving the housing crisis suffer from Frederic Bastiat’s broken window fallacy. FEMA trailers and the multitude of workers brought in are examples of what is seen, and, as Bastiat showed, we must also look at what is unseen. The paper shows the trailer problem, among others, has weakened the relief effort.

Vuk, Vedran. 2008. Taking advantage of disaster: Misrepresentation of housing shortage for political gain. *International Journal of Social Economics* 38(8): 603-614.

This article explores the political benefactors of perpetuating falsehoods in order to make political gains.

It explores the reports of housing shortages in post-Katrina New Orleans especially for low-income residents in the face of a returning working poor population. Despite the availability of housing vouchers by the New Orleans Housing Authority to any previous residents of New Orleans housing projects, a political uproar has claimed no homes are available and that destroying the previously failing New Orleans housing projects would amount to “forced homelessness.” The analysis is done by reflecting on different commentary from persons claiming the housing projects must be preserved while also exploring the failed goals of the same public institutions. Further, a brief overview of the housing situation regarding availability of homes is conducted. The findings show that the poor of New Orleans are being misled about available housing, and there is a continuing process of decline in sovereignty of local public policy makers and politicians.

Walker, Douglas M., and John D. Jackson. 2008. Market-based “disaster relief”: Katrina and the casino industry. *International Journal of Social Economics* 35(7): 521-530.

The purpose of this paper is to examine the effect the rebuilding of the casino industry has had on the recovery efforts from Katrina. Using quarterly data from four states affected by Katrina and a simple OLS model to test the effect the casino industry had had on personal income in the states researchers find that the casino industry has had a statistically significant positive impact on the economic recovery in casino states relative to non-casino states. While these results support previous evidence on a short-run economic stimulus effect from casinos, other research has suggested that the long-run effects of casinos are less certain. As more data become available, the model could be re-tested.

Westley, Christopher, Robert P. Murphy, and William L. Anderson. 2008. Institutions, incentives, and disaster relief: The case of the Federal Emergency Management Agency following Hurricane Katrina. *International Journal of Social Economics* 35(7): 501-511.

This paper highlights the importance of property rights institutions to disaster relief efforts, with a focus on the U.S. Federal Emergency Management Agency in the aftermath of Hurricane Katrina in New Orleans, Louisiana. It utilizes public choice, Austrian, and new institutional analyses of bureaucracy. It discusses private and public sector responses to the situation in New Orleans following Katrina and to disasters in general, and compares the institutional frameworks that develop over time in both sectors. The paper finds

that a large and bureaucratized response to disasters hinders economic calculation, incentive structure, and property rights institutions, all of which are crucial for rapid disaster response, the relief of human suffering, the minimization of knowledge problems, and the promotion of an efficient allocation of resources. This research suggests that the role of the price system in allocating resources is especially important following disasters and that in order to ensure relief efforts are as efficient as possible, public-sector actors should do nothing to impede them. It also suggests that the incentives to prepare an efficient emergency preparedness program are greater when those most affected by potential disasters are held responsible for their implementation. The paper provides a critical evaluation of the role of highly centralized approaches to disaster relief.

Wood, J. Stuart. 2008. The finance of Katrina.

International Journal of Social Economics 35(8): 579-589.

This is an interdisciplinary analysis of events using several different theoretical tools combined in an innovative way to examine why systematic errors were made and are continuing, and how errors can be stopped. The paper is of greatest value to those repairing the damaged infrastructure of southeast Louisiana and Mississippi. The paper's purpose is to discover the causes of the devastation of New Orleans and the Mississippi Gulf Coast and how it may be ameliorated. Economic analysis of the prior conditions causing susceptibility to flooding and of the subsequent events involving long-term assets; how assets had been selected; and what changes have occurred in the evaluation and selection process. The devastation caused by the hurricanes was far exceeded by: the prior governmental misleading of entrepreneurs and property owners regarding the actual level of flood protection provided to New Orleans by the bureaucratic Army Corps of Engineers' "flood protection system;" the resulting Rothbardian "cluster of entrepreneurial error" which allowed the devastation of New Orleans capital goods; the Hayekian unintended consequences of government actions and pronouncements following the storm, which interfered with market signals, increased subjective risk, reduced return expectations of entrepreneurs for capital assets, reducing net present values below zero; and the Misesian bureaucratic inefficiency of the corps and other governmental agents both before and after the storm. A sharp increase in their perception of flooding risk caused market participants to see that no improvement in flood control can be achieved under the present bureaucratic structure. They have perma-

nently increased their perceived risk and discount rates, thereby reducing the pace of asset emplacement. Replacing the system of Lachmanian heterogeneous capital assets and their communications connections destroyed by Katrina cannot be accomplished in the present situation. New government actions and regulations are continually changing, noisy, and have altered property rights. The interactive efficiency of the asset system has been decreased. Incorrect assets are being built, necessary assets are being neglected, and the communications network between assets is not being replaced. A finer level of detail could be investigated, focusing on smaller sub-systems and interactions. The greatest improvement in asset rebuilding would follow the elimination of all government regulations and regulatory agencies impeding the decision process, and private companies should be contracted to replace the destroyed wetlands and emplace flood controls.

Information and Spatial Technology

Brown, Kelly L., and Christina Scheungrab. 2008.

Emergency preparedness: Using the Internet to educate the public. *Journal of Emergency Management* 6(4): 17-23.

This research examines the use of the Internet to educate the public on emergency management and homeland security issues. Despite the fact that disasters, when they occur, happen at the local level and directly impact the general public, the public is conspicuously absent from emergency management planning and training activities at all levels. This is true despite research which suggests that the public, given accurate and relevant information, can respond well to disasters. Educating the public on possible disasters, response scenarios, and other key emergency management issues is a critical first step to engaging the public in emergency management. The current research investigates the use of one means of educating the public, the Internet, on emergency management and homeland security issues. Content analysis of the 50 largest cities in one midwestern state was conducted to determine whether the Internet is used to educate the public; the types of homeland security and emergency management information available to the public on city Web sites; and how difficult the existing information is to access. Results show that few cities are using the Internet as a means of educating the public on emergency management issues. Future research should investigate other means by which the general public should be educated and engaged in emergency management and how the public is using the emergency management information available to them.

Brown, Peter J. 2008. Expanding role of satellites in preparedness, surveillance, and response. *Disaster Medicine and Public Health Preparedness* 2(3): 200-203. Satellite technology plays a vital role in proactive global disease surveillance and detection. When hurricanes, cyclones, tornadoes, earthquakes, and tsunamis strike, first responders, National Guard, and emergency management personnel benefit greatly from satellite-enabled voice communications, satellite-based Global Positioning System location data, and geographic information system (GIS) data, including updated imagery provided by satellites, along with streams of satellite-delivered broadband data.

de Vos, Hugo, Joost Jongerden, and Jacob van Etten. 2008. Images of war: Using satellite images for human rights monitoring in Turkish Kurdistan. *Disasters* 32 (3): 449-466.

In areas of war and armed conflict, it is difficult to get trustworthy and coherent information. Civil society and human rights groups often face problems of dealing with fragmented witness reports, war propaganda, and difficulty in directly accessing these areas. Turkish Kurdistan was used as a case study of armed conflict to evaluate the potential use of satellite images to verify witness reports collected by human rights groups. The Turkish army was reported to be burning forests, fields, and villages as a strategy against guerrilla uprising. This paper concludes satellite images are useful to validate witness reports of forest fires. Even though the use of this technology for human rights groups will depend on factors such as prices, access, and expertise, the images proved to be key for analysis of spatial aspects of conflict and valuable for reconstructing a more trustworthy picture.

Fitrianie, Siska, and Leon J. M. Rothkrantz. 2008. An automated online crisis dispatcher. *International Journal of Emergency Management* 5(1/2): 123-144.

During crisis events, human operators in a crisis center will be overloaded information. The stress of dealing with crisis situations can have a significant impact on the certainty of the information. The need for a system that is able to handle information calls automatically may then become apparent. This research examines a dialogue system that can serve as a crisis hotline dispatcher. The system offers a natural user interaction through its ability to start a user-friendly dialogue taking care of the content, context and user's emotion. It retrieves information about crisis situations from users while controlling the communication flow. The system is able to recognize the emotion loading of the

user's linguistic content. The recognizer uses a database that contains selected keywords on a two dimensional "arousal" and "valence" scale. Its output includes an indication of the urgency of the information regarding the crisis.

Galderisi, Adriana, Andrea Ceudech, and Massimiliano Pistucci. 2008. A method for na-tech risk assessment as supporting tool for land use planning mitigation strategies. *Natural Hazards* 46(2): 221-241.

Hazardous industrial sites have always represented a threat for the community often provoking major accidents overcoming the boundaries of the plants and affecting the surrounding urban areas. If the industrial sites are located in natural hazard-prone areas, technological accidents may be triggered by natural events, generating so-called na-tech events which may modify and increase the impact and the overall damage in the areas around them. Nevertheless, natural and technological hazards are still treated as two separate issues, and up to now the methods for na-tech risk assessment have been developed mainly for specific natural hazards, generally restricted to some plant typologies and to the area of the plant itself. Based on a review of the current na-tech literature, this article illustrates a risk assessment method as a supporting tool for land use planning strategies aimed at reducing na-tech risk in urban areas. More specifically, a multi attribute decision-making method, combined with fuzzy techniques, has been developed. The method allows planners to take into account, according to different territorial units, all the individual na-tech risk factors, measured through both quantitative and qualitative parameters, while providing them with a na-tech risk index, useful to rank the territorial units and to single out the priority intervention areas. The method is designed to process information generally available about hazardous plants (safety reports), natural hazards (hazard maps) and features of urban systems mainly influencing their exposure and vulnerability to na-tech events (common statistical territorial data). Furthermore, the method implemented into a GIS framework should easily provide planners with comparable maps to figure out the hazard factors and the main territorial features influencing the exposure and vulnerability of urban systems to na-tech events. The method has been tested on a middle-sized Municipality in the Campania Region, identified as 2nd class seismic zone, according to the Ordinance 3274/2003, in which a LPG storage plant, classified as a plant with major accident potential by the Seveso II Directive (art. 9), is located just within the city core.

Gorum, T., B. Gonencgil, C. Gokceoglu, and H. A. Nefeslioglu. 2008. Implementation of reconstructed geomorphologic units in landslide susceptibility mapping: The Melen Gorge (NW Turkey). *Natural Hazards* 46(3): 323-351.

In the international literature, although there is a considerable number of publications on the landslide susceptibility mapping, geomorphology as a conditioning factor is only used in limited number of studies. The purpose of this article is to implement the geomorphologic parameters derived by reconstructed topography in landslide susceptibility mapping. According to the method employed in this study, terrain is generalized by the contours passed through the convex slopes of the valleys that were formed by fluvial erosion. Therefore, slope conditions before landslides can be obtained. The reconstructed morphometric and geomorphologic units are taken into account as a conditioning parameter when assessing landslide susceptibility. Two different data, one of which is obtained from the reconstructed DEM, have been employed to produce two landslide susceptibility maps. The binary logistic regression is used to develop landslide susceptibility maps for the Melen Gorge in the Northwestern part of Turkey. Due to the high correct classification percentages and spatial effectiveness of the maps, the landslide susceptibility map comprising the reconstructed morphometric parameters exhibits a better performance than the other. Five different datasets are selected randomly to apply proper sampling strategy for training. As a consequence of the analyses, the most proper outcomes are obtained from the dataset of the reconstructed topographical parameters and geomorphologic units, and lithological variables that are implemented together. Correct classification percentage and root mean square error (RMSE) values of the validation dataset are calculated as 86.28 percent and 0.35, respectively. Prediction capacity of the different datasets reveal that the landslide susceptibility map obtained from the reconstructed parameters has a higher prediction capacity than the other. Moreover, the landslide susceptibility map obtained from the reconstructed parameters produces logical results.

Gouman, Rianne, Masja Kempen, Eddy van der Heijden, Niek Wijngaards, Philip de Vree, and Toon Capello. 2008. The Borsele files: The challenge of acquiring usable data under chaotic circumstances. *International Journal of Emergency Management* 5(1/2): 57-74.

Conducting empirical research involves a balancing act between scientific rigor and real-life pragmatics. The Delft Co-operation on Intelligent Systems (D-CIS) laboratory researches systems-of-systems consisting of the

human and artificial systems involved in collaborative decision-making under chaotic circumstances. An important objective is the usefulness of the results in their major application domain: crisis management. The D-CIS lab was involved in setting up a crisis management exercise experiment and the according measurements regarding an improvement in internal communication at Gemeente (Municipality) Borsele. In this paper, the empirical research regarding this experiment, the methodology and its results are briefly outlined. The main lessons learned concern the interrelationship between the scenario, experiment and measurements, the acquisition of usable data, and conducting grounded research.

Jeber, Faisal, Husaini Omar, Shattri Mansor, Noordin Ahmad, and Mahdzir Mahmud. 2008. Satellite data potential for landslide studies in tropical regions. *Disaster Prevention and Management* 17(4): 470-477.

The purpose of this paper is to show that satellite data applicability for landslides studies is given concentration in tropical regions, which have two limitations: regular cloud cover and thick vegetation. Landslide studies have three categories: mapping, zonation, and monitoring. High spatial resolution images are convenient for mapping. Since the slope and slope materials are the dominant parameters for slide potential, a high resolution DEM produced from the above data with classification of multispectral data will be vital for zonation. Weather-free and penetration are advantages that make radar images essential for monitoring. A composition of satellite data with support of aerial photography, with its high spatial resolution, will give an excellent spatial database for these studies proving that satellite remote sensing data are applicable for landslides studies in non-accessible mountainous tropical regions.

Ji, Xuewei, Wenguo Weng, and Weicheng Fan. 2008. Cellular automata-based systematic risk analysis approach for emergency response. *Risk Analysis* 28 (5): 1247-1259.

Emergency response is directly related to the allocation of emergency rescue resources. Efficient emergency response can reduce loss of life and property, limit damage from the primary impact, and minimize damage from derivative impacts. An appropriate risk analysis approach to accidents is a rational way to assist emergency response. In this article, a cellular automata-based systematic approach for conducting risk analysis in emergency response is presented. Three general rules—diffusive effect, transporting effect, and dissipative effect—are developed to implement cel-

lular automata transition function. The approach takes multiple social factors such as population density and population sensitivity into consideration and also considers the risk of domino accidents that increase due to increasing congestion in city industrial complexes and increasing human population density. In addition, two risk indices—individual risk and aggregated weighted risk—are proposed to assist decision making for emergency managers during emergency response. Individual risk can be useful to plan evacuation strategies, while aggregated weighted risk can help emergency managers optimize emergency response programs and allocate rescue resources according to the danger in vulnerable areas.

Mills, Jacqueline Warren, Andrew Curtis, John C. Pine, Barrett Kennedy, Farrell Jones, Ramesh Ramani, and Douglas Bausch. 2008. The clearinghouse concept: A model for geospatial data centralization and dissemination in a disaster. *Disasters* 32(3): 467-479.

The disaster clearinghouse concept originates with the earthquake community as an effort to coordinate research and data collection activities. Though existing earthquake clearinghouses are small in comparison to what was needed to respond to Hurricane Katrina, these seminal structures are germane to the establishment of our current model. On September 3, 2005, five days after Katrina wrought cataclysmic destruction along the Gulf Coast, FEMA and Louisiana State University personnel met to establish the LSU GIS Clearinghouse Cooperative (LGCC), a resource for centralization and dissemination of geospatial information related to Hurricane Katrina. Since its inception, the LGCC has developed into a working model for organization, dissemination, archiving, and research about geospatial information in disaster. This article outlines the formation of the LGCC, issues of data organization, and methods of data dissemination and archiving with an emphasis on implementing the clearinghouse model as a standard resource to address geospatial data needs in disaster research and management.

Shahid, Shamsuddin, and Houshang Behrawan. 2008. Drought risk assessment in the western part of Bangladesh. *Natural Hazards* 46(3): 391-413.

Though drought is a recurrent phenomenon in Bangladesh, very little attention has been so far paid to the mitigation of and preparedness for droughts. This article presents a method for spatial assessment of drought risk in Bangladesh. A conceptual framework, which emphasizes the combined role of hazard and vulnerability in defining risk, is used for the study. Standardized precipitation index method in a GIS envi-

ronment is used to map the spatial extents of drought hazards in different time steps. The key social and physical factors that define drought vulnerability in the context of Bangladesh are identified and corresponding thematic maps at the district level are prepared. A composite drought vulnerability map is developed through the integration of those thematic maps. The risk is computed as the product of the hazard and vulnerability. The result shows that droughts pose highest risk to the northern and northwestern districts of Bangladesh.

Sicotte, Diane. 2008. Dealing in toxins on the wrong side of the tracks: Lessons from a hazardous waste controversy in Phoenix. *Social Science Quarterly* 89(5): 1136-1152.

The controversial expansion of a hazardous waste facility in a poor, minority neighborhood in Phoenix illustrates the unanticipated consequences of siting hazardous facilities in vulnerable communities, and the need to recognize neighborhood health/safety issues such as drug-related crime as environmental justice struggles. Qualitative methods include participant observation, document analysis, census data, GIS mapping, and interviews. South Central Phoenix's history reveals a disproportionate share of poverty, pollution, and drug crimes. Most commercial hazardous waste facilities in Phoenix were sited in minority areas. Residents contended that the siting, permitting process, and expansion of the facility and the drug crimes that later occurred there were all due to environmental racism. The expansion of the facility exacerbated environmental injustice in Phoenix through distributional and participative injustice, and was criminogenic. The dual impact on the community of hazardous waste and drug crime argues for a more holistic understanding of environmental justice.

Insurance and Economic Impacts

Anderson, William, and Scott A. Kjar. 2008. Hurricane Katrina and the levees: Taxation, calculation, and the matrix of capital. *International Journal of Social Economics* 35(8): 569-578.

The purpose of this paper is to analyze the havoc created by Hurricane Katrina from the viewpoint of Austrian Economics. The aim is to look specifically at the poorly invested capital that came about because of the construction of the complex levee system around New Orleans. Applying Austrian Economics, and especially the economic analysis of Carl Menger, the authors found that there indeed was much bad investment in New Orleans, and the situation was made worse because the levee system upon which everything

else depended was unfit to withstand a storm the size of Katrina. Research implications include the examination of other situations in which large amounts of government capital help to leverage other investments, but the original government capital itself proves to be unsustainable. The practical implications of this paper include a warning to people whom we believe should base large amounts of private investment upon government projects that have a political basis, but either cannot withstand natural forces or simply are untenable.

Carden, Art. 2008. Beliefs, bias, and regime uncertainty after Hurricane Katrina. *International Journal of Social Economics* 35(7): 531-545.

This paper offers evidence of anti-market and anti-foreign bias among what might be called political first responders to Hurricane Katrina, and posits the view that interference with prices compounded the shortages facing the Gulf Coast or any other disaster-stricken area. It explores the relationship between beliefs and economic policy in the context of gasoline prices following Hurricane Katrina. It applies three contributions by North, Caplan and Higgs to the question of gasoline pricing policy; and surveys public opinion regarding interference with prices. It further identifies evidence of “anti-market bias” in polling data, press releases, and legislation, and argues that the uncertainty emanating from statutes restricting “price gouging” may reduce investment in the provision of necessary goods and services after natural disasters.

Chester, David K. 2008. The effects of the 1755 Lisbon earthquake and tsunami on the Algarve region, southern Portugal. *Geography* 93(2): 78-90.

The 1755 Lisbon earthquake (magnitude c. 8-5Mw) killed between 15,000 and 20,000 people, of whom an estimated 1,020 lived in the Algarve. The earthquake cost Portugal between 32 percent and 48 percent of its Gross Domestic Product, probably making it financially the greatest natural catastrophe to have affected western Europe. Using a combination of archival information and data collected in the field, this article discusses the devastating effects of the earthquake and tsunami on the economy, society and major settlements in the Algarve, and the recovery of the region in the years that followed. Today the Algarve is one of Europe’s principal tourist destinations and a region vital to the Portuguese economy. The 1755 earthquake was not a single event and the Algarve, which now houses a resident population of over 400,000—a figure that more than doubles with tourists in the summer months—is highly exposed to earthquakes and tsunamis. An earthquake of similar size (minimum estimated

recurrence 614±105 years), is viewed as a worst-case future scenario. Although strict building codes which apply to the whole country were pioneered in Portugal following the 1755 earthquake, and have been revised on many occasions, there is a recognized need for more detailed hazard maps and emergency plans for the Algarve. In the Algarve a start has been made, where a tsunami risk map has recently been completed for Portimão concelho¹ (county).

Culpepper, Dreda, and Walter Block. 2008. Price gouging in the Katrina aftermath: Free markets at work. *International Journal of Social Economics* 35(7): 512-520.

The concept of “price gouging” during times of emergency, such as in the aftermath of Katrina, often evokes quite an emotional response from people who are outraged that stores and companies would increase their prices during a time of emergency. The problem is that people do not realize that, in times of emergency, the market price they knew before is no longer adequate. Government intervention is not the answer to this “problem.” The purpose of this paper is to explore basic concepts of economics, to glean a better perspective of the justification for raising prices during times of emergency, as well as what would happen if there were not laws preventing this very necessary practice. The paper addresses some basic concepts of economics and applies them to emergency situations, preeminently the dire plight of New Orleans and the Gulf coast after Katrina. It finds that a government passes legislation preventing price gouging based on the implicit premise that it can allocate resources more efficiently than the market. By doing so, it alleges that it knows what the people want better than entrepreneurs who sink or swim based on their ability to anticipate matters of this sort. The paper voices the view that government regulation is nothing short of a disaster as far as satisfying customers is concerned. During times of disaster, prices should be allowed to adjust as a signal to producers and consumers alike. Consumers will utilize less of these goods, and producers will increase their output. As the supply adjusts following the price increase, goods and services will get to those who want them the most and are willing to pay for them. This will undoubtedly be a more effective way to distribute supplies to hurricane victims price controls must be repealed. The free market must be allowed to work via the beneficent invisible hand, not by the stultifying hands of the bureaucrats and politicians.

D’Amico, Daniel J. 2008. Who’s to blame for all the heartache? A response to anti-capitalistic mentalities after

Katrina. *International Journal of Social Economics* 35(8): 590-602.

Claims against capitalism and market processes in the wake of natural disasters can be overstated. Markets are an integral part of people's cultures and local identities. Social commentators have often brought complaints against capitalism for promoting greed and selfishness during and after natural catastrophes. Recently academics have introduced a unique perspective in addition to the more traditional criticisms. They claim that free-market advocates have imposed capitalist theories and policies in the wake of crises to the detriment of traditional policies, preferred cultures, and democratically selected institutions. This paper investigates these claims. It argues that the left overlooks the case that capitalism and corporate businesses may be a natural part of local cultures and recovery processes. If such a claim is true, then the normative case against capitalist responses to natural disasters is weaker than has been presented. The two perspectives are speaking past one another.

Durukal, Eser, and Mustafa Erdik. 2008. Physical and economic losses sustained by the industry in the 1999 Kocaeli, Turkey earthquake. *Natural Hazards* 46(2): 153-178.

The aim of this article is to contribute with first-hand data on damage and failure modes at industrial facilities subject to earthquakes. Physical and economic losses faced by the industry in the 1999 Kocaeli earthquake are summarized. Industrial-sector based, as well as component-based descriptions of earthquake performance and damage are provided. The results of the post-earthquake questionnaire survey designed and executed with the aim of gathering factual data from industrial facilities that experienced physical damages, as well as suffered from business interruption losses are presented. Generalized-intensity-based mean damage ratios for industrial facilities in Turkey are given. The information provided in this article can be used for the first order estimation of building, machinery and equipment losses, as well as stock and business interruptions, associated with industry during earthquakes in Turkey.

Huang, Xin, Hongshuan Tan, Jia Zhou, Tubao Yang, Abuaku Benjamin, Shi Wu Wen, Shuoqi Li, Aizhong Liu, Xinhua Li, Shudidong Fen, and Xinli Li. 2008. Flood hazard in Hunan province of China: An economic loss analysis. *Natural Hazards* 47(1): 65-73.

Natural and man-made disasters have been increasing, affecting millions of people throughout the world. Floods are the most common natural disasters, affect-

ing more people across the globe than all other natural or technological disasters. They also are the most costly in terms of human hardship and economic loss. In order to explore the total economic loss, components of economic loss, and factors influencing economic loss during flooding, a retrospective study was carried out in year 2000 in areas that suffered floods in 1998 in Hunan province, China. A total of 10,722 families were investigated using a multistage sampling method. The authors found that the total economic loss to the 10,722 families investigated was US\$8.925 million; translating into an average economic loss of US\$832.45 per family and US\$216.75 per person. Economic loss related to property loss, income loss, and increased medical cost accounted for 57.4 percent, 40.0 percent, and 2.6 percent of the total economic loss, respectively. Economic loss was significantly related to a family's pre-flood income; duration of the flood; severity of flood; and type of flood. River floods yielded the highest economic loss and drainage problem floods yielded the lowest loss. The authors recommended that flood-related preventive measures should focus on the prevention of river floods and shortening the duration of floods with the view of significantly minimizing economic losses associated with floods.

McGee, Robert W. 2008. An economic and ethical analysis of the Katrina disaster. *International Journal of Social Economics* 35(7): 546-557.

This paper combines economic and ethical analysis and includes discussions from the perspectives of both utilitarian ethics and rights-based ethics, which is not usually done in the economics literature. It applies economic and ethical analysis to natural disasters such as Hurricane Katrina to determine which approaches to disaster relief work best and which should be abandoned. It combines narrative with argument and analysis and finds that government involvement in disaster relief has proven to be economically inefficient and also violates rights. Private sector initiatives and economic and political freedom provide better solutions.

Raskin, Max, Scott A. Kjar, and Robert Rahm. 2008. What is seen and unseen on the Gulf Coast. *International Journal of Social Economics* 35(7): 490-500.

The paper provides an overview of lessons learned from the aftermath of the Katrina disaster by analyzing the rebuilding of the Gulf Coast. It posits that though Frederic Bastiat passed away in 1850, the beauty of his sound economic reasoning lives on and that his essay, "That which is seen, and that which is not seen," is especially insightful in analyzing the rebuilding of the Gulf Coast. The paper first expounds his lesson, then

applies it to the conflict between the private and public sectors in order to attack the fallacies of government spending and vindicate the free-market approach to reconstruction. The paper finds that the areas where the government has coercively arrogated to itself a monopoly police and fire departments to protect lives and property, courts to punish rights violators, water and sewer systems to restore potable water to homes are the areas where recovery lags the most. Since government has diverted its attention from these services where competition is not allowed, and has instead become involved in the provision of goods and services otherwise provided on the free market— houses, food, and clothing—its efforts have not only not assisted the recovery, they have actually stood in its way.

Rheinberger, Christoph M., Michael Brundl, and Jakob Rhyner. 2008. Dealing with the white death: Avalanche risk management for traffic routes. *Risk Analysis* (ePub): 1-19.

This article discusses mitigation strategies to protect traffic routes from snow avalanches. Up to now, mitigation of snow avalanches on many roads and railways in the Alps has relied on avalanche sheds, which require large initial investments resulting in high opportunity costs. Therefore, avalanche risk managers have increasingly adopted organizational mitigation measures such as warning systems and closure policies instead. The effectiveness of these measures is, however, greatly dependent on human decisions. In this article, the authors present a method for optimizing avalanche mitigation for traffic routes in terms of both their risk reduction impact and their net benefit to society. First, they introduce a generic framework for assessing avalanche risk and for quantifying the impact of mitigation. This allows for sound cost-benefit comparisons between alternative mitigation strategies. Second, they illustrate the framework with a case study from Switzerland. The findings suggest that site-specific characteristics of avalanche paths, as well as the economic importance of a traffic route, are decisive for the choice of optimal mitigation strategies. On routes endangered by few avalanche paths with frequent avalanche occurrences, structural measures are most efficient, whereas reliance on organizational mitigation is often the most appropriate strategy on routes endangered by many paths with infrequent or fuzzy avalanche risk. Finally, keeping a traffic route open may be very important for tourism or the transport industry. Hence, local economic value may promote the use of a hybrid strategy that combines organizational and structural measures to optimize the resource allocation of avalanche risk mitigation.

Walker, Douglas M., and John D. Jackson. 2008. Market-based “disaster relief”: Katrina and the casino industry. *International Journal of Social Economics* 35(7): 521-530.

The purpose of this paper is to examine the effect the rebuilding of the casino industry has had on the recovery efforts from Katrina. Using quarterly data from four states affected by Katrina and a simple OLS model to test the effect the casino industry had had on personal income in the states researchers find that the casino industry has had a statistically significant positive impact on the economic recovery in casino states relative to non-casino states. While these results support previous evidence on a short-run economic stimulus effect from casinos, other research has suggested that the long-run effects of casinos are less certain. As more data become available, the model could be re-tested.

Westley, Christopher, Robert P. Murphy, and William L. Anderson. 2008. Institutions, incentives, and disaster relief: The case of the Federal Emergency Management Agency following Hurricane Katrina. *International Journal of Social Economics* 35(7): 501-511.

This paper highlights the importance of property rights institutions to disaster relief efforts, with a focus on the U.S. Federal Emergency Management Agency in the aftermath of Hurricane Katrina in New Orleans, Louisiana. It utilizes public choice, Austrian, and new institutional analyses of bureaucracy. It discusses private and public sector responses to the situation in New Orleans following Katrina and to disasters in general, and compares the institutional frameworks that develop over time in both sectors. The paper finds that a large and bureaucratized response to disasters hinders economic calculation, incentive structure, and property rights institutions, all of which are crucial for rapid disaster response, the relief of human suffering, the minimization of knowledge problems, and the promotion of an efficient allocation of resources. This research suggests that the role of the price system in allocating resources is especially important following disasters and that in order to ensure relief efforts are as efficient as possible, public-sector actors should do nothing to impede them. It also suggests that the incentives to prepare an efficient emergency preparedness program are greater when those most affected by potential disasters are held responsible for their implementation. The paper provides a critical evaluation of the role of highly centralized approaches to disaster relief.

Wood, J. Stuart. 2008. *The finance of Katrina*.

International Journal of Social Economics 35(8): 579-589.

This is an interdisciplinary analysis of events using several different theoretical tools combined in an innovative way to examine why systematic errors were made and are continuing, and how errors can be stopped. The paper is of greatest value to those repairing the damaged infrastructure of southeast Louisiana and Mississippi. The paper's purpose is to discover the causes of the devastation of New Orleans and the Mississippi Gulf Coast and how it may be ameliorated. Economic analysis of the prior conditions causing susceptibility to flooding and of the subsequent events involving long-term assets; how assets had been selected; and what changes have occurred in the evaluation and selection process. The devastation caused by the hurricanes was far exceeded by: the prior governmental misleading of entrepreneurs and property owners regarding the actual level of flood protection provided to New Orleans by the bureaucratic Army Corps of Engineers' "flood protection system;" the resulting Rothbardian "cluster of entrepreneurial error" which allowed the devastation of New Orleans capital goods; the Hayekian unintended consequences of government actions and pronouncements following the storm, which interfered with market signals, increased subjective risk, reduced return expectations of entrepreneurs for capital assets, reducing net present values below zero; and the Misesian bureaucratic inefficiency of the corps and other governmental agents both before and after the storm. A sharp increase in their perception of flooding risk caused market participants to see that no improvement in flood control can be achieved under the present bureaucratic structure. They have permanently increased their perceived risk and discount rates, thereby reducing the pace of asset emplacement. Replacing the system of Lachmanian heterogeneous capital assets and their communications connections destroyed by Katrina cannot be accomplished in the present situation. New government actions and regulations are continually changing, noisy, and have altered property rights. The interactive efficiency of the asset system has been decreased. Incorrect assets are being built, necessary assets are being neglected, and the communications network between assets is not being replaced. A finer level of detail could be investigated, focusing on smaller sub-systems and interactions. The greatest improvement in asset rebuilding would follow the elimination of all government regulations and regulatory agencies impeding the decision process, and private companies should be contracted to replace the destroyed wetlands and emplace flood controls.

Landslides and Avalanches

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

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

Gorum, T., B. Gonencgil, C. Gokceoglu, and H. A. Nefeslioglu. 2008. *Implementation of reconstructed geomorphologic units in landslide susceptibility mapping: The Melen Gorge (NW Turkey)*. *Natural Hazards* 46(3): 323-351.

In the international literature, although there is a considerable number of publications on the landslide susceptibility mapping, geomorphology as a conditioning factor is only used in limited number of studies. The purpose of this article is to implement the geomorphologic parameters derived by reconstructed topography in landslide susceptibility mapping. According to the method employed in this study, terrain is generalized by the contours passed through the convex slopes of the valleys that were formed by fluvial erosion. Therefore, slope conditions before landslides can be obtained. The reconstructed morphometric and geomorphologic units are taken into account as a conditioning parameter when assessing landslide susceptibility.

Two different data, one of which is obtained from the reconstructed DEM, have been employed to produce two landslide susceptibility maps. The binary logistic regression is used to develop landslide susceptibility maps for the Melen Gorge in the Northwestern part of Turkey. Due to the high correct classification percentages and spatial effectiveness of the maps, the landslide susceptibility map comprising the reconstructed morphometric parameters exhibits a better performance than the other. Five different datasets are selected randomly to apply proper sampling strategy for training. As a consequence of the analyses, the most proper outcomes are obtained from the dataset of the reconstructed topographical parameters and geomorphologic units, and lithological variables that are implemented together. Correct classification percentage and root mean square error (RMSE) values of the validation dataset are calculated as 86.28 percent and 0.35, respectively. Prediction capacity of the different datasets reveal that the landslide susceptibility map obtained from the reconstructed parameters has a higher prediction capacity than the other. Moreover, the landslide susceptibility map obtained from the reconstructed parameters produces logical results.

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

Lagmay, Alfredo Mahar A., Arlene Mae P. Tengonciang, Raymond S. Rodolfo, Janneli Lea A. Soria, Eden G. Baliatan, Engielle R. Paguican, John Burtkenley, T. Ong, Mark R. Lopus, Dan Ferdinand D. Fernandez, Zareth P. Quimba, and Christopher L. Uichanco.

2008. Science guides search and rescue after the 2006 Philippine landslide. *Disasters* 32(3): 416-433.

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

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

This article is drawn from preliminary findings, presented at the UNU-EHS Summer Academy in Munich, July 23–30, 2006. Most of the results are still being analyzed and thus those discussed here are not definitive and are subject to revision. Conclusions have been drawn from almost two years fieldwork in the western hill slope of La Paz, using various techniques for data collection: constant participant observation with the inhabitants and their neighborhood representatives; in-depth interviews with more than 30 families at risk; informal interviews with other people at risk and with disaster victims; semi-directed interviews with dozens of “old inhabitants” of the neighborhoods; in-depth interviews with dozens of “neighborhood presidents” and with many local authorities related to risk management; and analysis of documentation, maps, pictures, photographs, video collections and other visual material. The in-depth interviews with people living with risk contained more than 120 questions; those related to risk, emergencies and hazards were purposefully open-ended to see whether the theme appeared by itself in the interviewee’s discourse and concerns. In this respect, the interview guide took into account advances in sociology and anthropology, and applied human security studies, focusing on what really mattered for

the research subjects. This is a hybrid method combining the advantages of questionnaires, semi-structured interviews, and life stories, and is thus adaptive and flexible but also allows for future statistical analysis.

Pande, Ravindra K., and Neeta Pande. 2008. Nainital: A landslide town of Uttarakhand (India). *Disaster Prevention and Management* 17(4): 478-487.

The paper describes the natural hazards with which Uttaranchal is faced and proposes systematic studies which are required to deal with every aspect of the outstanding problems of slope instability. Uttaranchal is a hilly state recently constituted in the Himalayan region. Over 80 percent of Uttaranchal state is prone to slope instability because of weak and highly folded and fractured rocks, steep slopes, high seismicity and unfavorable hydro-geological conditions. In addition to this, unsystematic construction activities contribute to the problem. Newly formed Uttaranchal state is in the process of development, expanding its existing infrastructure. Bending of rock beds, their disjuncting, disruption and drag-folding are characteristic features of a creeping mass. Tilted trees and poles are indicative of creep movement as seen on a number of slopes in and around Nainital town. The curvature of the tree trunks bears record to the rate of creep during the period of growth of the tree. It hardly needs stating that the rate of creep movement is quicker during the rainy season, and there may be long periods stretching over years when no movement at all takes place. The temporal span of this phenomenon stretches over thousands of years. The rate is accelerated by clear-cutting in forests and by construction on steeper slopes. The depth of the creep movement is variable, and depends largely on the nature and degree of weathering of rocks, the sub-surface structure and amount of water present within. Construction activities are proceeding rapidly, which has given rise to the new landslide problems or have aggravated the existing slope instability problems. In order to keep the landslide problems to a minimum, systematic studies are required on every aspect of the slope instability problems. On the basis of slope instability evidence, past occurrence of landslides, deformation of civil structures and geological conditions, three zones have been identified safe, moderately safe, and very unsafe.

Rheinberger, Christoph M., Michael Brundl, and Jakob Rhyner. 2008. Dealing with the white death: Avalanche risk management for traffic routes. *Risk Analysis* (ePub): 1-19.

This article discusses mitigation strategies to protect traffic routes from snow avalanches. Up to now, mitiga-

tion of snow avalanches on many roads and railways in the Alps has relied on avalanche sheds, which require large initial investments resulting in high opportunity costs. Therefore, avalanche risk managers have increasingly adopted organizational mitigation measures such as warning systems and closure policies instead. The effectiveness of these measures is, however, greatly dependent on human decisions. In this article, the authors present a method for optimizing avalanche mitigation for traffic routes in terms of both their risk reduction impact and their net benefit to society. First, they introduce a generic framework for assessing avalanche risk and for quantifying the impact of mitigation. This allows for sound cost-benefit comparisons between alternative mitigation strategies. Second, they illustrate the framework with a case study from Switzerland. The findings suggest that site-specific characteristics of avalanche paths, as well as the economic importance of a traffic route, are decisive for the choice of optimal mitigation strategies. On routes endangered by few avalanche paths with frequent avalanche occurrences, structural measures are most efficient, whereas reliance on organizational mitigation is often the most appropriate strategy on routes endangered by many paths with infrequent or fuzzy avalanche risk. Finally, keeping a traffic route open may be very important for tourism or the transport industry. Hence, local economic value may promote the use of a hybrid strategy that combines organizational and structural measures to optimize the resource allocation of avalanche risk mitigation.

Public Health, Mental Health, and Emergency Medicine

Armstrong, John H., Erik R. Frykberg, and David G.

Burris. 2008. Toward a national standard in primary mass casualty triage. *Disaster Medicine and Public Health Preparedness* 2(S1): S8-S10.

Becker, Steven M., and Sarah A. Middleton. 2008.

Improving hospital preparedness for radiological terrorism: Perspectives from emergency department physicians and nurses. *Disaster Medicine and Public Health Preparedness* 2(3): 174-184.

Hospital emergency department clinicians will play a crucial role in responding to terrorist incidents involving radioactive materials. To date, however, there has been a paucity of research focused specifically on clinicians' perspectives regarding that threat. At the request of the U.S. Centers for Disease Control and Prevention, researchers at the University of Alabama at Birmingham conducted a series of 10 focus groups

(total participants, 77) with emergency physicians and nurses at hospitals in three U.S. regions. Participants considered a hypothetical “dirty bomb” scenario and discussed their perceptions, concerns, information needs, preferred information sources, and views of existing guides and informational materials. Clinicians consistently stated emergency departments and hospital facilities aren’t sufficiently prepared for a terrorist event involving radioactive materials. Participants expressed a need for additional information, strongly disagreed with aspects of current response guidance, and in some cases, indicated they would not carry out current protocols. The findings of this study—the first to examine the emergency clinicians’ views, perceptions, and information needs regarding radiological terrorism—may be useful in future efforts to improve hospital preparedness.

Behar, Solomon, Jeffrey S. Upperman, Marizen Ramirez, Fred Dorey, and Alan Nager. 2008. Training medical staff for pediatric disaster victims: A comparison of different teaching methods. *American Journal of Disaster Medicine* 3(4): 189-199.

This study assessed the effectiveness of the different types of healthcare worker training in pediatric disaster medicine knowledge and analyzed the effects of training type on workers’ attitudes toward pediatric disaster medicine. The study was a prospective, randomized-controlled, longitudinal study in the setting of a large, urban children’s hospital. The subjects, randomly selected Children’s Hospital Los Angeles physicians and nurses, underwent a didactic lecture or a combination of didactic lecture and tabletop exercise. Pre-intervention and post-intervention testing took place using a test on pediatric disaster medical topics. Subjects undergoing the tabletop simulation were found to have a more knowledge of and comfort with the topics, compared to those who only underwent a didactic lecture. Didactic lecture and tabletop exercises both increased healthcare worker’s knowledge of pediatric disaster topics. The addition of tabletop exercises to a standard didactic lecture might increase a learner’s sense of knowledge and comfort with disaster topics, leading to increased staff participation in the event of an actual disaster.

Bostick, Nathan A., Italo Subbarao, Frederick M. Burkle, Edbert B. Hsu, John H. Armstrong, and James L. James. 2008. Disaster triage systems for large-scale catastrophic events. *Disaster Medicine and Public Health Preparedness* 2(S1): S35-S39.

Large-scale catastrophic events typically result in a scarcity of essential medical resources and necessitate

triage management to minimize preventable morbidity and mortality. Accomplishing this goal requires a reconceptualization of triage as a population-based systemic process that integrates care at all points of interaction between patients and the health care system. This system identifies at minimum four orders of contact: the community, prehospital, facility, and regional level. Adopting this approach will ensure disaster response activities occur comprehensively, minimizing the patient care burden at subsequent intervention orders and reducing the need to ration care. The seamless integration of all orders of intervention in this disaster-specific triage model, coordinated through health emergency operations centers, can ensure disaster response measures are undertaken in an effective, just, and equitable manner.

Burkle, Frederick M., and P. Gregg Greenough. 2008. Impact of public health emergencies on modern disaster taxonomy, planning, and response. *Disaster Medicine and Public Health Preparedness* 2(3): 192-199.

Current disaster taxonomy describes diversity, distinguishing characteristics, and common relations in disaster event classifications. Compromised public health infrastructure and systems defines and influences how disasters are observed, planned for, and managed—especially those that are geographically widespread, population dense, or prolonged. What first results in direct injury and death can rapidly lead to excesses of indirect illness and subsequent death as essential public health resources are destroyed, deteriorate, or denied to vulnerable populations. Public health infrastructure and systems must be seen as issues that deserve attention from disaster managers, urban planners, the global humanitarian community, World Health Organization authorities, and parties to war and conflict. The authors propose disaster frameworks be reformed to emphasize and clarify the relation of public health emergencies to modern disasters.

Campbell, D., M. Stafford Smith, J. Davies, P. Kuipers, J. Wakerman, and M. J. McGregor. 2008. Responding to health impacts of climate change in the Australian desert. *Rural and Remote Health* (ePub) 8(1008).

Climate change is likely to have a significant effect on the health of those living in the 70 percent of Australia that is desert. The direct impacts on health, such as increased temperature, are important. But so too are the secondary impacts that will occur as a result of the impact of climate change on an uncertain and highly variable natural environment and on the interlinking social and economic systems. The consequence of these secondary impacts will appear as changes in the

incidence of disease and infections, and on the psychosocial determinants of health. Responding to the impacts of climate change on health in desert Australia will involve the active participation of a variety of interest groups ranging from local to state and federal governments and a range of public and private agencies, including those not traditionally defined as within the health sector. The modes of engagement required for this process need to be innovative, and will differ among regions on different trajectories. To this end, a first classification of these trajectories is proposed.

Casman, Elizabeth A., and Baruch Fischhoff. 2008. Risk communication planning for the aftermath of a plague bioattack. *Risk Analysis* 28 (5): 1327-1342.

This article creates an influence diagram of how a plague bioattack could unfold and then uses it to identify factors shaping infection risks in possible scenarios. The influence diagram and associated explanations provide a compact reference that allows risk communicators to identify key messages for pre-event preparation and testing. It can also be used to answer specific questions in unique situations that consider the conditions of the attack and the properties of the attacked populations. The influence diagram allows a quick, visual check of the factors that must be covered when evaluating audience information needs. The documentation provides content for explaining the resulting advice. The article shows how these tools can help in preparing for crises and responding to them.

Chan, Emily. 2008. The untold stories of the Sichuan earthquake. *The Lancet* 372(9636): 359-362.

The article presents an overview of the short-term needs of people affected by the 2008 earthquake in Sichuan province in China, and of the medical and public health challenges faced by the Chinese population as reconstruction efforts in the province continue. A discussion of the mental health needs of people in the province who were affected by the earthquake, and of a lack of preparedness which was seen in the province despite knowledge that it was in an at-risk area, is presented.

Convery, I., and C. Bailey. 2008. After the flood: The health and social consequences of the 2005 Carlisle flood event. *Journal of Floodplain Management* 1(2): 100-109.

This paper considers the health and social impacts that the flooding caused to a number of Carlisle households following the January 2005 floods and storms. In so doing the authors consider such impacts from a "lived,

local experience" perspective. They reflect on the need for both informal support and locally accessible and ongoing, post-flood information and support centers. Such centers can provide one point of contact for multiple emotional and practical problems. The authors suggest that these centers require both strong multi-partnership and multi-agency working and highly skilled support center personnel who have local knowledge and understanding of the affected community. In this way, local post-disaster needs may be contextualized and responded to in a way that both draws on existing local expertise and strengthens long-term community-based support.

Cookson, Susan T., Karl Soetebier, Erin L. Murray, Geroncio Fajardo, Randy Hanzlick, Alex Cowell, and Cherie Drenzek. 2008. Internet-based morbidity and mortality surveillance among Hurricane Katrina evacuees in Georgia. *Preventing Chronic Disease: Public Health Research, Practice, and Policy* 5(4).

The Internet has revolutionized the way public health surveillance is conducted. Georgia has used it for notifiable disease reporting, electronic outbreak management, and early event detection. It was used in the public health response to the 125,000 Hurricane Katrina evacuees who came to Georgia. Researchers developed Internet-based surveillance forms for evacuation shelters and an Internet-based death registry. District epidemiologists, hospital-based physicians, and medical examiners/coroners electronically completed the forms and analyzed these data and data from emergency departments used by the evacuees. The Internet was essential in collecting health data from multiple locations, by many different people, and for multiple types of health encounters during Georgia's Hurricane Katrina public health response.

DiMaggio, Charles, Paula A. Madrid, George T. Loo, and Sandro Galea. 2008. The mental health consequences of terrorism: Implications for emergency medicine practitioners. *Journal of Emergency Medicine* 35(2): 139-147.

Emergency physicians are likely to be first-line responders to local or regional terrorist attacks. In addition to preparing for potential physical conditions and injuries associated with terrorism, they should be aware of the behavioral and mental health implications, especially the characteristics that predict who may be at increased risk for mental illness after such events and how they can be identified in an emergency department setting. Although most people with behavioral conditions stemming from an attack can be expected

to recover spontaneously within several months, other individuals are at risk of developing debilitating mental health conditions associated with post-terrorist and disaster environments. Screening tools are available to help emergency practitioners identify these patients and refer them for formal psychiatric evaluation and possible interventions that facilitate and speed the recovery process.

Dyer, Carmel B., Mor Regev, Jason Burnett, Nicolo Festa, and Beth Cloyd. 2008. SWiFT: A rapid triage tool for vulnerable older adults in disaster situations. *Disaster Medicine and Public Health Preparedness* 2(S1): S45-S50.

Hurricane Katrina caused extensive damage to parts of Mississippi, Louisiana, and Alabama, causing many people, including vulnerable older adults, to evacuate to safer surroundings. Approximately 23,000 evacuees—many of them 65 or older, frail, and lacking family to advocate for their care—arrived at the Reliant Astrodome Complex in Houston, Texas. There was no method for assessing the immediate and long-term needs of this vulnerable population. A 13-item rapid needs assessment tool was piloted by the Seniors Without Families Team (SWiFT) on 228 evacuees to test the feasibility of triaging vulnerable older adults with medical and mental health needs, financial needs, and/or social needs. The SWiFT tool is a feasible approach for triaging vulnerable older adults and seemed to provide rapid determination of level of need necessary for this population during disaster. Further testing to determine reliability and validity of the pilot tool is still necessary. Implications for using such a tool and suggestions for disaster response and preparation related to vulnerable older adults are provided.

Galea, Sandro, Melissa Tracy, Fran Norris, and Scott F. Coffey. 2008. Financial and social circumstances and the incidence and course of PTSD in Mississippi during the first two years after Hurricane Katrina. *Journal of Traumatic Stress* 21(4): 357-368.

Hurricane Katrina was the most devastating natural disaster to hit the United States in the past 75 years. The authors conducted interviews of 810 persons who were representative of adult residents living in the 23 southernmost counties of Mississippi before Hurricane Katrina. The prevalence of posttraumatic stress disorder (PTSD) since Hurricane Katrina was 22.5 percent. The determinants of PTSD were female gender, experience of hurricane-related financial loss, post-disaster stressors, low social support, and post-disaster traumatic events. Kaplan-Meier survival curves suggest that exposure to both hurricane-related traumatic

events and to financial and social stressors influenced the duration of PTSD symptoms. Post-disaster interventions that aim to improve maneuverable stressors after these events may influence the onset and course of PTSD.

Hensley, Lauren, and Enrique Varela. 2008. PTSD symptoms and somatic complaints following Hurricane Katrina: The roles of trait anxiety and anxiety sensitivity. *Journal of Clinical Child and Adolescent Psychology* 37(3): 542-552.

This study examined relationships between trait anxiety and anxiety sensitivity and the outcome variables post-traumatic stress disorder (PTSD) symptoms and somatic complaints following a major hurricane. Sixth- and seventh-graders in the New Orleans area were surveyed five to eight months after Hurricane Katrina. As expected, hurricane exposure was a significant predictor of PTSD symptoms and somatic symptoms. Also as hypothesized, certain factors of anxiety sensitivity interacted with trait anxiety to predict PTSD symptoms and somatic symptoms. Clinical implications of potential linkages among trait anxiety, dimensions of anxiety sensitivity and PTSD, and somatic symptoms are discussed.

Hick, John L., Jeffery Chipman, Gregory Loppnow, Marc Conterato, David Roberts, William G. Heegard, Greg Beilman, Michael Clark, Jonathan Pohland, Jeffrey D. Ho, Douglas D. Bruneyye, and Joseph E. Clinton. 2008. Hospital response to a major freeway bridge collapse. *Disaster Medicine and Public Health Preparedness* 2(S1): S11-S16.

The authors describe hospital system response to the Interstate 35W bridge collapse in Minneapolis on August 1, 2007. The incident resulted in 13 deaths and 127 injuries. Comparative analysis of response activities at three hospitals that received critical or serious casualties is provided. First-hand experiences of hospital physicians, issues identified in after-action reports, injury severity scores, and other relevant patient data were collected. The most critical patients arrived first at each hospital, suggesting appropriate pre-hospital triage. The capacity of the healthcare system was not overwhelmed and the involved hospitals generally reported over response by staff. Communication and patient tracking problems occurred at all of the hospitals. Situational awareness was limited due to the scope of structural collapse and incomplete information from the scene. Hospitals were generally satisfied with their surge capacity and incident management plan activation. Issues such as communications, patient tracking, and staff over reporting identified in past incidents

were problematic in this event, as well. Hospitals need to address deficiencies and build on successes to cope with potentially larger future incidents.

Hick, John L., Jeffrey D. Ho, William G. Heegard, Douglas D. Brunette, Anne Lapine, Tom Ward, and Joseph E. Clinton. 2008. Emergency medical services response to a major freeway bridge collapse. *Disaster Medicine and Public Health Preparedness* 2(S1): S17-S24.

The Interstate 35W Bridge in Minneapolis collapsed on August 1, 2007, killing 13 people and injuring 127. This article describes the emergency medical services response to this incident. Complexities of the event included difficult patient access, multiple operation sectors, and multiple mutual-aid agencies. Patient evacuation and transportation was rapid, with the collapse zone cleared of victims 95 minutes after the initial 911 call. Critical to the response success was a common regional emergency medical service incident management. Communication and patient tracking difficulties could be improved in future responses.

Hick, John L., Kristi L. Koenig, Donna Barbisch, and Tareg A. Bey. 2008. Surge capacity concepts for health care facilities: The CO-S-TR model for initial incident assessment. *Disaster Medicine and Public Health Preparedness* 2(S1): S51-S57.

Facility-based health care personnel often lack emergency management training and experience, making it a challenge to efficiently assess evolving incidents and rapidly mobilize appropriate resources. The authors propose the CO-S-TR model, a simple conceptual tool for hospital incident command personnel to prioritize initial incident actions, adequately addressing key components of surge capacity. There are three major categories in the tool, each with four sub-elements. "CO" stands for command, control, communications, and coordination and ensures an incident management structure is implemented. "S" considers the logistical requirements for staff, stuff, space, and special (event-specific) considerations. "TR" comprises tracking, triage, treatment, and transportation: basic patient care and patient movement functions. This comprehensive, yet simple, approach was designed to be implemented in the immediate aftermath of an incident and complements incident command systems by aiding effective incident assessment and surge capacity responses at the healthcare facility level.

Jafari, Mohsen A., Davood Golmohammadi, and Kian Seyyed. 2008. Staff management in emergency evacua-

tion preparedness and response. *Journal of Homeland Security and Emergency Management* 5(1).

In this paper, the role of resource management in a hospital emergency environment is addressed and analyzed. The authors propose a methodology to help incident managers allocate available medical and non-medical staff members to the areas undergoing emergency evacuation. They show assumptions of unlimited resource capacity and lack of interaction between resources can lead to invalid results and plans. They then present an analytical approach to model the dispatch of limited human resources to impacted floors and formulate a procedure to estimate evacuation time. This estimation methodology can be used with a reasonable degree of accuracy, replacing complex simulation models that often take time to develop and test.

Kade, Kristy A., Kathryn H. Brinsfield, Richard A. Serino, Elena Savoia, and Howard K. Koh. 2008. Emergency medical consequence planning and management for national special security events after September 11: Boston 2004. *Disaster Medicine and Public Health Preparedness* 2(3): 166-173.

The post-September 11 era has prompted unprecedented attention to medical preparations for national special security events (NSSE), requiring extraordinary planning and coordination among federal, state, and local agencies. During the 2004 Democratic National Convention (DNC), a designated NSSE, the Boston Emergency Medical Services (BEMS) was tasked with the design and implementation of convention-related health services. In this article, the authors describe the planning and development of BEMS' 2004 DNC Medical Consequence Management Plan that addressed public health surveillance, on-site medical care, mass casualty surge capacity, and federal response asset management. Lessons learned from enhanced medical planning for the 2004 DNC could serve as an effective model for future mass gathering events.

Klein, Kelly R., Paul E. Pepe, Frederick M. Burkle, Nanci E. Nagel, and Raymond E. Swienton. 2008. Evolving need for alternative triage management in public health emergencies: A Hurricane Katrina case study. *Disaster Medicine and Public Health Preparedness* 2(S1): S40-S44.

In many countries, traditional medical planning for disasters were largely developed in response to battlefield and multiple casualty incidents. The mass evacuation of a metropolitan population after Hurricane Katrina evolved into life-and-death triage scenarios involving thousands of patients with non-traumatic illnesses and special medical needs. Although un-

precedented in the United States, triage management needs for this disaster were similar to large-scale public health emergencies, both natural and human-generated, around the world in the past half-century. The need for alternative processes similar to global mass public health emergency methodologies is illustrated by the experience of disaster medical assistance teams in the three days following Katrina's landfall. The immediate establishment of disaster-specific, consensus-based public health triage protocols—developed with ethical and legal expertise and a renewed focus on multidimensional decision-making processes—is strongly recommended.

Kutcher, Stan, and Sonia Chehil. 2008. Application of a needs-driven, competencies-based mental health training program to a post-disaster situation: The Grenada experience. *American Journal of Disaster Medicine* 3(4): 235-240.

This report outlines an innovative approach to mental health needs following natural disasters in a region in the Caribbean. Instead of the traditional external vertical psychosocial interventions commonly used in this region, the authors developed and implemented a mental health intervention training program in Grenada. The training is focused on enhancing local community-based health service providers' ability to provide immediate and continued mental healthcare following a natural disaster. Soon after this training, a hurricane struck Grenada. A review of the self-confidence in the application of this training and these community health providers' intervention activities demonstrated they felt able to effectively identify, intervene, and address post-disaster mental health needs and care of individuals continued beyond immediate post-disaster period. This suggests enhancing the capacity of local providers could be a useful model and might be applicable in other jurisdictions.

Kuwabara, Hideki, Toshiki Shioiri, Shin-Ichi Toyabe, Tsuyoshi Kawamura, Masataka Koizumi, Miki Ito-Sawamura, Kouhei Akazawa, and Toshiyuki Someya. 2008. Factors impacting on psychological distress and recovery after the 2004 Niigata-Chuetsu earthquake, Japan: Community-based study. *Psychiatry & Clinical Neurosciences* 62(5): 503-507.

This study was undertaken five months after the 2004 Niigata-Chuetsu earthquake in Japan to assess factors that impacted psychological distress and recovery. Three thousand and twenty-six adult victims who lived in temporary shelter and in seriously damaged areas were evaluated by questionnaire. The questionnaire queried subject profile, degree of house damage, health

status, and psychological distress using a five-point scale before, immediately and five months after the earthquake. Immediately after the earthquake, 59.3 percent of the subjects had psychological distress. At five months after the earthquake, however, this percentage decreased to 21.8 percent. The psychological distress immediately after the earthquake was serious in victims who: (i) were female; (ii) felt stronger fear of the earthquake and the aftershocks; (iii) lived at home or office after the earthquake; and (iv) were injured due to the earthquake or suffered from sickness after the earthquake. In contrast, the factors impairing psychological recovery five months after the earthquake were as follows: (i) being with unfamiliar people during the night after the earthquake; (ii) serious house damage; (iii) living in temporary shelter or at a relative's home after the earthquake; and (iv) physical illness after the earthquake. Despite differences between disasters, these results were consistent with those in some previous studies and may be useful for long-term mental care support.

Lerner, E. Brooke, Richard B. Schwartz, Philip L. Coule, Eric S. Weinstein, David C. Cone, Richard C. Hunt, Scott M. Sasser, J. Marc Liu, Nikiyah G. Nudell, Ian S. Wedmore, Jeffrey Hammond, Eileen M. Bulger, Jeffrey P. Salomone, Teri L. Sanddal, Graydon C. Lord, David Markenson, and Robert E. O'Connor. 2008. Mass casualty triage: An evaluation of the data and development of a proposed national guideline. *Disaster Medicine and Public Health Preparedness* 2(S1): S25-S34.

Mass casualty triage is a critical skill. Although many systems exist to guide providers in making triage decisions, there is little scientific evidence available to demonstrate that available systems are valid. Furthermore, there is little consistency in the application of mass casualty triage methodology from one jurisdiction to the next in the United States. There are no nationally agreed upon categories or color designations. This review reports on a consensus committee process used to evaluate and compare commonly used triage systems and to develop a proposed national mass casualty triage guideline. The proposed guideline, called SALT (sort, assess, life-saving interventions, treatment and/or transport) triage, was based on the best available science and consensus opinion. It incorporates aspects from all of the existing triage systems to create a single overarching guide to unify mass casualty triage across the United States.

Marsee, Monica A. 2008. Reactive aggression and post-traumatic stress in adolescents affected by Hurricane

Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 519-529.

The current study tests a theoretical model illustrating a potential pathway to reactive aggression through exposure to a traumatic event (Hurricane Katrina) in 166 adolescents recruited from high schools on the Gulf Coast of Mississippi. Results support an association between exposure to Hurricane Katrina and reactive aggression via post-traumatic stress disorder (PTSD) symptoms and poorly regulated emotion. The proposed model fits well for both boys and girls; however, results suggest minority youth in this sample were more likely to experience emotional dysregulation in relation to post-traumatic stress than Caucasian youth. Further, results indicate hurricane exposure, PTSD symptoms, and poorly regulated emotion are associated with reactive aggression even after controlling for proactive aggression. These findings have implications for post-disaster mental health services. Researchers examining mental health problems in youth after a significant disaster traditionally focus on the presence of internalizing problems such as anxiety, depression, and post-traumatic stress disorder (PTSD) symptoms, with very little empirical attention paid to the incidence of post-disaster externalizing problems such as aggression. Specific types of aggressive responses, particularly those involving poorly regulated emotion (i.e., reactive aggression), were associated with a history of trauma and, thus, may be especially common following a traumatic event such as a hurricane.

Norris, Fran H., Jessica L. Hamblen, Lisa M. Brown, and John A. Schinka. 2008. Validation of the short post-traumatic stress disorder rating interview (expanded version, Sprint-E) as a measure of post disaster distress and treatment need. *American Journal of Disaster Medicine* 3(4): 201-211.

Professionals and paraprofessionals working in disaster settings need tools to identify people with mental health needs. To validate the Sprint-E as a measure of post-disaster distress and treatment need, the authors tested 1) the concurrent validity of the measure compared with other measures of distress, 2) the sensitivity and specificity of a 3/7 rule on the Sprint-E relative to probable PTSD diagnosis, and 3) the hypothesis that Sprint-E scores would be stable in the absence of treatment, but would improve in its presence. The utility of the 3/7 rule for the Sprint-E, with 3 suggesting possible and 7 suggesting probable treatment needs, was supported in Study 1. Tested against the PTSD checklist, the Sprint-E performed well in ROC analyses; a score of 7 achieved sensitivity of 78 percent and specificity of

79 percent. In Study 2, Sprint-E scores evidenced little change between referral and pretreatment but substantial change between pretreatment and intermediate treatment. The Sprint-E is useful as an assessment and referral tool in situations where more in-depth assessment is not feasible and mental health services are available.

Peng, Zongchao. 2008. Preparing for the real storm during the calm: A comparison of the crisis preparation strategies for pandemic influenza in China and the U.S. *Journal of Homeland Security and Emergency Management* 5(2).

Humanity faces the rapid spread of avian flu and the potential severe threat of global pandemic flu. China and the United States issued plans for managing a pandemic flu in September 2005 and November 2005, respectively. This article asks whether there are vulnerabilities or shortcomings inherent in either plan, and if so, what measures should be taken to improve them. The article provides a theoretical analysis of issues of crisis preparation from the perspective of a real crisis. It also does some crisis analysis of a pandemic flu and proposes preliminary preparation strategies to deal with it. More importantly, it compares the United States' and China's crisis preparation strategies, including the process of forming strategies, cognition of risks, choices of goals, basic principles, framework, and implementation. It concludes with suggestions for crisis policy formulation regarding a pandemic flu.

Perlman, David. 2008. Public health practice vs. research: Implications for preparedness and disaster research review by state health department IRBs. *Disaster Medicine and Public Health Preparedness* 2(3): 185-191. Under the current U.S. Department of Health and Human Services regulatory and ethical system for research involving human subjects, research is defined in terms of several key concepts: intent, systematic investigation, and ability to generalize. If that research involves living individuals and the investigator will either interact or intervene with people or obtain their identifiable personal information, then it must be reviewed by an institutional review board (IRB), a federally-mandated committee that ensures the ethical and regulatory appropriateness of the proposed research. In public health institutions, and especially at state departments of health, the definition of research can prove vexing when determining if public health activities must be reviewed by IRBs. In the current climate of public health preparedness initiatives at state health departments for disasters and bioterrorism, how

research is defined vis-à-vis public health interventions can add even more confusion to preparedness initiatives and make it difficult to know when IRB review and the added protections it affords are appropriate. This article suggests several practical ways to avoid confusion and strikes a balance between the need for expeditious approvals and ensuring proper protections for human subjects. These suggestions can assist state health departments and the academic researchers who collaborate with them or need to have their research reviewed by their IRBs.

Pina, Armondo A., Ian K. Villalta, Claudio D. Ortiz, Amanda C. Gottschall, Natalie M. Costa, and Carl F. Weems. 2008. Social support, discrimination, and coping as predictors of posttraumatic stress reactions in youth survivors of Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 564-574.

This study examined the influence of the post-Hurricane Katrina recovery environment (i.e., discrimination, social support) and coping behaviors on children's post-traumatic stress reactions (symptoms of post-traumatic stress disorder [PTSD], anxiety, and depression). Data revealed that greater helpfulness from extra-familial sources of social support predicted lower levels of child-rated symptoms of PTSD, anxiety, and depression. A positive-predictive relation was found between helpfulness from professional support sources and PTSD, perhaps suggesting that parents whose children were experiencing higher PTSD-symptom levels sought professional support and reported it was helpful. Youths' avoidant coping behaviors predicted both PTSD and anxiety symptoms. Discrimination, active coping, and familial support did not predict any of the post-traumatic stress reactions assessed in this study.

Rebmann, Terri, Ruth Carrico, and Judith F. English. 2008. Lessons public health professionals learned from past disasters. *Public Health Nursing* 25(4): 344-352.

This article seeks to delineate the lessons that public health professionals learned during past disasters, as well as the information/resources that were lacking. Disasters can result in public health crises if infection prevention/control interventions are not implemented rapidly and appropriately. Gaps in past public health disaster response include infection prevention/control in mass casualty incidents, public education, internal and external communication, mental health, physical plant, and partnerships with outside agencies. Participants emphasized the need to provide consistent messages to the public, communicate between

agencies, and provide public education on disaster preparedness. These tasks can be challenging during infectious disease emergencies when recommendations change. Effective communication is necessary to maintain public trust. Infection control issues in shelters, such as hand hygiene products/facilities, sanitation, outbreaks of unusual infectious diseases, overcrowded conditions, and poor environmental decontamination, were identified as critical to prevent secondary disease transmission. Public health and infection control nurses must partner and continue to address gaps in disaster planning.

Redlener, Irwin. 2008. Population vulnerabilities, pre-conditions, and the consequences of disasters. *Social Research* 75(3): 1-8.

The author argues that the public health consequences of a major disaster are worse when health, nutrition, and economic status are less than optimal and when conditions in the larger community lack basic levels of support. He suggests investing in community support systems, creating income stability, and improving access to necessary services should be part of overall disaster planning.

Salloum, Alison, and Stacy Overstreet. 2008. Evaluation of individual and group grief and trauma interventions for children post disaster. *Journal of Clinical Child and Adolescent Psychology* 37(3): 495-507.

This study evaluated a community-based grief and trauma intervention for children following a disaster. Fifty-six children (7 to 12 years old) who reported moderate to severe symptoms of post-traumatic stress were randomly assigned group or individual treatment consisting of a manualized 10-session grief- and trauma-focused intervention and a parent meeting. Measures of disaster-related exposure, post-traumatic stress symptoms, depression, traumatic grief, and distress were administered at pre-intervention, post-intervention, and three weeks post-intervention. There was a significant decrease in all outcome measures over time and no difference between group and individual intervention outcomes. Results suggest that intervention using either treatment modality could be effective for addressing childhood grief and trauma following disasters.

Scaramella, Laura V., Sara L. Sohr-Preston, Kristin L. Callahan, and Scott P. Mirabile. 2008. A test of the family stress model on toddler-aged children's adjustment among Hurricane Katrina impacted and nonim-

pacted low-income families. *Journal of Clinical Child and Adolescent Psychology* 37(3): 530-541.

The Family Stress Model describes a process where financial strain undermines parents' mental health, the quality of family relationships, and child adjustment. Our study considered the extent to which the Family Stress Model explained toddler-aged adjustment in families affected by Hurricane Katrina-affected and those not affected. Two groups of very low-income mothers and their 2-year-old children participated. Consistent with the Family Stress Model, financial strain and neighborhood violence were associated with higher levels of mothers' depressed mood; depressed mood was linked to less parenting efficacy. Poor parenting efficacy was associated to more internalizing and externalizing problems among children.

Scheeringa, Michael S., and Charles H. Zeanah. 2008.

Reconsideration of harm's way: Onsets and co-morbidity patterns of disorders in preschool children and their caregivers following Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 508-518.

This study examined post-traumatic stress disorder (PTSD) and co-morbid disorders in 70 preschool children (ages 3-6) and their caregivers following Hurricane Katrina. The children's rate of PTSD was 50 percent using age-modified criteria. The rate of PTSD was 62.5 percent for those who stayed in the city and 43.5 percent in those who evacuated. Of those with PTSD, 88.6 percent had at least one co-morbid disorder, with oppositional defiant disorder and separation anxiety disorder being most common. Caregivers' rate of PTSD was 35.6 percent, of which 47.6 percent was post-Katrina. No children and only two caregivers developed new non-PTSD disorders in the absence of new PTSD symptoms. Differences by race and gender weren't largely significant. Children's new PTSD symptoms correlated more strongly to caregivers with new symptoms compared to caregivers with old or no symptoms.

Sinha, Abhinav, D. K. Pal, P. K. Kasar, R. Tiwari, and A. Sharma. 2008. Knowledge, attitude and practice of disaster preparedness and mitigation among medical students. *Disaster Prevention and Management* 17(4): 503-507.

This paper assesses the present level of disaster preparedness and mitigation knowledge among undergraduate medical students. Disasters more often are seen in context of emergency response than pre-planning or preparedness. Continuous preparedness saves lives, lessens personal and economic losses, and re-

duces property destruction. Knowledge about disaster preparedness and mitigation is essential for medical students. A total of 375 undergraduate medical student volunteers were included in the study, which used a pre-tested, structured questionnaire to assess current disaster preparedness and mitigation attitudes, practices, and level of knowledge. The percentage marks were analyzed and compared for statistically significant difference. The mean score was 8.77 percent, which was slightly higher in females and maximum in age group 26-30 years. There was little variation according to the year (professional) of the MBBS course.

Spell, Annie W., Mary Lou Kelley, Jing Wang, Shannon Self-Brown, Karen L. Davidson, Angie Pellegrin, Jeanette L. Palcic, Kara Meyer, Valerie Paasch, and Audrey Baumeister. 2008. The moderating effects of maternal psychopathology on children's adjustment post-Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 553-563.

This study investigated the role maternal psychopathology plays in predicting children's psychological distress in a disaster-exposed sample. Participants consisted of 260 public school children (ages 8-16) and their mothers. These families were displaced from New Orleans because of Hurricane Katrina in 2005. Assessment took place three to seven months post-disaster. Hierarchical regression analyses revealed that global maternal psychological distress and maternal post-traumatic stress disorder moderated the relation between the child's hurricane exposure and mother-reported child internalizing and externalizing symptoms.

Sprung, Manuel. 2008. Unwanted intrusive thoughts and cognitive functioning in kindergarten and young elementary school-age children following Hurricane Katrina. *Journal of Clinical Child and Adolescent Psychology* 37(3): 575-587.

Seven months after Hurricane Katrina, 183 5- to 8-year-old children were surveyed about intrusive thoughts and tested on their level of cognitive functioning (knowledge about the mind and the mind's operations). Basic developmental research suggests children who lack sufficient knowledge about the mind could have difficulties answering questions about intrusive thoughts. Hurricane-affected children reported relatively more intrusive thoughts with negative content than non-affected children. An association between children's understanding of the mind and their ability to report on their intrusive thoughts supports this hypothesis. Results point to funneling of intrusive thoughts toward negative content following a traumatic event and highlight the importance of consider-

ing a child's level of understanding of the mind when investigating intrusive thoughts in young children.

Walter, Frank G., Jimmy Tak-shing Chen, Billie Winegard, Peter B. Chase, Farshad Shirazi, Yuk-yin Chow, Melanie de Boer, and Kurt Denninghoff. 2008. Hazmat disaster preparedness in Hong Kong: What are the hazardous materials on Lantau, Lamma, and Hong Kong islands? *American Journal of Disaster Medicine* 3(4): 213-233.

Hazmat disaster preparedness is critical, especially as Hong Kong prepares for major international events, such as the 2008 Olympic Equestrian Games. No published medical study describes the identities and quantities of hazardous materials (HMs) in Hong Kong or lists what antidotes are needed for these dangerous goods. This study describes what HMs are most common in Hong Kong and prioritizes disaster preparedness and training accordingly. Most HMs do not have antidotes. The most common HMs with recognized antidotes are carbon monoxide, methylene chloride, fluorides, cyanides, nitriles, hydrazine, methanol, and nitrates. The most common categories of dangerous goods are substances giving off inflammable vapors, compressed gases, and corrosive and poisonous substances. Hazmat disaster preparedness and training should emphasize the most common categories. Disaster planning should ensure adequate antidotes.

Wood, Karen, and Stanley B. Supinski. 2008. Pandemic influenza tabletop exercises: A primer for the classroom and beyond. *Journal of Homeland Security and Emergency Management* 5(1).

An influenza pandemic has been at the forefront of the homeland security and emergency management concerns for the past several years. The U.S. Department of Health and Human Services has led federal efforts to address the threat, including establishing operational plans and training and developing a template for tabletop exercises—Tabletop Exercise for Pandemic Influenza Preparedness in Local Public Health Agencies—that can serve as a model for every jurisdiction. The exercise is valuable for public health planning, but neglects some of the broader implications of the planning and coordination required of the first response community. This paper is designed as an educational tool to prepare emergency management and homeland security students for complex pandemic realities and the experience of a tabletop exercise. Beyond the classroom, it focuses on pandemic issues that exceed the scope of the Health and Human Services tabletop by discussing the role of the exercises in emergency management planning, providing

an overview of the present threat, outlining special considerations and assumptions relevant to that threat, and reviewing the foundations of existing pandemic influenza planning and response materials. It also offers an adapted version of the tabletop that addresses problematic planning areas for public safety and emergency management professionals and can facilitate pandemic problem solving for public and private organizations.

Zilm, Frank, Robert Berry, Michael P. Pietrzak, and Amy Paratore. 2008. Integrating disaster preparedness and surge capacity in emergency facility planning. *Journal of Ambulatory Care Management* 31(4): 377-385.

The ability to adapt and use emergency facilities is critical in responding to surges from man-made and natural events. Few emergency services departments in the United States are adequately prepared to absorb a sudden increase in patients in conjunction with potential special needs, such as quarantining epidemic patients or mass decontamination. This article reviews major findings of the federally-funded ER One project, a research initiative that describes a number of facility strategies to be considered in planning new emergency facilities. An early case study in the application of these principles at the recently-completed Tampa General Hospital emergency service is provided, illustrating how, when integrated into the early planning and design, many of the ER One recommendations can be implemented at modest capital cost increases.

Risk and Decision Making

Ben-Asher, Joseph Z. 2008. Development program risk assessment based on utility theory. *Risk Management* 10(4): 285-299.

Risk management is an indispensable process in the development of a new system. This process typically involves five major steps: planning, identification, assessment, analysis and handling. Risk assessment introduces quantitative and qualitative measures to assess and prioritize the program risks. Risk assessment based on utility theory is proposed. The main idea of this approach is to quantify the risk consequences by using a loss function derived from an equivalent lottery where the probability of getting the worst possible risk outcome is taken as the value representing the risk consequences. The prioritization of the risks is then based on their expected loss. The method is compared with other existing methods and is demonstrated by a representative case study of a complex defense system designed for intercepting ballistic missiles during their boost phase.

Bertsch, Valentin, and Jutta Geldermann. 2008. Preference elicitation and sensitivity analysis in multicriteria group decision support for industrial risk and emergency management. *International Journal of Emergency Management* 5(1/2): 7-24.

The resolution of complex decision situations in crisis and remediation management following an industrial emergency requires input from different disciplines. Contributing to the transparency and traceability of decisions and taking subjective preferences into account, multi-criteria decision analysis (MCDA) is suitable for involving various stakeholder and expert groups process with diverse background knowledge and different views in the decision making. The focus of this paper is to highlight the role of MCDA in risk and emergency management in the nuclear power generation sector on the basis of a hypothetical case study. Special emphasis is placed on the modeling of the decision makers' preferences. The paper explores the sensitivity of decision making processes to simultaneous variations of the preference parameters and consequently to contribute to a facilitation of the preference modeling process by comprehensibly visualizing and communicating the impact of these preferential uncertainties on the results of the analysis.

Busby, J. S., and R. E. Alcock. 2008. Risk and organizational networks: Making sense of failure in the division of labor. *Risk Management* 10(4): 235-256.

Recent crises have implicated organizational networks, rather than individual, unitary organizations, suggesting that the network rather than the single organization is the appropriate unit of analysis for understanding risk. It is the division of labor across organizational boundaries that appear to be especially threatening. This study investigated how sense is made of the risk that arises from this division of labor, analyzing journalistic commentary on two iconic cases in the United Kingdom: the Hatfield derailment and the Sudan 1 food contamination scandal. In both cases it was the nature of networks that was central to most explanations of the events that took place. In both cases societal perception of risk was more consequential than the objective physical harm. The main conclusion from the analysis was that this sensemaking was ambivalent about organizational networks—seeing advantages as well as drawbacks, indicating that the main problem was not the choice of how to divide labor but to ensure that the chosen division was rigorously developed and maintained.

Campedel, Michela, Valerio Cozzani, Anita Garcia-Agreda, and Ernesto Salzano. 2008. Extending the

quantitative assessment of industrial risks to earthquake effects. *Risk Analysis* 28(4): 1-16.

In the general framework of quantitative methods for natural-technological risk analysis, a specific methodology was developed for assessing risks caused by hazardous substances released as a result of earthquakes. The contribution of accidental scenarios initiated by seismic events to the overall industrial risk was assessed in three case studies derived from the actual plant layout of existing oil refineries. Several specific vulnerability models for different equipment classes were compared and assessed. The effect of differing structural resistances for process equipment on the final risk results was also investigated. The main factors influencing the final risk values resulted from the models for equipment vulnerability and the assumptions for the reference damage states of the process equipment. The analysis of case studies showed, in seismic zones, the additional risk deriving from damage caused by earthquakes may be up to more than one order of magnitude higher than that associated with internal failure causes. Critical equipment was determined to be mainly pressurized tanks, even though atmospheric tanks were more vulnerable to containment loss. Failure of minor process equipment having a limited hold-up of hazardous substances (such as pumps) was shown to have limited influence on the final values of the risk increase caused by earthquakes.

Casman, Elizabeth A., and Baruch Fischhoff. 2008. Risk communication planning for the aftermath of a plague bioattack. *Risk Analysis* 28(5): 1327-1342.

This article creates an influence diagram of how a plague bioattack could unfold and then uses it to identify factors shaping infection risks in possible scenarios. The influence diagram and associated explanations provide a compact reference that allows risk communicators to identify key messages for pre-event preparation and testing. It can also be used to answer specific questions in unique situations that consider the conditions of the attack and the properties of the attacked populations. The influence diagram allows a quick, visual check of the factors that must be covered when evaluating audience information needs. The documentation provides content for explaining the resulting advice. The article shows how these tools can help in preparing for crises and responding to them.

Cruz, Ana Maria, and Norio Okada. 2008. Methodology for preliminary assessment of natech risk in urban areas. *Natural Hazards* 46(2): 199-220.

Concern for natural hazard-triggered technological disasters (natech disasters) in densely populated and

industrialized areas is growing. Residents living in urban areas subject to high natural hazard risk are often unaware of the potential for secondary disasters such as hazardous materials releases from neighboring industrial facilities, chemical storage warehouses or other establishments housing hazardous materials. Lessons from previous disasters, such as the natech disaster during the Kocaeli earthquake in Turkey in 1999 call for the need to manage low frequency/high consequence events, particularly in today's densely populated areas. However, there is little guidance available on how local governments and communities can assess natech risk. To add to the problem, local governments often do not have the human or economic resources or expertise to carry out detailed risk assessments. In this article, the authors propose a methodology for preliminary assessment of natech risk in urban areas. The proposed methodology is intended for use by local government officials in consultation with the public. The methodology considers possible interactions between the various systems in the urban environment: the physical infrastructure (e.g., industrial plants, lifeline systems, critical facilities), the community (e.g., population exposed), the natural environment (e.g., delicate ecosystems, river basins), and the risk and emergency management systems (e.g., structural and nonstructural measures). Factors related to vulnerability and hazard are analyzed and qualitative measures are recommended. Data from hazardous materials releases during the Kocaeli, Turkey earthquake of August 17, 1999 are used as a case study to demonstrate the applicability of the methodology. Limitations of the proposed methodology are discussed as well as future research needs.

Earle, Timothy C., and Michael Siegrist. 2008. On the relation between trust and fairness in environmental risk management. *Risk Analysis* 28(5): 1395-1413.

In this study, the authors empirically examine the relations between trust, fairness, and cooperation within two environmental risk management contexts, one in which the focal issue is of high personal moral importance and the other in which the focal issue is of low moral importance. Using an experimental design embedded in two parallel survey questionnaires, one mailed to residents of Washington State, the other to German-speaking residents of Switzerland, the authors either manipulated or constructed three factors, issue importance (high/low), procedural fairness (fair/unfair), and policy outcome (risk averse/risk accepting). This design enabled them to compare the predictions of the standard account of procedural fairness, that trust and cooperation are determined by judgments of fairness, with the predictions of an alternative ac-

count, that trust and cooperation will be determined by judgments of procedural fairness only when the issue involved is not morally important. Results for the American case showed that under conditions of high issue importance, policy outcome affected judged fairness, trust, and cooperation. Under conditions of low issue importance, policy outcome had no effect on judged fairness or trust but did have a moderate impact on cooperation. Analyses also showed that when issue importance was high, procedural fairness had no effects. When issue importance was low, procedural fairness had moderate effects on judged fairness and trust. Results for the Swiss case replicated the main findings for the American case. Together, these results support the alternative model of the relation between trust and fairness, suggesting that the efficacy of fair procedures is strictly limited.

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

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

Galderisi, Adriana, Andrea Ceudech, and Massimiliano Pistucci. 2008. A method for natech risk assessment

as supporting tool for land use planning mitigation strategies. *Natural Hazards* 46(2): 221-241.

Hazardous industrial sites have always represented a threat for the community often provoking major accidents overcoming the boundaries of the plants and affecting the surrounding urban areas. If the industrial sites are located in natural hazard-prone areas, technological accidents may be triggered by natural events, generating so-called natech events which may modify and increase the impact and the overall damage in the areas around them. Nevertheless, natural and technological hazards are still treated as two separate issues, and up to now the methods for natech risk assessment have been developed mainly for specific natural hazards, generally restricted to some plant typologies and to the area of the plant itself. Based on a review of the current natech literature, this article illustrates a risk assessment method as a supporting tool for land use planning strategies aimed at reducing natech risk in urban areas. More specifically, a multi attribute decision-making method, combined with fuzzy techniques, has been developed. The method allows planners to take into account, according to different territorial units, all the individual natech risk factors, measured through both quantitative and qualitative parameters, while providing them with a natech risk index, useful to rank the territorial units and to single out the priority intervention areas. The method is designed to process information generally available about hazardous plants (safety reports), natural hazards (hazard maps) and features of urban systems mainly influencing their exposure and vulnerability to natech events (common statistical territorial data). Furthermore, the method implemented into a GIS framework should easily provide planners with comparable maps to figure out the hazard factors and the main territorial features influencing the exposure and vulnerability of urban systems to natech events. The method has been tested on a middle-sized Municipality in the Campania Region, identified as 2nd class seismic zone, according to the Ordinance 3274/2003, in which a LPG storage plant, classified as a plant with major accident potential by the Seveso II Directive (art. 9), is located just within the city core.

Green, Rebekah A. 2008. Unauthorized development and seismic hazard vulnerability: A study of squatters and engineers in Istanbul, Turkey. *Disasters* 32(3): 358-376.

Many cities in developing nations have experienced an influx of poor migrants in search of work. This population influx has often been accommodated through land

squatting, irregular construction, and unauthorized housing. For the urban poor, this has resulted in immediate affordable housing. This housing frequently has long-term vulnerability to natural hazards, however. This article examines the ways in which squatters in Istanbul, Turkey, understand the seismic vulnerability of their unauthorized housing. Distrust of professional engineers and contractors has led Istanbul squatters to believe that self-built housing will not only be less costly but also safer than commercially built housing. The impact of residents' risk perceptions on their vulnerability to natural hazards is examined through a comparison of social attitudes regarding safe housing and the quality of unauthorized construction. This comparison highlights how squatters' risk perceptions necessitate innovative means of reducing vulnerability in unauthorized neighborhoods of developing cities.

Iuchi, Kanako, and Ann-Margaret Esnard. 2008.

Earthquake impact mitigation in poor urban areas: The case of Metropolitan Manila. *Disaster Prevention and Management* 17(4): 454-469.

The Philippines is often described as the melting pot of natural disasters (typhoons, floods and torrential rains). As part of the Pacific ring of fire, the Philippines is also prone to earthquakes and volcanic eruptions. In the current disaster management scheme, the poor are likely to be put last. Conventional risk reduction mitigation methods (such as land use and building codes) are failing. A paradigm shift is needed, one that enables poor communities to maximize their limited resources and contribute to risk reduction. Interviews and field investigations were conducted between 2001 and 2006 in three case study neighborhoods in metropolitan Manila to understand the risk components that exist and the resources (or lack of) for dealing with them. Field surveys highlighted three major risk components: liquefied petroleum gas (LPG), illegal electrical connections, and residential buildings. Mitigation efforts must be implemented by: developing hybrid community organizations; minimizing direct physical damage; developing neighborhood cooperatives through microfinance schemes; and developing an in-kind community insurance system. While this research focused on earthquake impact mitigation, the inquiry and findings with respect to the urban poor in high risk areas, have applicability to other localities in the developing world. Furthermore, Manila's situation is not unique. Disaster threats, rapid substandard urban development, growth in the number of the poor, and degradation of social capital, are phenomena present in other parts of the de-

veloping world. In such settings, traditional mitigation approaches are difficult to carry out effectively.

Ji, Xuewei, Wenguo Weng, and Weicheng Fan. 2008. Cellular automata-based systematic risk analysis approach for emergency response. *Risk Analysis* 28 (5): 1247-1259.

Emergency response is directly related to the allocation of emergency rescue resources. Efficient emergency response can reduce loss of life and property, limit damage from the primary impact, and minimize damage from derivative impacts. An appropriate risk analysis approach to accidents is a rational way to assist emergency response. In this article, a cellular automata-based systematic approach for conducting risk analysis in emergency response is presented. Three general rules—diffusive effect, transporting effect, and dissipative effect—are developed to implement cellular automata transition function. The approach takes multiple social factors such as population density and population sensitivity into consideration and also considers the risk of domino accidents that increase due to increasing congestion in city industrial complexes and increasing human population density. In addition, two risk indices—individual risk and aggregated weighted risk—are proposed to assist decision making for emergency managers during emergency response. Individual risk can be useful to plan evacuation strategies, while aggregated weighted risk can help emergency managers optimize emergency response programs and allocate rescue resources according to the danger in vulnerable areas.

Jonkman, S. N., J. K. Vrijling, and A. C. W. M. Vrouwenvelder. 2008. Methods for the estimation of loss of life due to floods: A literature review and proposal for a new method. *Natural Hazards* 46(3): 353-389.

This article deals with methods for the estimation of loss of life due to flooding. These methods can be used to assess the flood risks and to identify mitigation strategies. The first part of this article contains a comprehensive review of existing literature. Methods have been developed for different types of floods in different regions. In general they relate the loss of life in the flooded area to the flood characteristics and the possibilities for evacuation and shelter. An evaluation showed that many of the existing methods do not take into account all of the most relevant determinants of loss of life and that they are often to a limited extent based on empirical data of historical flood events. In the second part of the article, a new method is pro-

posed for the estimation of loss of life caused by the flooding of low-lying areas protected by flood defenses. An estimate of the loss of life due to a flood event can be given based on: (1) information regarding the flood characteristics, (2) an analysis of the exposed population and evacuation, and (3) an estimate of the mortality amongst the exposed population. By analyzing empirical information from historical floods, new mortality functions have been developed. These relate the mortality amongst the exposed population to the flood characteristics. Comparison of the outcomes of the proposed method with information from historical flood events shows that it gives an accurate approximation of the number of observed fatalities during these events. The method is applied to assess the consequences for a large-scale flooding of the area of South Holland, in the Netherlands. It is estimated that the analyzed coastal flood scenario could lead to approximately 3,200 fatalities in this area.

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

This article is drawn from preliminary findings, presented at the UNU-EHS Summer Academy in Munich, July 23–30, 2006. Most of the results are still being analyzed and thus those discussed here are not definitive and are subject to revision. Conclusions have been drawn from almost two years fieldwork in the western hill slope of La Paz, using various techniques for data collection: constant participant observation with the inhabitants and their neighborhood representatives; in-depth interviews with more than 30 families at risk; informal interviews with other people at risk and with disaster victims; semi-directed interviews with dozens of “old inhabitants” of the neighborhoods; in-depth interviews with dozens of “neighborhood presidents” and with many local authorities related to risk management; and analysis of documentation, maps, pictures, photographs, video collections and other visual material. The in-depth interviews with people living with risk contained more than 120 questions; those related to risk, emergencies and hazards were purposefully open-ended to see whether the theme appeared by itself in the interviewee’s discourse and concerns. In this respect, the interview guide took into account advances in sociology and anthropology, and applied human security studies, focusing on what really mattered for the research subjects. This is a hybrid method combining the advantages of questionnaires, semi-structured

interviews, and life stories, and is thus adaptive and flexible but also allows for future statistical analysis.

Pennings, Joost M. E., and Daniel B. Grossman. 2008. Responding to crises and disasters: The role of risk attitudes and risk perceptions. *Disasters* 32(3): 434-448.

Discussions are taking place both in the United States and in Europe about how governments should respond to both disasters and crises, and how citizens' undesirable behavior might be managed with respect to such disasters. The authors examine the role that risk attitudes and risk perceptions play in decision making behavior of individuals in times of crises and disasters and how knowledge about individual behavior and its drivers may be helpful when developing policy. The proposed framework complements the existing literature, thereby further enriching the knowledge of crises and disaster management.

Raaijmakers, Ruud, Jorg Krywkow, and Anne van der Veen. 2008. Flood risk perceptions and spatial multi-criteria analysis: An exploratory research for hazard mitigation. *Natural Hazards* 46(3): 307-322.

The conventional method of risk analysis (with risk as a product of probability and consequences) does not allow for a pluralistic approach that includes the various risk perceptions of stakeholders or lay people within a given social system. This article introduces a methodology that combines the virtues of three different methods: the quantifiable conventional approach to risk; the taxonomic analysis of perceived risk; and the analytical framework of a spatial multi-criteria analysis. This combination of methods is applied to the case study "Ebro Delta" in Spain as part of the European sixth framework project "Floodsite." First, a typology for flood hazards is developed based on individual and/or stakeholders' judgments. Awareness, worry, and preparedness are the three characteristics that typify a community to reflect various levels of ignorance, perceived security, perceived control, or desired risk reduction. Applying 'worry' as the central characteristic, a trade-off is hypothesized between worry and the benefits groups in society receive from a risky situation. Second, this trade-off is applied in Spatial Multi-Criteria Analysis (SMCA). MCA is the vehicle that often accompanies participatory processes, where governmental bodies have to decide on issues in which local stakeholders have a say. By using risk perception-scores as weights in a standard MCA procedure a new decision framework for risk assessment is developed. Finally, the case of sea-level rise in the Ebro Delta in

Spain serves as an illustration of the applied methodology. Risk perception information has been collected with help of an on-site survey. Risk perception enters the multi-criteria analysis as complementary weights for the criteria risk and benefit. The results of the survey are applied to a set of scenarios representing both sea-level rise and land subsidence for a time span of 50 years. Land use alternatives have been presented to stakeholders in order to provide the regional decision maker with societal preferences for handling risk. Even with limited resources a characteristic risk profile could be drawn that enables the decision maker to develop a suitable land use policy.

Reshetin, Vladimir P. 2008. Fuzzy assessment of human-health risks due to air pollution. *International Journal of Risk Assessment and Management* 9(1/2): 160-177.

Uncertainty of input data creates fuzzy conditions for assessing and forecasting ecological risk and risks associated with human health due to environmental pollution. Many uncertainties are difficult to eliminate and they do not have sufficient structure so that they can be modeled or described by probabilities and probability processes. This paper describes the application of a formalism of fuzzy sets to model and to assess the risk of carcinogenesis and additional mortality associated with air-pollution. With this formalism it is possible to handle uncertainty by means of modeling. A formulated approach makes it possible to assess the extent of expert confidence that the risk of carcinogenicity (risk of additional mortality) does not exceed some definite value that can be presented both as an accurate and as a fuzzy number.

Technological Hazards

Bertsch, Valentin, and Jutta Geldermann. 2008. Preference elicitation and sensitivity analysis in multicriteria group decision support for industrial risk and emergency management. *International Journal of Emergency Management* 5(1/2): 7-24.

The resolution of complex decision situations in crisis and remediation management following an industrial emergency requires input from different disciplines. Contributing to the transparency and traceability of decisions and taking subjective preferences into account, multi-criteria decision analysis (MCDA) is suitable for involving various stakeholder and expert groups process with diverse background knowledge and different views in the decision making. The focus of this paper is to highlight the role of MCDA in risk and emergency management in the nuclear power generation sector on the basis of a hypothetical case study. Special emphasis

is placed on the modeling of the decision makers' preferences. The paper explores the sensitivity of decision making processes to simultaneous variations of the preference parameters and consequently to contribute to a facilitation of the preference modeling process by comprehensibly visualizing and communicating the impact of these preferential uncertainties on the results of the analysis.

Bushnell, James, Carla Peterman, and Catherine Wolfman. 2008. Local solutions to global problems: Climate change policies and regulatory jurisdiction. *Review of Environmental Economics and Policy* 2(2): 175-193.

This article considers the effectiveness of various types of environmental regulations when they are applied locally to pollutants whose damages extend beyond the jurisdiction of the local regulator. For example, within the United States, many of the efforts to adopt policies to mitigate climate change are taking place at the local level. A number of states have adopted various controls to address climate change while, at the same time, many U.S. cities have adopted climate change policies (as evidenced by the over 700 mayors who have signed the U.S. Conference of Mayors Climate Protection Agreement). This article discusses these issues as well as various regulatory tools, the vulnerability of these regulatory tools to the issues of leakage and reshuffling, and issues of leakage and reshuffling. It also presents numerical analyses demonstrating that several proposed policies to limit greenhouse gas emissions from the California electricity sector may have very little effect on carbon emissions if they are applied only within that state. The last section of this article summarizes findings.

Cox, Robert, Teresa Amundson, and Bruce Brackin. 2008. Evaluation of the patterns of potentially toxic exposures in Mississippi following Hurricane Katrina. *Clinical Toxicology* 46(8): 722-727.

The paper describes the changes in the frequency of selected toxic exposures reported to the state poison control center following Hurricane Katrina. The number of selected exposures reported to the Mississippi Poison Control Center at 0-2 weeks, 3-4 weeks, and 5-12 weeks following Hurricane Katrina were compared to those for the same time periods in the previous three years. Absolute numbers of exposures and odds ratios with confidence intervals were used for comparison. In the first two weeks following Hurricane Katrina, there were 44 reported gasoline exposures compared to seven expected, eight lamp oil exposures compared to

one expected, and seven carbon monoxide exposures compared to one expected. Only gasoline exposures remained elevated in the second two-weeks period following the hurricane. Lamp oil exposures were elevated during the 5-12 week recovery period. There was no increase in the frequency of exposures to household cleaning agents, food poisoning, pediatric exposures, drug-related suicide events, bites and stings, or venomous snakebites. The most common toxic exposures following Hurricane Katrina were related to the lack of typical energy sources—electricity and gasoline.

Cruz, Ana Maria, and Norio Okada. 2008. Methodology for preliminary assessment of natech risk in urban areas. *Natural Hazards* 46(2): 199-220.

Concern for natural hazard-triggered technological disasters (natech disasters) in densely populated and industrialized areas is growing. Residents living in urban areas subject to high natural hazard risk are often unaware of the potential for secondary disasters such as hazardous materials releases from neighboring industrial facilities, chemical storage warehouses or other establishments housing hazardous materials. Lessons from previous disasters, such as the natech disaster during the Kocaeli earthquake in Turkey in 1999 call for the need to manage low frequency/high consequence events, particularly in today's densely populated areas. However, there is little guidance available on how local governments and communities can assess natech risk. To add to the problem, local governments often do not have the human or economic resources or expertise to carry out detailed risk assessments. In this article, the authors propose a methodology for preliminary assessment of natech risk in urban areas. The proposed methodology is intended for use by local government officials in consultation with the public. The methodology considers possible interactions between the various systems in the urban environment: the physical infrastructure (e.g., industrial plants, lifeline systems, critical facilities), the community (e.g., population exposed), the natural environment (e.g., delicate ecosystems, river basins), and the risk and emergency management systems (e.g., structural and nonstructural measures). Factors related to vulnerability and hazard are analyzed and qualitative measures are recommended. Data from hazardous materials releases during the Kocaeli, Turkey earthquake of August 17, 1999 are used as a case study to demonstrate the applicability of the methodology. Limitations of the proposed methodology are discussed as well as future research needs.

Fendler, Roland. 2008. Floods and safety of establishments and installations containing hazardous substances. *Natural Hazards* 46(2): 257-263.

As a consequence of the floods in Germany in August 2002 the Umweltbundesamt (German Environment Agency) set up a research project on natural hazards and their relevance for the safety of establishments and installations containing hazardous substances, i.e. the prevention of "Natechs" (natural hazards triggering technological accidents). The scope of the project included hazards by earthquakes and storms but the main focus was on floods. Subject of the project was the safety of establishments, installations containing substances hazardous to water according to the German Federal Water Act (e.g. chemical plants, tank farms, filling stations, heating oil tanks) and vessels for storage of extremely flammable gases (mainly LPG). The project included a survey of the flood risk management at establishments and installations in the catchment areas of the Rhine and the Elbe, a description of available flood protection and safety technology and a discussion of emergency planning requirements. Gaps in flood risk management at industrial sites and installations were identified and recommendations on policy, regulations, standards and safety management made.

Galderisi, Adriana, Andrea Ceudech, and Massimiliano Pistucci. 2008. A method for natech risk assessment as supporting tool for land use planning mitigation strategies. *Natural Hazards* 46(2): 221-241.

Hazardous industrial sites have always represented a threat for the community often provoking major accidents overcoming the boundaries of the plants and affecting the surrounding urban areas. If the industrial sites are located in natural hazard-prone areas, technological accidents may be triggered by natural events, generating so-called natech events which may modify and increase the impact and the overall damage in the areas around them. Nevertheless, natural and technological hazards are still treated as two separate issues, and up to now the methods for natech risk assessment have been developed mainly for specific natural hazards, generally restricted to some plant typologies and to the area of the plant itself. Based on a review of the current natech literature, this article illustrates a risk assessment method as a supporting tool for land use planning strategies aimed at reducing natech risk in urban areas. More specifically, a multi attribute decision-making method, combined with fuzzy techniques, has been developed. The method allows planners to take into account, according to different territorial units, all the individual natech risk factors, measured

through both quantitative and qualitative parameters, while providing them with a natech risk index, useful to rank the territorial units and to single out the priority intervention areas. The method is designed to process information generally available about hazardous plants (safety reports), natural hazards (hazard maps) and features of urban systems mainly influencing their exposure and vulnerability to natech events (common statistical territorial data). Furthermore, the method implemented into a GIS framework should easily provide planners with comparable maps to figure out the hazard factors and the main territorial features influencing the exposure and vulnerability of urban systems to natech events. The method has been tested on a middle-sized Municipality in the Campania Region, identified as 2nd class seismic zone, according to the Ordinance 3274/2003, in which a LPG storage plant, classified as a plant with major accident potential by the Seveso II Directive (art. 9), is located just within the city core.

Krausmann, Elisabeth, and Fesil Mushtaq. 2008. A qualitative natech damage scale for the impact of floods on selected industrial facilities. *Natural Hazards* 46(2): 179-197.

There is increasing evidence that natural disasters can trigger technological accidents and damage. These so-called natech accidents can pose a significant risk to regions that are unprepared for responding to them. The European Commission's Joint Research Centre has recognized the risk associated with natech events and has started systematic research into natechs and their underlying dynamics. This work investigates the risk associated with the flooding of industrial installations through an analysis of past case histories and using expert judgment. The potential impact of three levels of flood severity on selected industrial facilities storing and/or processing (eco-)toxic, flammable or explosive materials is analyzed qualitatively and a scale is developed that links the flood intensity to the level of potential damage. The analysis indicates that natural disasters have the potential for triggering hazmat releases and other types of technological accidents. Hence, natural disasters should be considered as separate accident-triggering events in the planning, design and operating stages of industrial facilities that process or store hazardous substances. The work revealed a lack of detailed information on the occurrence of natech events which indicates not necessarily a scarcity of natechs but rather a lack of standardized reporting and record keeping.

Reshetin, Vladimir P. 2008. Fuzzy assessment of human-health risks due to air pollution. *International Journal of Risk Assessment and Management* 9(1/2): 160-177.

Uncertainty of input data creates fuzzy conditions for assessing and forecasting ecological risk and risks associated with human health due to environmental pollution. Many uncertainties are difficult to eliminate and they do not have sufficient structure so that they can be modeled or described by probabilities and probability processes. This paper describes the application of a formalism of fuzzy sets to model and to assess the risk of carcinogenesis and additional mortality associated with air-pollution. With this formalism it is possible to handle uncertainty by means of modeling. A formulated approach makes it possible to assess the extent of expert confidence that the risk of carcinogenicity (risk of additional mortality) does not exceed some definite value that can be presented both as an accurate and as a fuzzy number.

Sicotte, Diane. 2008. Dealing in toxins on the wrong side of the tracks: Lessons from a hazardous waste controversy in Phoenix. *Social Science Quarterly* 89(5): 1136-1152.

The controversial expansion of a hazardous waste facility in a poor, minority neighborhood in Phoenix illustrates the unanticipated consequences of siting hazardous facilities in vulnerable communities, and the need to recognize neighborhood health/safety issues such as drug-related crime as environmental justice struggles. Qualitative methods include participant observation, document analysis, census data, GIS mapping, and interviews. South Central Phoenix's history reveals a disproportionate share of poverty, pollution, and drug crimes. Most commercial hazardous waste facilities in Phoenix were sited in minority areas. Residents contended that the siting, permitting process, and expansion of the facility and the drug crimes that later occurred there were all due to environmental racism. The expansion of the facility exacerbated environmental injustice in Phoenix through distributional and participative injustice, and was criminogenic. The dual impact on the community of hazardous waste and drug crime argues for a more holistic understanding of environmental justice.

Steinberg, Laura J., Hatice Sengul, and Ana Maria Cruz. 2008. Natech risk and management: An assessment of the state of the art. *Natural Hazards* 46(2): 143-152.

The present state-of-the-art for natech risk and management is discussed. Examples of recent natechs include catastrophic oil spills associated with Hurricane

Katrina and hazardous chemical releases in Europe during the heavy floods of 2002. Natechs create difficult challenges for emergency responders due to the geographical extent of the natural disaster, the likelihood of simultaneous releases, emergency personnel being preoccupied with response to the natural disaster, mitigation measures failing due to the effects of the natural disaster, and others. Recovery from natechs may be much more difficult than for "normal" chemical accidents, as the economic and social conditions of the industrial facility and the surrounding community may have been drastically altered by the natural disaster. Potential safeguards against natechs include adoption of stricter design criteria, chemical process safeguards, community land use planning, disaster mitigation and response planning, and sustainable industrial processes, but these safeguards are only sporadically applied. Ultimately, the public must engage in a comprehensive discussion of acceptable risks for natechs.

Tofani, Alessandro, and Massimiliano Bartolozzi. 2008. Ranking nuclear and radiological terrorism scenarios: The Italian case. *Risk Analysis* 28 (5): 1431-1443.

A quantitative criterion for ranking the different scenarios of nuclear and radiological terrorism has been developed. The aim of the model is not to predict terrorist events but to indicate which scenario a terrorist organization would view as more useful in terms of balance between factors that favor and discourage the attack, respectively. These factors were quantified using a scoring system that takes into account the logarithmic relationship between perceptions and stimuli. The criterion was applied to several scenarios, each of which was modeled in a simple, but not trivial, way to estimate the expected deaths from both radiative and nonradiative effects. The outcome from the ranking method indicates the attractive scenario appears to be the detonation of a low-yield improvised nuclear device in the metropolitan area of a major city.

Walter, Frank G., Jimmy Tak-shing Chen, Billie Winegard, Peter B. Chase, Farshad Shirazi, Yuk-yin Chow, Melanie de Boer, and Kurt Denninghoff. 2008. Hazmat disaster preparedness in Hong Kong: What are the hazardous materials on Lantau, Lamma, and Hong Kong islands? *American Journal of Disaster Medicine* 3(4): 213-233.

Hazmat disaster preparedness is critical, especially as Hong Kong prepares for major international events, such as the 2008 Olympic Equestrian Games. No published medical study describes the identities and

quantities of hazardous materials (HMs) in Hong Kong or lists what antidotes are needed for these dangerous goods. This study describes what HMs are most common in Hong Kong and prioritizes disaster preparedness and training accordingly. Most HMs do not have antidotes. The most common HMs with recognized antidotes are carbon monoxide, methylene chloride, fluorides, cyanides, nitriles, hydrazine, methanol, and nitrates. The most common categories of dangerous goods are substances giving off inflammable vapors, compressed gases, and corrosive and poisonous substances. Hazmat disaster preparedness and training should emphasize the most common categories. Disaster planning should ensure adequate antidotes.

Tornadoes

Kupec, Robert J. 2008. Tuning in: Weather radios for those most at risk. *Journal of Emergency Management* 6(4): 51-56.

In 2005, a tornado killed 25 people in a mobile home park in Evansville, Indiana. Spurred by this disaster, the state of Indiana passed a law in 2007 requiring that all new manufactured homes come with a NOAA Weather Radio. Members of the Indiana Congressional delegation introduced similar legislation in the US House of Representatives, which passed on October 30, 2007. The bill has since moved to the Senate Committee on Banking Housing and Urban Affairs. Since 2000, over 50 percent of deaths from tornadoes have occurred in mobile homes. NOAA weather radio is now accessible by 98 percent of the population, but usage remains low. More effort should be made to notify the citizenry of this vital resource.

Simmons, Kevin M., and Daniel Sutter. 2008.

Manufactured home building regulations and the February 2, 2007 Florida tornadoes. *Natural Hazards* 46(3): 415-425.

The Department of Housing and Urban Development (HUD) and the state of Florida implemented new wind load and tie-down regulations for manufactured homes following Hurricane Andrew. This article examines the effect of the new regulations on the likelihood that occupants of mobile homes would survive a tornado. On February 2, 2007, three tornadoes struck central Florida, resulting in 21 deaths in Lake County, all in manufactured homes. The deaths occurred almost exclusively in homes rated as leveled by the county tax appraiser. Manufactured homes built to the new regulations, however, were significantly less likely to be leveled. Regression analysis finds that manufactured homes built to the post-Andrew requirements were 79

percent less likely to be leveled than homes built prior to the HUD Code in 1976, and 68 percent less likely to be leveled than homes built after 1976 but before the 1994 wind load regulations. Construction of all manufactured homes in the tornado paths to the wind load and tie-down requirements could have reduced fatalities by 70 percent.

Tsunamis

Becker, Julia, David Johnston, Heather Lazrus, George Crawford, and Dave Nelson. 2008. Use of traditional knowledge in emergency management for tsunami hazard: A case study from Washington State, USA. *Disaster Prevention and Management* 17(4): 488-502.

The purpose of this paper is to explore a case study in Washington State, United States, where traditional stories ("oral tradition") are being used in a contemporary context. Traditional knowledge is a system of experiential knowledge acquired through the continual observation of and interaction with the environment. This form of knowledge is still held by many societies and can provide an important contribution in emergency management for natural hazards. Those holding traditional knowledge can assist in understanding the nature of local hazards, suggest appropriate risk reduction and response mechanisms, and even give options for recovery based on past experiences. The paper first discusses the nature of traditional knowledge and how it can contribute to emergency management. It then goes on to investigate a particular case study where a traditional Native American story has been combined with contemporary methods of hazard mitigation to create an educational video for tsunami hazard. Traditional knowledge can be used effectively to undertake hazard education and enhance response to warnings. The video titled "Run to Higher Ground!" is an example of this, and has been readily taken up by indigenous communities and the general population (both in the U.S. and internationally) as an educational tool. The paper will be of value to those working within the emergency management sector, and is particularly useful for communities who need to respond to warnings.

Chester, David K. 2008. The effects of the 1755 Lisbon earthquake and tsunami on the Algarve region, southern Portugal. *Geography* 93(2): 78-90.

The 1755 Lisbon earthquake (magnitude c. 8-5Mw) killed between 15,000 and 20,000 people, of whom an estimated 1,020 lived in the Algarve. The earthquake cost Portugal between 32 percent and 48 percent of its Gross Domestic Product, probably making it finan-

cially the greatest natural catastrophe to have affected western Europe. Using a combination of archival information and data collected in the field, this article discusses the devastating effects of the earthquake and tsunami on the economy, society and major settlements in the Algarve, and the recovery of the region in the years that followed. Today the Algarve is one of Europe's principal tourist destinations and a region vital to the Portuguese economy. The 1755 earthquake was not a single event and the Algarve, which now houses a resident population of over 400,000—a figure that more than doubles with tourists in the summer months—is highly exposed to earthquakes and tsunamis. An earthquake of similar size (minimum estimated recurrence 614 ± 105 years), is viewed as a worst-case future scenario. Although strict building codes which apply to the whole country were pioneered in Portugal following the 1755 earthquake, and have been revised on many occasions, there is a recognized need for more detailed hazard maps and emergency plans for the Algarve. In the Algarve a start has been made, where a tsunami risk map has recently been completed for Portimão concelho (county).

Gaillard, Jean-Christophe, Elsa Clave, Oceane Vibert, Jean-Charles Dedain, Yusuf Efendi, Delphine Grancher, Catherine C. Liamzon, Desy Rosnita Sari, and Ryo Setiawan. 2008. Ethnic groups' response to the 26 December 2004 earthquake and tsunami in Aceh, Indonesia. *Natural Hazards* 47(1): 17-38.
The December 26, 2004 earthquake and tsunami unequally hit the different ethnic groups of Aceh, Indonesia. About 170,000 Acehnese and Minangkabau people died in the Northern tip of Sumatra while only 44 Simeulue people passed away in the neighboring Simeulue Island located near the earthquake epicenter. Such a difference in the death toll does not lie in the nature of the hazard but in different human behaviors and ethnic contexts. The present study draws on a contextual framework of analysis where people's behavior in the face of natural hazards is deeply influenced by the cultural, social, economic and political context. Questionnaire-based surveys among affected communities, key informant interviews and literature reviews show that the people of Simeulue detected the tsunami very early and then escaped to the mountains. On the other hand, Acehnese and Minangkabau people, respectively in the cities of Banda Aceh and Meulaboh, did not anticipate the phenomenon and were thus caught by the waves. The different behaviors of the victims have been influenced by the existence or the absence of a disaster subculture in the communi-

ties as well as by their capacity to protect themselves in facing the tsunami. People's behaviors and the capacity to protect themselves can be further tracked down to a deep tangle of intricate factors which include the armed conflict that has been affecting the province since the 1970s, the historical and cultural heritage and the national political economy system. This paper finally argues that the uneven impact of the 2004 earthquake and tsunami in Aceh lies in the different daily life conditions of the ethnic groups struck by the disaster.

- Ghosh, A. K. 2008. Assessment of earthquake-induced tsunami hazard at a power plant site. *Nuclear Engineering and Design* 238(7): 1743-1749.**
This paper presents a study of the tsunami hazard due to submarine earthquakes at a power plant site on the east coast of India. The paper considers various sources of earthquakes from the tectonic information, and records of past earthquakes and tsunamis. Magnitude frequency relationship for earthquake occurrence rate and a simplified model for tsunami run-up height as a function of earthquake magnitude and the distance between the source and site have been developed. Finally, considering equal likelihood of generation of earthquakes anywhere on each of the faults, the tsunami hazard has been evaluated and presented as a relationship between tsunami height and its mean recurrence interval (MRI). Probability of exceedence of a certain wave height in a given period of time is also presented. These studies will be helpful in making an estimate of the tsunami-induced flooding potential at the site.
- Lim, Chae Ho, Jae Seok Bae, Jong In Lee, and Sung Bum Yoon. 2008. Propagation characteristics of historical tsunamis that attacked the east coast of Korea. *Natural Hazards* 47(1): 95-118.**
In this study, a numerical modeling system based on the dispersion–correction finite difference scheme equipped with a grid-nesting scheme is constructed. The model is applied to simulate the propagation of three historical tsunami events that attacked the east coast of Korea. The calculated free-surface displacements for the cases of the 1983 Akita and the 1993 Okushiri tsunamis are compared with the observations at four tidal stations along the east coast of Korea. The comparison shows that the results agree well with the observations. The analyses of the simulated results show that underwater topography, such as submerged rises and ridges, plays an important role in the propagation of tsunamis in this region.

Raholm, Maj-Britt, Maria Arman, and Arne Rehnsfeldt. 2008. The immediate lived experience of the 2004 tsunami disaster by Swedish tourists. *Journal of Advanced Nursing* 63(6): 597-606.

This paper is a report of a study of the immediate experiences of victims and relatives of the 2004 tsunami disaster. Disasters serve to remind us of our frailty and vulnerability. They raise existential questions. From the perspective of caring sciences, suffering is regarded as a natural source for change in patients' understanding of the world and the meaningfulness of their lives. A phenomenological hermeneutic study was conducted, using in-depth interviews with a convenience sample of 19 informants in 2006-2007. Ricoeur's theory of interpretation served as a guiding principle for interpreting the interview texts. The immediate lived experiences of the tsunami survivors and their relatives revealed a comprehensive picture, described as different acts of the drama. These acts were: "experiencing the very core of existence," "a changed understanding of life," and "the power of communion." Confronting our frailty and vulnerability makes us more authentic to ourselves, to our relatives, and to life itself. The first step towards progression involves an act where the suffering is seen and validated by another person. Reshaping the suffering together with the family adds a valuable dimension to life. Availability and presence by the family opened up for communion. The immediate lived experiences of the tsunami disaster from an existential and ontological perspective constitute an important aspect of understanding the whole phenomenon. Concepts such as communion, understanding life and progression of suffering can help us construct an image of this previously unexplored dimension.

Rigg, Jonathan, Carl Grundy-Warr, Lisa Law, and May Tan-Mullins. 2008. Grounding a natural disaster: Thailand and the 2004 tsunami. *Asia Pacific Viewpoint* 49(2): 137-154.

Drawing on field work in Southern Thailand undertaken in July 2005, the study illuminates the complex and contingent way in which the Indian Ocean tsunami of December 2004 affected communities, households and individuals. The paper problematizes the indiscriminate/discriminate patterning of impact and recovery and also makes a case for a delocalized and transnational approach to understanding the impacts of the wave. Using the notion of 'tsunami footprints' and drawing on qualitative interviews, the paper proposes that impacts need to be seen in the context of the spatially dispersed networks of association that characterize the Thai economy and Thai society. Drawing on work on poverty dynamics, the paper also explores

three explanatory disjunctures in recovery transitions: the disjuncture between the pre-tsunami context and the post-tsunami situation; the disjuncture between structure and agency; and the disjuncture between the appearance of progressive and gradual change in societies and the lived reality of turbulence.

Warnings and Evacuations

Bird, Deanne, Matthew J. Roberts, and Dale Dominey-Howes. 2008. Usage of an early warning and information system Web site for real-time seismicity in Iceland. *Natural Hazards* 47(1): 75-94.

Iceland has been subjected to destructive earthquakes and volcanic eruptions throughout its history. These events are often preceded by changes in earthquake activity over varying timescales. Although most seismicity is confined to micro-earthquakes, large earthquakes have occurred within populated regions. Following the most recent hazardous earthquakes in 2000, the Icelandic Meteorological Office (IMO) developed an early warning and information system (EWIS) Web site for viewing near-real-time seismicity in Iceland. Here the authors assess Web site usage data in relation to earthquake activity, as recorded by the South Iceland Lowland (SIL) seismic network. Between March 2005 and May 2006 the SIL seismic network recorded 12,583 earthquakes. During this period, the EWIS Web site logged a daily median of 91 visits. The largest onshore event struck 20 km from Reykjavík on March 6, 2006 and was followed by an immediate, upsurge in usage resulting in a total of 1,173 unique visits to the Web site. The greatest cluster of large events occurred 300 kilometers (180 miles) offshore from Reykjavík in May 2005. Within this swarm, nine earthquakes were detected on May 11, 2005, resulting in the release of a media bulletin by IMO. During the swarm, and following the media bulletin, the EWIS Web site logged 1,234 unique visits gradually throughout the day. In summary, the data reveal a spatial and temporal relationship between Web site usage and earthquake activity. The EWIS Web site is accessed immediately after the occurrence of a local earthquake, whereas distant, unfelt earthquakes generate gradual interest prompted by media bulletins and, possibly, other contributing factors. The authors conclude that the Internet is a useful tool for displaying seismic information in near-real-time, which has the capacity to help increase public awareness of natural hazards.

Chiu, Yi-Chang, Hong Zheng, Jorge A. Villalobos, Walter Peacock, and Russell Henk. 2008. Evaluating regional contra-flow and phased evacuation strategies for

Texas using a large-scale dynamic traffic simulation and assignment approach. *Journal of Homeland Security and Emergency Management (ePub)* 5(1).

After Hurricane Rita, the need for systematic and quantitative assessments of evacuation planning and operations strategies was recognized. Both contra-flow operation and phased evacuation were put into rigorous analysis through a large-scale regional traffic simulation modeling approach. After extensive data preparation and model developments, the Central Texas Evacuation network (CTE) in Dynamic Urban Systems in Transportation (DynusT) was created. The analysis results are presented and elaborated through relevant measures of effectiveness as well as innovative visualization techniques in this paper. The results show that the contra-flow strategy yields considerable improvements in all evacuation corridors in spite of several hot spots requiring further mitigation. The phased evacuation strategy in conjunction with the contra-flow strategy brings forth further improvements, particularly for the coastal high risk zones.

Edmonds, Andrew S., and Susan L. Cutter. 2008. Planning for pet evacuations during disasters. *Journal of Homeland Security and Emergency Management (ePub)*5(1)

Planning for pets in emergencies is now part of local, state, and federal preparedness efforts as a result of the enactment of the 2006 PETS Act. Yet there is little guidance on how to conduct such planning efforts. This paper provides a procedure for estimating the number and location of pet-owning households. Utilizing behavioral studies of evacuation non-compliance, estimates of the number and location of non-evacuating pet-households are made. The procedures are tested in Horry County, South Carolina and Mercer County, New Jersey. It was found that the pet estimation model provided a more detailed (numerically and geographically) estimate than the application of national averages. Furthermore, the two approaches to estimating pet owner evacuation.

Kendra, James, Jack Rozdilsky, and David A. McEntire. 2008. Evacuating large urban areas: Challenges for emergency management policies and concepts. *Journal of Homeland Security and Emergency Management (ePub)* 5(1).

This article presents several policy observations regarding evacuation planning and disaster mitigation in large urban areas. The article provides background information about and lessons learned from Hurricanes Katrina and Rita in 2005 and Hurricane Dean in 2007. The often-erroneous planning assumptions in emergen-

cy management are then explored along with a discussion about future policy and management implications. Three themes are identified in this research, including: 1) public officials must anticipate a much broader scope of issues when issuing evacuation requests, 2) they must do more to prepare for disasters than write "fantasy" emergency operations plans, and 3) they must adjust development activities that have a negative impact upon disaster mitigation.

Mortensen, Karoline, and Zachary Dreyfuss. 2008.

How many walked through the door? The effect of Hurricane Katrina evacuees on Houston emergency departments. *Medical Care* 46(9): 998-1001.

Hurricane Katrina necessitated the evacuation of over 200,000 New Orleans residents into Houston in the days after landfall. The already stressed emergency departments (EDs) were faced with a potential influx of patients suffering injuries and conditions exacerbated by the hurricane and resulting devastation. Data from total 2005 visits to 25 Houston EDs (n=875,750) were analyzed to evaluate the impact of visits by Katrina evacuees (n=8,427). ED visits by individuals with a FEMA designated disaster area zip code due to Katrina were counted. In September, immediately after Katrina, Houston-area EDs reported the lowest monthly total visits in 2005 despite treating 4,518 evacuees that month. The EDs experienced an increase in visits by Katrina evacuees in the hurricane's aftermath. However, the initial surge of visits was modest and corresponded with decreases in visits by non-evacuees and medical care provided in large shelters.

Shenhar, Gilead, David Gidron, and Kobi Peleg. 2008. Mass population displacement under an unclear evacuation policy during the Israel-Lebanon War. 2006. *Journal of Homeland Security and Emergency Management (ePub)* 5(1).

In the Second Lebanon War (July 2006), the Hezbollah attacked the civilian population of Israel. The war lasted 34 days and more than 4,000 rockets were fired on the north of the country. The Home Front Command called on the population residing in the north to spend lengthy periods in protected shelters. Throughout the war, the government did not debate the necessity for the evacuation of residents from the area under fire, with a population of about one million. In practice, about 300,000 people evacuated the area, most of them independently or with the assistance of voluntary organizations (NGOs). This paper describes the evacuation behavior during the war, the government's policy in regard to this issue, and proposes generic criteria

according to which the necessity for evacuation may be assessed under similar circumstances in the future.

Wildfires

Liang, Jingjing, Dave E. Calkin, Krista M. Gebert, Tyron J. Venn, and Robin P. Silverstein. 2008. Factors influencing large wildland fire suppression expenditures. *International Journal of Wildland Fire* 17(5): 650-659. There is an urgent and immediate need to address the excessive cost of large fires. This article discusses large wildland fire suppression costs by the U.S. Department of Agriculture Forest Service. Among 16 potential non-managerial factors, which represented fire size and shape, private properties, public land attributes, forest and fuel conditions, and geographic settings, the authors found only fire size and private land had a strong effect on suppression costs. When these factors were accounted for, the other variables had no significant effect. An economical model predicting suppression costs suggested fire size and private land explained 58 percent of the variation in cost. Other things being equal, suppression expenditures routinely increased with fire size. For the average fire size, expenditures first increased with the percentage of private land within burned area, but as the percentage exceeded 20 percent, expenditures slowly declined until they stabilized when private land reached 50 percent of burned area. The results suggest efforts to contain federal suppression expenditures need to focus on the highly-complex, politically-sensitive topic of wildfires on private land.

Pfister, G. G., C. Wiedinmyer, and L. K. Emmons. 2008. Impacts of the Fall 2007 California wildfires on surface ozone: Integrating local observations with global model simulations. *Geophysical Research Letters* 35: L19814. This study quantifies the Fall 2007 wildfire impact on regional air quality, especially on surface ozone, by analyzing surface observations of ozone concentrations with global chemistry transport model simulations. The latter includes a synthetic tracer providing information about the amount of ozone produced from the fires. The global model is well suited for simulating the overall fire impact and a valuable tool for extracting information about fire influence from the observations. A clear increase in observed ozone is found when the model predicts a strong impact of pollution from the fires, where measured afternoon 8-hour concentrations increased by about 10 ppb on average. The findings demonstrate intense wildfire periods can significantly increase the frequency of ozone concentrations, exceed-

ing current U.S. health standards and possibly causing violations during less photochemically active seasons. The study also demonstrates the far-reaching impact of ozone production from the fires.

Steinberg, Laura J., Hatice Sengul, and Ana Maria Cruz. 2008. Natech risk and management: An assessment of the state of the art. *Natural Hazards* 46(2): 143-152. The present state-of-the-art for natech risk and management is discussed. Examples of recent natechs include catastrophic oil spills associated with Hurricane Katrina and hazardous chemical releases in Europe during the heavy floods of 2002. Natechs create difficult challenges for emergency responders due to the geographical extent of the natural disaster, the likelihood of simultaneous releases, emergency personnel being preoccupied with response to the natural disaster, mitigation measures failing due to the effects of the natural disaster, and others. Recovery from natechs may be much more difficult than for "normal" chemical accidents, as the economic and social conditions of the industrial facility and the surrounding community may have been drastically altered by the natural disaster. Potential safeguards against natechs include adoption of stricter design criteria, chemical process safeguards, community land use planning, disaster mitigation and response planning, and sustainable industrial processes, but these safeguards are only sporadically applied. Ultimately, the public must engage in a comprehensive discussion of acceptable risks for natechs.

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

Beem, H., R. Fendler, and W. B. Kratzig. 2008. Impact of storms and earthquakes on industrial installations: New risk control approaches required? *Natural Hazards* 46(2): 243-256. As a consequence of heavy floods in Germany in August, 2002, the Umweltbundesamt UBA—German Environmental Protection Agency—started a research project on the safety of industrial installations related to technical as well as natural risks. Although the main focus of this research was on floods, risks from storms and earthquakes were also studied. The present paper offers a brief survey of the storm and earthquake regulations for all built environment in Germany, including industrial plants. It further shows how these natural hazardous risks are treated in national building standards, and how they are transformed into residual failure risks of buildings. Based on this knowledge, the manuscript then elucidates safety gaps in combination

with technical risks in industrial plants under operation.



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