

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 Hazard

Briggs, Lisa T., and Karen A. Mason. 2008. First-responder preparedness in western North Carolina: A preliminary analysis. *Journal of Emergency Management* 6(1): 37-42.

The need for well-prepared emergency response agencies has become more evident since the natural disaster of Hurricane Katrina and the Sept. 11 terrorist attacks. While political and public attention has focused on the needs of urban areas, the state of preparedness among rural first-responder agencies has not been sufficiently addressed. Rural areas are home to nearly 59 million U.S. citizens and are the sites of critical infrastructure and military facilities. An assessment of emergency-related resources in rural areas is necessary not only to protect these assets but also to support disasters response in neighboring urban areas. To better understand the level of preparedness in rural western North Carolina (WNC), this survey measures perceptions of emergency preparedness for natural disasters and terrorist attacks among representatives from first-responder agencies in 18 counties.

Eksioglu, Burak, Mingzhou Jin, Ismail Capar, Zhuoxiu Zhang, and Sandra D. Eksioglu. 2008. Highway traffic management in incidents of national significance. *Journal of Emergency Management* 6(1): 22-36.

A framework is proposed to help federal and state agencies in responding to disasters by effectively routing vehicles around a disaster area. The proposed framework includes an information center that uses prediction and optimization models and heuristic algorithms to generate alternative routes for those vehicles that are not able to follow their planned routes because of a disaster. The prediction model determines the routes that will be taken by the vehicles that do not have any communication means. For those vehicles that can communicate with the information center, alternative routes are generated by an optimization model. When a disaster strikes, the information center is immediately informed about the damage and the current traffic conditions in and around the disaster area. The information gathered is used by the optimization model to find alternative routes. The proposed framework is tested

using a simulation model on a hypothetical terrorist attack that takes place in Mississippi. The simulation model is executed to compare the system-wide average mobility and speed for three different cases. The first case represents the traffic situation under normal conditions prior to any disaster. The second case shows the effect of setting up simple detours to reroute the traffic after a disaster. The third case shows the traffic conditions if the proposed framework is implemented. The results indicate that the proposed framework improves both system mobility and average speed.

Marshall, Brent K, and J. Steven Picou. 2008. Postnormal science, precautionary principle, and worst cases: The challenge of twenty-first century catastrophes. *Sociology Inquiry* 78(2): 230-247.

Considering the damage caused by the recent spate of catastrophic events (e.g., Hurricane Katrina, 9/11 terrorist attacks of 2001, and the Indian Ocean tsunami of 2004), it is increasingly clear that complex, large-scale environmental problems will characterize the twenty-first century. This article contends that the ability of science to address these problems is attenuated by the ideological embrace of scientific-technical rationality. With scientific and technological pursuits increasingly marching to the drum beat of economic growth, is there a place for science to operate driven not by short-term profitability, but the long-term interests of the public and needs of the environment? Can the problems associated with complex, large-scale catastrophes be addressed adequately by science and technology alone, especially considering that technological failure may be the primary cause of the catastrophe? The purpose of this article is to provide answers to these questions and to offer a tenable solution to the challenges posed by recent catastrophes. First, the authors outline a framework to better understand the changing relationship between science, stakeholders, and environmental problems. Second, they make the case that recent catastrophes are qualitatively different from past disasters. As a result, they discuss (1) the reasons why dichotomizing disasters as natural or technological is increasingly problematic empirically; and (2) the inability of traditional science to effectively address issues, damages, and problems stemming from recent catastrophes. Finally, they suggest that the more participatory approach of postnormal science, strengthened by the precautionary principle and worst-case analysis, is a viable strategy for addressing complex, large-scale catastrophes.

Schmidtlein, Mathew C., Christina Finch, and Susan L. Cutter. 2008. Disaster declarations and major hazard occurrences in the United States. *The Professional Geographer* 60(1): 1-14.

This article examines the potential geographic inequities between major hazard events and U.S. presidential disaster declarations at the county level from 1965 through 2004. The previous literature suggests that the disaster declaration process is highly politicized and not necessarily based on need. The authors hypothesize that there is a spatial inequity between the receipt of disaster declarations and the distribution of major hazard events. The results indicate that the geographic distribution of disaster declarations is not totally explained by the spatial pattern of major hazard events. In some locales, state experience in submitting disaster requests and achieving success translates into more disaster declarations, providing further evidence of the political nature of the process.

Climate Change, Drought and El Nino

Alongi, Daniel M. 2008. Mangrove forests: Resilience, protection from tsunamis, and responses to global climate change. *Estuarine, Coastal and Shelf Science* 76(1): 1-13. This review assesses the degree of resilience of mangrove forests to large, infrequent disturbance (tsunamis) and their role in coastal protection, and to chronic disturbance events (climate change) and the future of mangroves in the face of global change. From a geological perspective, mangroves come and go at considerable speed with the current distribution of forests a legacy of the Holocene era, having undergone almost chronic disturbance as a result of fluctuations in sea-level. Mangroves have demonstrated considerable resilience over timescales commensurate with shoreline evolution. This notion is supported by evidence that soil accretion rates in mangrove forests are currently keeping pace with mean sea-level rise. Further support for their resilience comes from patterns of recovery from natural disturbances (storms, hurricanes) which coupled with key life history traits, suggest pioneer-phase characteristics. Stand composition and forest structure are the result of a complex interplay of physiological tolerances and competitive interactions leading to a mosaic of interrupted or arrested succession sequences, in response to physical/chemical gradients and landform changes. The extent to which some or all of these factors come into play depends then on width. The magnitude of energy absorption strongly depends on tree density, stem and root diameter, shore slope, bathymetry, spectral characteristics of incident waves, and tidal stage upon entering the forest. The ultimate disturbance, climate change, may lead to a maximum global loss of 10 to 15 percent of mangrove forest, but must be considered of secondary importance compared with current average annual rates of 1 to 2 percent deforestation. A large reservoir of below-ground nutrients, rapid rates of nutrient flux and microbial decomposition, complex and highly efficient biotic controls, self-design

and redundancy of keystone species, and numerous feedbacks, all contribute to mangrove resilience to various types of disturbance.

Babugura, Agnes A. 2008. Vulnerability of children and youth in drought disasters: A case study of Botswana. *Children, Youth and Environments* 18(1): 126-157.

Throughout southern Africa, millions of people, especially children and youth, are affected by drought. Though young people are usually the most affected, they are rarely given the opportunity to voice their concerns and experiences with drought disasters. This study explores the vulnerabilities of children and youth during drought in Botswana, which is highly susceptible to drought disasters. Using face-to-face interviews and participatory rural appraisal (picture drawing and story telling) the researcher collected data from adult caregivers and 30 young people (ages 10-18). The study demonstrates that the needs of children and youth during drought go well beyond physical survival. Children also experience emotional distress during times of disaster, which emerges from fears of being separated from family, the loss of educational opportunities, mounting tensions and pressures within the household, a lack of emotional support at the family level, and increased workloads. Gender, age, family structure, and roles within the household all affect children's vulnerability and the ways that they cope with drought disaster as well as other stresses related to poverty and HIV/AIDS.

Bartlett, Sheridan. 2008. The implications of climate change for children in lower-income countries. *Children, Youth and Environments* 18(1): 71-98.

This article provides a brief overview of the implications for children of climate change both of extreme weather events and more gradual changes, along with the adaptations likely to be made at various levels. Because data on the impacts of climate change tend not to be disaggregated by sub-population or by age, there is insufficient knowledge to present a comprehensive picture of the impacts for this age group. Instead, this paper extrapolates from existing knowledge in a number of related areas to present a picture of the probable implications for children's health, safety, and long-term well being, especially in lower-income countries and communities that are at highest risk from climate change. The article stresses not only children's vulnerability, but also their resilience and capacity as active agents to play a role in addressing challenges related to climate change they confront.

Belatos, Spyros. 2008. Progress in the study and management of river ice jams. *Cold Regions Science and Technology* 51(1): 2-19.

River ice jams can cause extreme flood events with major consequences to infrastructure, riverside communities, and aquatic life. Yet, it is only in the last few decades that concerted efforts have been made to understand and predict ice-jam occurrence and severity. Building on a 1990s state-of-the-art review, new physical knowledge, prediction capabilities, and management methods are discussed herein. The thickness and hydraulic roughness of ice jams have been elucidated, and flow through ice-jam voids quantified. Under-ice transport of frazil ice, which can lead to enormous freeze up accumulations, has been placed on a more rigorous footing while heat exchange with the water flowing under a jam can be predicted with some confidence. Systematic field measurements have produced new understanding of the waves that are generated by ice-jam releases. Increased understanding of the physical processes has enhanced confidence in older numerical models and motivated development of more sophisticated ones, leading to two-dimensional dynamic algorithms based on continuum as well as discrete element approaches. Ice-jam management and control continue to be difficult tasks, but new structural and non-structural techniques offer promising avenues, at least in the case of relatively small rivers. The emerging issue of climate change and the growing appreciation of related ecological linkages have led to important, but still few, insights on how ice jamming regimes can be modified by altered climatic conditions and what the repercussions might be on river ecology. Despite the progress, there are still major unknowns, particularly related to the conditions of formation and release of ice jams.

Charpentier, Arthur. 2008. Insurability of climate risks. *The International Association for the Study of Insurance Economics* 33(1): 91-109.

The 2007 Intergovernmental Panel on Climate Change (IPCC) report noted that both the frequency and strength of hurricanes, floods and droughts have increased during the past few years. Thus, climate risk, and more specifically natural catastrophes, are now hardly insurable: losses can be huge (and the actuarial pure premium might even be infinite), diversification through the central limit theorem is not possible because of geographical correlation (a lot of additional capital is required), there might exist no insurance market since the price asked by insurance companies can be much higher than the price householders are willing to pay (short-term horizon of policyholders), and, due to climate change, there is more uncertainty (and thus additional risk). The first idea discussed in this paper is about insurance markets and climate risks, is that insurance exists only if risk can be transferred, not only to re-insurance companies but also to capital markets (through securitization or catastrophes options). The second one is

that climate is changing, and therefore, not only prices and capital required should be important, but also uncertainty can be very large. It is extremely difficult to insure in a changing environment.

Clemo, Kim. 2008. Preparing for climate change: Insurance and small business. *The International Association for the Study of Insurance Economics* 33(1): 110-116.

This paper considers the threat of climate change in the U.K., especially flooding, with regard to the impact that it will have on small and medium-sized enterprises and on the insurance industry itself and the role it plays. It examines the current situation facing the U.K. and then examines the responses being made to this and what can be done in the future to help resolve this issue.

Dlugolecki, Andrew. 2008. Climate change and the insurance sector. *The International Association for the Study of Insurance Economics* 33(1): 71-90.

Climate change matters to the insurance sector. In terms of underwriting, in one scenario, the economic cost of weather losses could reach over 1 trillion USD in a single year by 2040. The impacts will be worse in developing countries. The private sector needs to work with the public sector, as part of a "triple dividend" approach that coordinates adaptation, disaster management and sustainable economic development. For asset management the indirect impacts are key. Greenhouse gas emissions have to drop by 60 percent by 2050, which means transforming the energy economy. Finance for renewables will soon reach 100 billion USD a year. Political uncertainty is a serious blockage to market forces, and the re-evaluation of assets and project returns is happening too slowly. Finally, insurers have a duty as ubiquitous players in the economy and society to help to shape climate policies in a responsible and effective way.

Greer, Amy, Victoria Ng, and David Fisman. 2008. Climate change and infectious diseases in North America: The road ahead. *Canadian Medical Association Journal* 178(6): Online edition.

Global climate change is inevitable. The combustion of fossil fuels has resulted in a buildup of greenhouse gases within the atmosphere, causing unprecedented changes to the earth's climate. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change suggests that North America will experience marked changes in weather patterns in coming decades, including warmer temperatures and increased rainfall, summertime droughts and extreme weather events (e.g., tornadoes and hurricanes). Although these events may have direct consequences for health (e.g., injuries and displacement of populations due to thermal stress), they are also likely to cause important

changes in the incidence and distribution of infectious diseases, including vector-borne and zoonotic diseases, water- and food-borne diseases and diseases with environmental reservoirs (e.g., endemic fungal diseases). Changes in weather patterns and ecosystems, and health consequences of climate change will probably be most severe in far northern regions (e.g., the Arctic). This article provides an overview of the expected nature and direction of such changes, which pose current and future challenges to health care providers and public health agencies.

Hovi, Jon, and Tora Skodvin. 2008. Which way to U.S. climate cooperation? Issue linkage versus a U.S.-based agreement. *Review of Policy Research* 25(2): 129-148.

Several scholars have suggested that the United States can be compelled to re-engage in the Kyoto process by linking cooperation on climate change to cooperation on trade or technology research and development. The authors claim that such issue linkage would likely fail and suggest that a more promising road to U.S. cooperation is to develop an alternative climate agreement based on federal U.S. climate policy. However, the question then becomes whether the Kyoto countries might be prepared to abandon the Kyoto process in favor of such a U.S.-based agreement. They argue that if a U.S.-based agreement were to be built on President Bush's current climate policy, the Kyoto countries (especially the European Union) would likely be reluctant to go along. However, if a U.S.-based agreement were to be built on the many Kyoto-like initiatives now emerging at state and local levels, the Kyoto countries might well be more favorably inclined.

Hulme, Mike. 2008. The conquering of climate: discourses of fear and their dissolution. *The Geographical Journal* 174(1): 5-16.

We are living in a climate of fear about our future climate. The language of the public discourse around global warming routinely uses a repertoire which includes words such as 'catastrophe', 'terror', 'danger', 'extinction' and 'collapse'. To help make sense of this phenomenon, the story of the complex relationships between climates and cultures in different times and in different places is in urgent need of telling. If we can understand from the past something of this complex interweaving of our ideas of climate with their physical and cultural settings, we may be better placed to prepare for different configurations of this relationship in the future. This paper examines two earlier European discourses of fear associated with climate – one from the early-modern era (climate as judgment) and one from the modern era (climate as pathology) and traces the ways in which these discourses formed and dissolved within a specific cultural matrix. The contemporary discourse of fear about future climate change (climate

as catastrophe) is summarized and some ways in which this discourse, too, might be dissolved are examined. Conventional attempts at conquering the climatic future all rely, implicitly or explicitly, upon ideas of control and mastery, whether of the planet, of global governance or of individual and collective behavior. These attempts at “engineering” future climate seem somewhat utopian and brash. Understanding the cultural dimensions of climate discourses offers a different way of thinking about how we navigate the climatic future. However the contemporary climatic fears have emerged as linked, (e.g. to neoliberal globalism, to ecological modernization and the emergence of a risk society, or to a deeper instinctive human anxiety about the future) they will in the end be dissipated, re-configured or transformed as a function of cultural change.

Kellstedt, Paul M., Sammy Zahran, and Arnold Vedlitz. 2008.

Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. *Risk Analysis* 28(1): 113-126.

Despite the growing scientific consensus about the risks of global warming and climate change, the mass media frequently portray the subject as one of great scientific controversy and debate. Previous studies of the mass public’s subjective assessments of the risks of global warming and climate change have not sufficiently examined public informedness, public confidence in climate scientists, and the role of personal efficacy in affecting global warming outcomes. By examining the results of a survey on an original and representative sample of Americans, the authors found that these three forces, informedness, confidence in scientists, and personal efficacy are related in interesting and unexpected ways, and exert significant influence on risk assessments of global warming and climate change. In particular, more informed respondents both feel less personally responsible for global warming and show less concern for global warming. The authors also found that confidence in scientists has unexpected effects: respondents with high confidence in scientists feel less responsible for global warming and also show less concern for global warming. These results have substantial implications for the interaction between scientists and the public in general, and for the public discussion of global warming and climate change in particular.

Maynard, Trevor. 2008. Climate change: Impacts on insurers and how they can help with adaptation and mitigation. *The International Association for the Study of Insurance Economics* 33(1): 140-146.

Climate change is already affecting the global insurance industry. These changes are often seen as being negative, although opportunities also exist. Other areas of insurance coverage may also be affected in addition to property

damage. The potential for third-party liability claims from climate change is less well understood but has even greater potential to affect the industry. Financial assets held to meet claims and provide a capital buffer may also be affected. Therefore, the balance sheet of an insurer may be damaged from all sides. Insurers cannot force policy holders to mitigate CO2 emissions, but they can give them a choice and a number of them are already offering such policies. They can also take steps to reduce their own carbon emissions. Insurance is adaptation; there are a surprisingly large number of small to medium companies that do not have catastrophe coverage, so increasing insurance penetration of these markets would be an adaptive measure. Insurers will continue to lobby governments for appropriate weather defenses to keep areas insurable for as long as possible. Non-traditional forms of insurance are available (such as those based on weather indices with parametric triggers) and it may be possible to continue to offer these for longer than traditional insurance. They do bring basic risks with them and therefore possible reputational risk to the industry. Insurers can only pool risk; they cannot insure our way out of this problem, but they can help to spread the impacts where possible.

Milinski, Manfred, Ralf D. Sommerfeld, Hans-Jurgen

Krambeck, Floyd A. Reed, and Jochem Marotzke. 2008.

The collective-risk social dilemma and the prevention of simulated dangerous climate change. *Proceedings of the National Academy of Sciences* 105(7): 2291-2294.

Will a group of people reach a collective target through individual contributions when everyone suffers individually if the target is missed? This “collective-risk social dilemma” exists in various social scenarios, the globally most challenging one being the prevention of dangerous climate change. Reaching the collective target requires individual sacrifice, with benefits to all but no guarantee that others also will also contribute. It even seems tempting to contribute less and save money to induce others to contribute more, hence the dilemma and the risk of failure. Here, the authors introduce the collective-risk social dilemma and simulate it in a controlled experiment: Will a group of people reach a fixed target sum through successive monetary contributions, when they know they will lose all their remaining money with a certain probability if they fail to reach the target sum? They find that, under high risk of simulated dangerous climate change, half of the groups succeed in reaching the target sum, whereas the others only marginally fail. When the risk of loss is only as high as the necessary average investment or even lower, the groups generally fail to reach the target sum. They conclude that one possible strategy to relieve the collective-risk dilemma in high-risk situations is to convince people that failure to invest enough is very likely to

cause grave financial loss to the individual. Their analysis describes the social window humankind has to prevent dangerous climate change.

Nitschke, Craig R., and John L. Innes. 2008. Climatic change and fire potential in South-Central British Columbia, Canada. *Global Change Biology* 14(4): 841-55.

The incidence and severity of forest fires are linked to the interaction between climate, fuel and topography. Increased warming and drying in the future is expected to have a significant impact on the risk of forest fire occurrence. An increase in fire risk is linked to the synchronous relationship between climate and fuel moisture conditions. A warmer, drier climate will lead to drier forest fuels that will in turn increase the chance of successful fire ignition and propagation. This interaction will increase the severity of fire weather, which, in turn, will increase the risk of extreme fire behavior. A warmer climate will also extend fire season length, which will increase the likelihood of fires occurring over a greater proportion of the year. In this study of the North Okanagan area of British Columbia, Canada, the impacts of climate change of fire potential were evaluated using the Canadian Forest Fire Danger Rating System and multiple climate scenario analysis. Utilizing this approach, a 30% increase in fire season length was modeled to occur by 2070. In addition, statistically significant increases in fire severity and fire behavior were also modeled. Fire weather severity was predicted to increase by 95% during the summer months by 2070 while fire behavior was predicted to shift from surface fire-intermittent crown fire regimes to a predominantly intermittent-full crown fire regime by 2070 onwards. An increase in fire season length, fire weather severity and fire behavior will increase the costs of fire suppression and the risk of property and resource loss while limiting human-use within vulnerable forest landscapes. An increase in fire weather severity and fire behavior over a greater proportion of the season will increase the risks faced by ecosystems and biodiversity to climatic change and increase the costs and difficulty of achieving sustainable forest management.

Pidgeon, Nick F., Irene Lorenzon, and Wouter Poortinga. 2008. Climate change or nuclear power - No thanks! A quantitative study of public perceptions and risk framing in Britain. *Global Environmental Change* 18(1): 69-85.

The U.K. is witnessing a new line in political debate around new nuclear energy generation as one potential feature of future energy policy, specifically for contributing to climate change mitigation alongside energy security. Little is known about how ordinary citizens might be responding to this reframing. This paper reports the results from a major British survey (n=1491) undertaken in

the autumn of 2005. The consistent message is that while higher proportions of the British public are prepared to accept nuclear power if they believe it contributes to climate change mitigation, this is a highly conditional view, with very few actively preferring this over renewable sources given the choice. People see both climate change and nuclear power as problematic in terms of risks and express only a "reluctant acceptance" of nuclear power as a solution to climate changes. The combined data from this survey can also be interpreted as an indication of the complexity surrounding beliefs about energy futures and the difficulty of undertaking simplistic risk-risk tradeoffs within any single framing of the issues; such as nuclear energy versus climate change. The results also indicate it would be unwise, in the U.K., as elsewhere, to simplistically assume there exists any single or stable public opinion on such complex matters. The article concludes with a discussion of the role and implications of the survey evidence for the policy process.

Rabe, Barry G. 2008. States on steroids: The intergovernmental odyssey of American climate policy. *Review of Policy Research* 25(2): 105-128.

Climate change has conventionally been framed as an issue that would be addressed by an international regime established through negotiation among nation-states. The experience of policy development in the decade following the signing of the Kyoto Protocol indicates that climate change also needs to be examined as a challenge of multilevel governance. The increasingly central role of state governments in American climate policy formation squares with recent experience in other Western democracies that share authority across governmental levels. This paper examines the American experience, considering factors that have contributed to a state-centric policy process and using that body of experience to assess competing strategic choices faced by individual states based on their mix of emission trends and policy adoption rates. In turn, the collective state experience allows for consideration of the varied political feasibility of competing climate policy tools that remain under active review in subnational, national, and international contexts. The paper concludes with a set of scenarios that explore different ways in which a state-centric system may be integrated with expanding involvement at the national level.

Speranza, Chinwe Ifejika, Boniface Kiteme, and Urs Wiesmann. 2008. Droughts and famines: The underlying factors and the causal links among agro-pastoral households in semi-arid Makueni district, Kenya. *Global Environmental Change* 18(1): 220-233.

Famines are often linked to drought in semi-arid areas of Sub-Saharan Africa where not only pastoralists, but

also increasingly agropastoralists are affected. This study addresses the interplay between drought and famine in the rural semi-arid areas of Makueni district, Kenya, by examining whether and how crop production conditions and agro-pastoral strategies predispose smallholder households to drought-triggered food insecurity. If this hypothesis holds, then approaches to deal with drought and famine have to target factors that cause household food insecurity during non-drought periods. Data from a longitudinal survey of 127 households, interviews, workshops, and daily rainfall records (1961-2003) were analyzed using quantitative and qualitative methods. This integrated approach confirms the above hypothesis and reveals that factors other than rainfall, such as asset and labor constraints, inadequate policy enforcement, as well as the poverty-driven inability to adopt risk-averse production systems play a key role. When linking these factors to the high rainfall variability, farmer-relevant definitions and forecasts of drought have to be applied.

Urwin, Kate, and Andrew Jordan. 2008. Does public policy support or undermine climate change adaptation? Exploring policy interplay across different scales of governance. *Global Environmental Change* 18(1): 180-191.

Policy makers have now recognized the need to integrate thinking about climate change into all areas of public policy making. However, the discussion of climate policy integration has tended to focus on mitigation decisions mostly taken at international and national levels. Clearly, there is also a more locally focused adaptation dimension to climate policy integration that has not been adequately explored by academics or policy makers. Drawing on a case study of the U.K., this paper adopts both a top-down and a bottom-up perspective to explore how far different sub-elements of policies within the agriculture, nature conservation and water sectors support or undermine potential adaptive responses. The top-down approach, which assumes that policies set explicit aims and objectives that are directly translated into action on the ground, combines a content analysis of policy documents with interviews with policy makers. The bottom-up approach recognizes the importance of other actors in shaping policy implementation and involves interviews with actors in organizations within the three sectors. This paper reveals that neither approach offers a complete picture of the potentially enabling or constraining effects of different policies on future adaptive planning, but together they offer new perspectives on climate policy integration. These findings inform a discussion on how to implement climate policy integration, including auditing existing policies and “climate proofing” new ones so they support rather than hinder adaptive planning.

Ward, Robert E. T. Herweijer Celine, Nicola Patmore, and Robert Muir-Wood. 2008. The role of insurers in promoting adaptation to the impacts of climate change. *The International Association for the Study of Insurance Economics* 33(1): 133-139.

Scientific evidence of climate change impacting the frequency, intensity and geographical distribution of extreme weather events is accumulating. With these trends likely to continue for the foreseeable future, the insurance industry can help society to adapt by limiting and managing risks associated with extreme weather, thereby maintaining the insurability of potentially vulnerable and exposed populations. There are already examples of the insurance industry promoting efforts to mitigate the impacts of weather hazards by disseminating information about reducing the vulnerability of properties, offering financial incentives to invest in mitigating the impacts of extreme weather, and by working in partnership with policy-makers to establish maximum thresholds of acceptable risk. However, these efforts need to be more widely promoted by insurers to make a significant contribution to society's adaptation to climate change.

Zhang, Ying, Peng Bi, and Janet E. Hiller. 2008. Climate change and the transmission of vector-borne diseases: A review. *Asia-Pacific Journal of Public Health* 20(1): 64-76.

This article reviews studies examining the relationship between climate variability and the transmission of vector- and rodent-borne diseases, including malaria, dengue fever, Ross River virus infection, and hemorrhagic fever with renal syndrome. The review has evaluated the study designs, statistical analysis methods, usage of meteorological variables, and results of those studies. The authors found that the limitations of analytical methods exist in most of the articles. Besides climatic variables, few have included other factors that can affect the transmission of vector-borne disease (e.g., socioeconomic status). In addition, the quantitative relationship between climate and vector-borne diseases is inconsistent. Further research should be conducted among different populations with various climatic/ecological regions by using appropriate statistical models.

Critical Infrastructure

deWolfe, Victor G., Paul M. Santi, J. Ey, and Joseph E. Gartner. 2008. Effective mitigation of debris flows at Lemon Dam, La Plata County, Colorado. *Geomorphology* 96(3-4): 366-377.

To reduce the hazards from debris flows in drainage basins burned by wildfire, erosion control measures such as construction of check dams, installation of log erosion barriers (LEBs), and spreading of straw mulch and seed

are common practice. At Lemon Dam, these methods were effective as cubic meters of debris traveled down channel where it was intercepted by debris racks. These mitigation measures, therefore, reduced the debris volume by several orders of magnitude.

Erdik, Mustafa, Eser Durukal, and Eren Uckman. 2008.

Earthquake risk to industry in Istanbul and its management. *Natural Hazards* 44(2): 199-212.

Istanbul is home to 40 percent of the industrial facilities in Turkey. Thirty percent of the population working in industry lives in the city. Past earthquakes have shown that the structural reliability of residential and industrial buildings in the country is questionable. In the Marmara region, earthquake hazard is very high with a 2 percent annual probability of occurrence of a magnitude 7+ earthquake on the main Marmara fault. These facts make the management of industrial risks imperative for the reduction of socioeconomic losses. In this paper we present a first-order assessment of earthquake damage to the industry in Istanbul and raise issues for better characterization and quantification of industrial losses and management of urban industrial risks.

Tatano, Hirokazu, and Satoshi Tsuchiya. 2008. A framework for economic loss estimation due to seismic transportation network disruption: A spatial computable general equilibrium approach. *Natural Hazards* 44(2): 253-265.

This paper presents a framework for assessing the economic impact of disruption in transportation that can relate the physical damage to transportation networks to economic losses. A spatial computable general equilibrium (SCGE) model is formulated and then integrated with a transportation model that can estimate the traffic volumes of freight and passengers. Economic equilibrium under a disruption in the transportation network is computed subject to the condition that the adjustment of labor and capital inputs is restricted. The model reflects slow adjustment of these linked to the state of recovery. As a case study, the model reviews the large Niigata-Chuetsu earthquake of 2004. Considering the damage to the transportation infrastructure, the model indicates the extent of the economic losses arising from the earthquake distributed over regions as a consequence of the intra- and inter-regional trade in a regional economy. The results show that 20 percent of indirect losses occur in the Niigata region, directly affected by the earthquake, whereas 40 percent of total losses are experienced in the Kanto region and non-negligible losses reach rather remote zones of the country such as Okinawa.

Disaster and Emergency Management

Bajek, Robert, Yoko Matsuda, and Norio Okada. 2008. Japan's Jishu-bosai-soshiki community activities: analysis of its role in participatory community disaster risk management. *Natural Hazards* 44(2): 281-292.

Jishu-bosai-soshiki, or Jishubo for short, with a literal meaning of "autonomous organization for disaster reduction," is a neighborhood association for disaster preparedness and rescue activity. In this paper, the role of Jishubo in the context of participatory disaster management in Japan is discussed. Although the formation of Jishubo is not legally mandated, local governments exercise a great deal of persuasion on the inhabitants of their community to organize and participate in disaster management activities. Therefore, participants in Jishubo activities tend to be guided and mobilized with a soft touch by local governments rather than being truly self-motivated, with the objective of reducing disaster risks in their residential areas. There have been several studies on community participatory management conducted in a number of countries, including New Zealand, the USA and Europe that will serve as a reference in our study. However interesting, the cultural comparison of the "Western" and "Japanese" approaches to community disaster management, is beyond the scope of this paper, which aims to determine a case of community disaster management in Japan. This paper addresses the background behind the development of Jishubo and discusses the uniqueness and limits of this softly mobilized participatory movement in Japan. Based on a case study in Kishiwada City, Osaka, the motivations driving people to participate in disaster management activities organized for Jishubo members is examined. In conclusion, some policy implications are derived and possible approaches for improving the effectiveness of Jishubo and increasing the motivation of people to participate are suggested. The authors also propose that the roles of administrative bodies in Japan, such as non-profit organizations, be better incorporated into community's participatory disaster reduction activities.

Briggs, Lisa T., and Karen A. Mason. 2008. First-responder preparedness in western North Carolina: A preliminary analysis. *Journal of Emergency Management* 6(1): 37-42.

The need for well-prepared emergency response agencies has become more evident since the natural disaster of Hurricane Katrina and the Sept. 11 terrorist attacks. While political and public attention has focused on the needs of urban areas, the state of preparedness among rural first-responder agencies has not been sufficiently addressed. Rural areas are home to nearly 59 million U.S. citizens and are the sites of critical infrastructure and military facilities. An assessment of emergency-related resources in rural

areas is necessary not only to protect these assets but also to support disasters response in neighboring urban areas. To better understand the level of preparedness in rural western North Carolina (WNC), this survey measures perceptions of emergency preparedness for natural disasters and terrorist attacks among representatives from first-responder agencies in 18 counties.

Choi, Sang Ok. 2008. Emergency management: Implications from a strategic management perspective. *Journal of Homeland Security and Emergency Management* 5(1): Online publication.

This study argues the necessity for and the benefits of a strategic management approach in current emergency management systems. Strategic management is characterized as a long-term process for developing a continuing commitment to the mission and vision of an organization, nurturing a culture that identifies with and supports the mission and vision, and maintaining a clear focus on the organization's strategic agenda throughout all its decision processes and activities. Recent emergency management practice demands more strategic approaches and management styles be used than before. This study addresses the following benefits of the integration of strategic management into emergency management: forward thinking, professionalization, capacity building, goal identification and achievement, increased public support, increased funding, and greater accountability. This study offers the following suggestions for fostering strategic planning in emergency management practice: centralize planning and decentralize execution, strengthen the intergovernmental response process, build cooperation among public and nonprofit organizations, provide training for operating emergency management strategic planning, and recruit professional emergency managers. Implications for future research are also presented.

Ffeworn, Alexander, Devin Ostrom, Kevin Barnum, Mike Dallaire, Denis Harkness, and Mike Dolderman. 2008. Canine remote deployment system for urban search and rescue. *Journal of Homeland Security and Emergency Management* 5(1): Online publication.

The Canine Remote Deployment System (CRDS) is a dog-mounted remote delivery system for patients trapped in rubble when human contact is precluded but access by disaster dogs is possible. The system is capable of deploying items to the trapped individual by placing them in a pouch, called an "underdog," attached to the release mechanism. This paper describes the device, how it works, how it has been used and how it might be employed in future disasters.

Hall, Stacey A., Lou Marciani, and Walter Cooper. 2008. Emergency management and planning at major sports events. *Journal of Emergency Management* 6(1): 43-47. High profile sporting events in the United States have been identified by the Department of Homeland Security as potential targets of terrorism (Lipton E: New York Times. March 16, 2005: A1). Other potential threats to major sports events include natural disasters and crowd management issues. It is therefore imperative that agencies involved in security planning at sports venues are trained in threat/risk assessment practices and engage in multiagency collaboration to ensure effective development and coordination of game day security plans. This article will highlight the potential threats to sports events, provide an overview of research conducted on sports event security, and outline some measures that can be utilized by emergency managers in their planning and preparation for managing major sports events.

Hoogendoorn, Mark, Catholjin M. Jonker, Viara Popova, and Alexei Sharpanskykh. 2008. Automated verification of disaster plans in incident management. *Disaster Prevention and Management* 17(1): 16-32.

The purpose of this paper is to create a formal specification language for disaster plans to remove possible inconsistencies between disaster plans and to enable the automated verification of properties from such plans against logs of actual incidents. Different types of properties in disaster plans have been identified and formalized using order-sorted predicate logic, enabling automated comparison of plans and verification of such properties against logs by means of software tools. Actual disaster plans and logs have been used as a case study to show the working of the approach. The automated approach can be used quite easily and result in important findings. For the case study disaster plans, crucial differences were found that could have catastrophic consequences. Furthermore, it is shown in the logs of a well-known incident that the disaster plan was not followed. If the approach is introduced in practice, disaster plans would be stored in a formal format, enabling the automated comparison of disaster plans and immediate detection of derivation from a disaster plan in case of an incident. Other literature about the formal modeling of disaster plans that includes both structural and dynamic aspects and allows representation of organizational structure at multiple aggregation levels has not been found. Nor has comparing the disaster plans using such a formal model, and using the model of the disaster plan to check empirical traces for compliance with this plan, been addressed in prior literature.

Ikeda, Saburo, Teruko Sato, and Teruki Fukuzono. 2008. Towards an integrated management framework for

emerging disaster risks in Japan. *Natural Hazards* 44(2): 267-280.

An integrated framework for disaster risk management is presented to cope with the risk of low-probability, high-consequence (LPHC) disasters in urban communities. Since the 2000 Tokai flood in Japan, there has been a shift in the management strategy from disaster prevention with a presumed zero risk to disaster reduction with an acceptable risk. The framework consists of: (1) integration of different categories of risk reduction options in terms of structural and nonstructural measures, regulation and market-oriented measures, (2) strengthening of the capacity of local communities to make their own management choices for LPHC-type disaster risks, and (3) promoting the participation of stakeholders throughout the entire cycle of risk management. The interdisciplinary framework is discussed with reference to lessons learned from two recent major flood disasters (the 2000 Tokai flood and the 2004 Niigata flood). To implement the goals of the integrated framework, a participatory platform for disaster risk communication called "Pafrics" has been developed. Preliminary results of the pilot study of participation and risk communication supported by Pafrics are presented.

Morris, Kerry-Ann N., and Michelle T. Edwards. 2008. Disaster risk reduction and vulnerable populations in Jamaica: Protecting children within the comprehensive disaster management framework. *Children, Youth and Environments* 18(1): 389-407.

The Office of Disaster Preparedness and Emergency Management (ODPEM), the disaster management headquarters of the Government of Jamaica, understands that the best approach to take in effectively protecting children during emergency situations is to create a culture of risk reduction in which all involved are aware of local hazards and are actively involved in reducing the resulting risks. This includes the promotion of disaster risk education in schools while integrating children's needs into the Comprehensive Disaster Management framework. This field report describes the efforts of the ODPEM in protecting Jamaican children in emergency situations. This was and continues to be achieved through two main approaches: building a culture of prevention in and through schools and integrating children's rights into disaster management and response.

Randeree, Ebrahim. 2008. RHIOs as the foundation for emergency disaster management response. *Journal of Emergency Management* 6(1): 49-58.

This research explores the regional health information organization (RHIO) framework and models for organization in response to emergencies. The increasing threats from weather-related phenomenon, disease outbreaks, and bioterrorism have focused the national agenda on emergency management and response. The creation of a national health information

network is being replicated with state-level efforts to create a support structure for emergency management. Efforts by state agencies to create statewide health information infrastructure network can be the foundation for a RHIO model. This article will develop RHIO formation models as well as explore data issues on quality and security. Beyond the focus on stakeholders, RHIOs must establish trust at various levels and provide credible and current information for usage to increase. Stakeholders must be included in RHIO formation. Data must be rich to provide emergency responders with relevant information to coordinate responses. The limited success of RHIOs needs to be reexamined and repositioned as federal and state initiatives to respond to disasters. RHIOs need to be an integral part of the electronic health record (EHR) rollout to physicians to make them more inter-operable and beneficial to regional health planning and response.

Sauvagnargues-Lesage, Sophie, and Pierre-Alain Ayral. 2007. Using GIS for emergency management: A case study during the 2002 and 2003 flooding in south-east France. *International Journal of Emergency Management* 4(4): 682-703.

Emergency management has always required tools to get geographic information from the affected area. The objectives are to have a general view of the theater of operations with its geographic characteristics, troops' location, roads and railways, and fighting location. The emergency management of natural hazards is specific because it is necessary to evaluate the appropriate number of emergency units for the dimension and probable evolution of the situation; it is necessary to know how to transport emergency units, to anticipate the outcome of the situation and to give the best missions to the units. Geographic aspects are essential because every minute is important when rescuing people. This paper aims to outline the position of Geographic Information Systems (GIS) for emergency management of natural hazards, and especially during the 2002 and 2003 south-east flooding in France.

Schafer, Wendy A., John M. Carroll, Steven R. Haynes, and Stephen Abrams. 2008. Emergency management planning as collaborative community work. *Journal of Homeland Security and Emergency Management* 5(1): Online publication.

Emergencies often have causes and effects that are global. However, emergencies are also inherently local. They occur in a particular place and point in time. While it is critical for governments and society to better organize emergency management top-down, it is also important to become more aware of local community-level values, planning, involvement, knowledge, and skill. Local communities plan collaboratively for potential emergencies of varying scales. The discipline of Human-Computer Interaction studies the interaction between people and computers. Researchers in this

field consider how information technology affects emergency management. They aim to improve emergency management through the design of useful and novel interfaces with technology. The purpose of the authors' work was to take a broader perspective on emergency management and investigate the models and patterns of emergency-related work practices. In particular, they examine emergency management from a local community perspective. This focus on local communities partly stems from prior research on community groups and use of information technology. It is also motivated by the realization that emergencies are local events, which happen in communities. This paper reports on a study of one community's emergency planning activities. Five aspects of community preparedness are discussed: collaborative efforts, local area details, local culture, geographic information, and emergency plans. A case study provides concrete examples of each. Local community preparedness is complex, giving rise to many collaboration issues. Revealing this complexity, the paper offers some implications for community emergency management technology.

Shaluf, Ibrahim Mohamed. 2008. Technological disaster stages and management. *Disaster Prevention and Management* 17(1): 114-126.

This paper aims to provide graduate students, researchers, governmental and independent agencies with an overview on the stages and management of technological disasters. The technological disasters are a subject of concern to the researchers, the academicians, the governmental and independent agencies. The disasters, which involve major hazard installations (MHIs), are known as technological disasters. The information has been collected from several sources such as the technical and general articles, Web sites, and internal reports. The technological disaster definition and stages have been reviewed. This paper presents an overview on the technological disaster management cycle. Technological disasters consist of three stages. The stages are classified into pre-, during and post-disaster stages. Disaster management is a collective term encompassing all aspects of planning for and responding to disasters, including both pre-disaster and post-disaster activities. Disaster management cycle is an open-ended process. The four phases comprising the cycle begin and end with mitigation. The stages are not mutually exclusive; there is an overlap. The stages of disaster management can be operative concurrently, because those stages are interrelated; they are not independent entities with one stopping and the next following. This paper presents an overview of the technological disaster definition and stages. It provides the MHIs management and the related authority with a background on the technological disaster management cycle. It motivates the members of the MHIs, particularly managerial staff, and the emergency planners to continually improve

the control of MHIs. It provides the background and basis for further research in disaster and disaster management.

Wang, Jing-ai, Pei-jun Shi, Xiang-sheng Yi, Hui-cong Jia, and Lai-yin Zhu. 2008. The regionalization of urban natural disasters in China. *Natural Hazards* 44(2): 169-179.

An integrated urbanization level (CL) index and an integrated natural disaster intensity (QC) index were developed on the basis of Disaster System Theory and China Natural Disaster Database for integrated urban disaster risk assessment. Integrated quantitative assessments of the urban socio-economic system and the intensity of hazards in China were carried out by the Model-Tupu (map series) and inter-feedback process using digital map technology. On the basis of this assessment, China can be regionalized into three regions—coastal urban disaster region, eastern urban disaster region and western urban disaster region, 15 sub-regions and 22 units. These results can provide a scientific basis for determining a city's disaster risk management and natural disaster relief regionalization in China.

Disaster Relief

Berke, Philip R., Ratana Chuenpagdee, Kungwan Juntarashote, and Stephanie Chang. 2008. Human-ecological dimensions of disaster resiliency in Thailand: Social capital and aid delivery. *Journal of Environmental Planning and Management* 51(2): 303-317.

This study focuses on the human-ecological dimension of disaster resilience after the 2004 tsunami. It examines how concepts of social capital and external aid delivery influence community performance in conservation of mangrove ecosystems. Experiences are reported through the words of local informants in six villages in Thailand. Findings indicate that social capital represents a potential for collective action, but design of aid programs may prevent such action. Programs that emphasized bottom-up aid delivery mobilized local social capital and directed it toward obtaining resources that fit local needs and capabilities. Alternatively, top-down aid programs provided significant resources, but oppressed mobilization of social capital. Implications are that disaster stricken communities should be treated as active participants, rather than the more common perspective that views them as vulnerable and in a state of helplessness.

Leiby, Sandra L. 2008. Caring for the caregivers and patients left behind: Experiences of a volunteer nurse during Hurricane Katrina. *Critical Care Nursing Clinics of North America* 20(1): 83-90.

As a volunteer nurse deployed to New Orleans after Hurricane Katrina, the author observed the need for honest and informative leadership, volunteer flexibility, an "I'll-do-anything" mind-set, and more advanced disaster training.

This article describes the author's experiences and highlights how she learned those lessons. She advocates learning from the experiences of responders to recent national and international relief efforts to ensure the organizational and personal preparedness needed to deal with the complex ethical, moral, legal, and medical issues during a disaster.

Reams, Margaret A., and Philip J. Chandler. 2008. An examination of FEMA's temporary emergency housing program and the criteria used to make site selections in post-Katrina New Orleans. *Journal of Emergency Management* 6(1): 59-69.

The authors examine the Federal Emergency Management Agency's (FEMA's) emergency temporary housing program and its implementation in Orleans Parish during the first months after Hurricane Katrina. They identify environmental and demographic factors that may have influenced the selection of sites for temporary trailer parks. The environmental assessments for each of the sites considered for use were obtained directly from FEMA under the Freedom of Information Act. Socioeconomic characteristics of the communities near the proposed sites were gathered from the U.S. Census Bureau. Using cross-tabulations and difference-of-means tests to make comparisons between the sites selected and those not selected, the authors identify several environmental and socioeconomic factors associated with site selection. None of the selected sites were found to be in an area designated as residential, nor were any sites selected that possessed known hazardous wastes, hazardous materials or that contained habitat critical to endangered species. Also, all of the selected developments involved the installation of fewer than 100 trailers. The analysis suggests that the trailer parks tended to be built in zip codes with slightly lower per capita incomes, although this trend was not reflected in property values. The authors found no evidence that the trailer parks were placed in communities with larger percentages of African American residents. All the sites selected for use passed the environmental reviews as required by the National Environmental Policy Act.

Earthquakes

Anagnostopoulos, S., and M. Moretti. 2008. Post-earthquake emergency assessment of building damage, safety and usability Part 1: Technical issues. *Soil Dynamics and Earthquake Engineering* 28(3): 223-232.

In this paper, the key technical issues associated with post-earthquake emergency inspections operations of buildings are presented and recommendations are made based on extensive local (Greek) experience from past earthquakes. Safety and usability criteria are established and correlations of such criteria, with various damage states, are given, along with detailed rules of damage assessment for reinforced concrete and masonry buildings. The damage states of various

structural, as well as non-structural, elements are quantified and their descriptions are supplemented with appropriate photographs of damage from past earthquakes. Rules are then provided for assessing the overall safety of a building based on the severity and extent of damage of its elements. Organizational and logistical aspects of such operations have been presented and discussed in a companion paper.

Anagnostopoulos, S., and M. Moretti. 2008. Post-earthquake emergency assessment of building damage, safety and usability Part 2: Organization. *Soil Dynamics and Earthquake Engineering* 28(3): 233-244.

The purpose of this paper is to describe the organizational aspects of the planning, setting up and execution of building inspection operations under emergency conditions created by damaging earthquakes. The procedures developed herein reflect experience from damaging earthquakes in Greece and elsewhere and were tested in a pilot trial in the Greek city of Chania. The purpose was to adapt them in the overall earthquake emergency response plan of Greece. A computer program, PEADAB, for Post-Earthquake Assessment of Damaged Buildings, has been developed to support the planning and execution of such operations. Technical aspects of the operation are described in a companion paper.

Erdik, Mustafa, and Eser Durukal. 2008. Earthquake risk and its mitigation in Istanbul. *Natural Hazards* 44(2): 181-197.

Physical and societal vulnerability to earthquakes along with expected physical, social, economic, and industrial losses in Istanbul are outlined. This risk quantification is the basis for the Earthquake Master Plan. Risk-mitigation activity being conducted by several agencies and in different context and sectors is elaborated.

Erdik, Mustafa, Eser Durukal, and Eren Uckman. 2008.

Earthquake risk to industry in Istanbul and its management. *Natural Hazards* 44(2): 199-212.

Istanbul is home to 40 percent of the industrial facilities in Turkey. Thirty percent of the population working in industry lives in the city. Past earthquakes have shown that the structural reliability of residential and industrial buildings in the country is questionable. In the Marmara region, earthquake hazard is very high with a 2 percent annual probability of occurrence of a magnitude 7+ earthquake on the main Marmara fault. These facts make the management of industrial risks imperative for the reduction of socioeconomic losses. In this paper we present a first-order assessment of earthquake damage to the industry in Istanbul and raise issues for better characterization and quantification of industrial losses and management of urban industrial risks.

Ghafory-Ashtiany, Mohsen, and Mahmood Hosseini. 2008.

Post-Bam earthquake: recovery and reconstruction. *Natural Hazards* 44(2): 229-241.

This paper gives a brief explanation of the earthquake in Bam. It also reports on the rescue and relief operations, including the construction of emergency shelters and temporary housing, and on the country's plan for the reconstruction of the city, which includes debris removal, the rebuilding of rural and urban residential and commercial units, the reconstruction of state and public buildings and public facilities such as schools, rural and urban water aqueducts and grids, the construction of a sewage system, power network and telecommunication system, the provision of water to orchards and farmlands, the renovation of industries and the revival of the cultural heritage, particularly the historical Bam citadel. The authors also report briefly on the effect of the Bam earthquake on the Iran Earthquake Risk Reduction Strategy and actions.

Menoni, Scira, and Giulia Pesaro. 2008. Is relocation a good answer to prevent risk? Criteria to help decision makers choose candidates for relocation in areas exposed to high hydrogeological hazards. *Disaster Prevention and Management* 17(1): 33-53.

The purpose of this paper is to illustrate the results of research mandated by the regional government of Lombardia, Italy. The results identify the criteria used to decide in what situations the relocation from areas subject to high levels of hydrogeological hazards is a viable preventive strategy. In the first part, the state-of-the-art regarding voluntary relocation from hazardous areas supported by governmental funding and incentives has been described, showing that very few examples are available for reference. Therefore, lessons learned from involuntary relocation have been considered especially regarding specific strategies that must be designed to address societal needs. In the second part of the article, the criteria developed to help decision makers decide when and if relocation may be considered a preventive option are described in detail. Finally, it shows what results have been obtained by applying the criteria to the case of the Lombardia region. Four sets of criteria were proposed, shaped according to different geographical scales and to different demands, recognizing that relocation is a rather extreme solution that must be carefully evaluated and proposed to interested parties and citizens. Those criteria have been applied to assess some specific cases in the Lombardia region and to identify potential candidates for relocation in the whole region by querying a complex database that was prepared by integrating layers representing hydrogeological hazards on one side, and exposed settlements on the other. Until now, most of the laws to prevent risks have imposed limitations to building and development in hazardous areas, while rarely focusing on existing settlements. The experience described in this

article concerns a region that has decided to design a specific law to promote preventive relocation in the most critical situations, where structural measures have failed a number of times, and losses are frequent and large. The criteria proposed in this paper provide a method and a tool for deciding in what cases and circumstances relocation can be considered a viable preventive option to lessen the risk in particularly critical zones that are exposed to high hydrogeological hazards. In doing so, it shows that relocation can be considered not as an "emergency" and episodic measure, but rather as a part of a more comprehensive policy in which candidates for relocation can be determined on a regional scale respecting basic social, political and economic conditions.

Sadeghi, Naghmeh, and Mohammad H. Ahmadi. 2008. Mental health preparedness for natural disasters in Iran. *Natural Hazards* 44(2): 243-252.

Appropriate emergency preparedness and response rely on social, economical, cultural, and political infrastructures that vary widely according to the level of the development of each country. Mental health damages are among the consequences of absence of such infrastructure that have not been studied comprehensively until now. In most countries, planning for natural disasters and earthquakes has been mainly focused on physical and economic impacts. However, lessons learned from recent earthquakes in Iran and other countries show that psychological impacts need to be considered more seriously. The first responder to an emergency is really the affected community, which consequently should be mentally prepared by appropriate training programs. These should include simple psychosocial interventions developed for people with an average level of education in a way that is easily understandable and practicable. After the Bam earthquake, local community volunteers have been selected and trained to provide post-disaster mental health services.

Sakakibara, H., H. Murakami, S. Esaki, D. Mori, and H. Nakata. 2008. Modeling households' decisions on reconstruction of houses damaged by earthquakes: Japanese case study. *Natural Hazards* 44(2): 293-303.

In this study, households' decisions on reconstruction of damaged houses were modeled using questionnaire data in Japan. Characteristics of households' decisions were investigated using parameter estimation results. The effects of subsidizing policy were evaluated as follows: first, subsidy for rebuilding may be effective for the households where houses were heavily damaged; second, there is a possibility that subsidy accelerated rebuilding of houses by the households with children; third, subsidy for rebuilding may not be effective for elderly people's households and households in depopulated areas.

Tatano, Hirokazu, and Satoshi Tsuchiya. 2008. A framework for economic loss estimation due to seismic transportation net-

work disruption: A spatial computable general equilibrium approach. *Natural Hazards* 44(2): 253-265.

This paper presents a framework for assessing the economic impact of disruption in transportation that can relate the physical damage to transportation networks to economic losses. A spatial computable general equilibrium (SCGE) model is formulated and then integrated with a transportation model that can estimate the traffic volumes of freight and passengers. Economic equilibrium under a disruption in the transportation network is computed subject to the condition that the adjustment of labor and capital inputs is restricted. The model reflects slow adjustment of these linked to the state of recovery. As a case study, the model reviews the large Niigata-Chuetsu earthquake of 2004. Considering the damage to the transportation infrastructure, the model indicates the extent of the economic losses arising from the earthquake distributed over regions as a consequence of the intra- and inter-regional trade in a regional economy. The results show that 20 percent of indirect losses occur in the Niigata region, directly affected by the earthquake, whereas 40 percent of total losses are experienced in the Kanto region and non-negligible losses reach rather remote zones of the country such as Okinawa.

Floods

Belatos, Spyros. 2008. Progress in the study and management of river ice jams. *Cold Regions Science and Technology* 51(1): 2-19.

River ice jams can cause extreme flood events with major consequences to infrastructure, riverside communities, and aquatic life. Yet, it is only in the last few decades that concerted efforts have been made to understand and predict ice-jam occurrence and severity. Building on a 1990s state-of-the-art review, new physical knowledge, prediction capabilities, and management methods are discussed herein. The thickness and hydraulic roughness of ice jams have been elucidated, and flow through ice-jam voids quantified. Under-ice transport of frazil ice, which can lead to enormous freeze up accumulations, has been placed on a more rigorous footing while heat exchange with the water flowing under a jam can be predicted with some confidence. Systematic field measurements have produced new understanding of the waves that are generated by ice-jam releases. Increased understanding of the physical processes has enhanced confidence in older numerical models and motivated development of more sophisticated ones, leading to two-dimensional dynamic algorithms based on continuum as well as discrete element approaches. Ice-jam management and control continue to be difficult tasks, but new structural and non-structural techniques offer promising avenues, at least in the case of relatively small rivers. The emerging issue of climate change and the growing appreciation of related ecological linkages have led to

important, but still few, insights on how ice jamming regimes can be modified by altered climatic conditions and what the repercussions might be on river ecology. Despite the progress, there are still major unknowns, particularly related to the conditions of formation and release of ice jams.

Crichton, David. 2008. Role of insurance in reducing flood risk. *The International Association for the Study of Insurance Economics* 33(1): 117-132.

This paper considers the problems of flood risk management in the context of public and private insurance. It demonstrates the important role of insurance in reducing flood risk with examples from the U.K. and France. It includes a brief description of the 2007 summer floods in England.

Hankin, Barry, Simon Waller, Geoff Astle, and Richard Kellagher. 2008. Mapping space for water: Screening for urban flash flooding. *Journal of Flood Risk Management: Online edition.*

This paper builds on the Flooding from Other Sources project (HA4a), funded as part of Defra's Making Space for Water strategy. The HA4a study concluded that flood risk mapping is feasible for many of the sources of flooding that were investigated, which are not currently covered by the Environment Agency Flood Map, using existing flow modeling and GIS tools. However, there are some major constraints in terms of the need to undertake extensive data collection to allow the generation of useful flood maps that are not dominated by modeling uncertainties. The project anticipated that different levels of data collection and modeling might be needed for different purposes, given the hierarchical nature of U.K. flood risk assessment and management in the United Kingdom under PPS25 and the EC Floods Directive. This paper compares and contrasts three different approaches to urban flood modeling using topographic analysis, blanket extreme rainfall and semi-coupled sewer/overland routing. The 2007 U.K. summer floods have highlighted the pressing need for mapping risk from urban flash flooding. The Pitt Review has recommended areas at high risk from surface waters should be urgently identified. This can be done now at some level of detail. We can be guided as to what level from our increasing knowledge of vulnerable populations, from records of historical flooding and by using some of the screening methods described herein.

Hansson, K., M. Danielson, and L. Ekenberg. 2008. A framework for evaluation of flood management strategies. *Journal of Environmental Management* 86(3): 465-480.

The impact of disasters on society depends on the affected country's economic strength prior to the disaster. The larger the disaster and the smaller the economy, the more significant is the impact. This is clearly seen in developing countries, where weak economies become even weaker after a disaster.

Deliberate strategies for the sharing of losses from hazardous events may aid a country or a community in efficiently using scarce prevention and mitigation resources, thus being better prepared for the effects of a disaster. Nevertheless, many governments lack an adequate institutional system for applying cost-effective, reliable technologies for disaster prevention, early warnings, and mitigation. Modeling by event analyses and strategy models is one way of planning ahead, but these models have so far not been linked together. An approach to this problem was taken during a large study in Hungary, the Tisza case study, where a number of policy strategies for spreading of flood loss were formulated. In these strategies, a set of parameters of particular interest were extracted from interviews with stakeholders in the region. However, the study was focused on emerging economies, and, in particular, on insurance strategies. The scope is now extended to become a functional framework also for developing countries. In general, they have a higher degree of vulnerability. The paper takes northern Vietnam as an example of a developing region. The authors identify important parameters and discuss their importance for flood strategy formulations. Based on the policy strategies in the Tisza case, they extract data from the strategies and propose a framework for loss spread in developing and emerging economies. The parameter set can straightforwardly be included in a simulation and decision model for policy formulation and evaluation, taking multiple stakeholders into account.

Jonkman, S. N., and J. K. Vrijling. 2008. Loss of life due to floods. *Journal of Flood Risk Management: Online Edition.*

This article gives an overview of the research on loss of life due to floods. The limited information regarding this topic is presented and evaluated. Analysis of global data for different flood types shows that the magnitude of mortality is related to the severity of the flood effects and the possibilities for warning and evacuation. Information from historical flood events gives more detailed insight into the factors that determine mortality for an event, such as flood characteristics and the effectiveness of warning and evacuation. At the individual level, the occurrence of fatalities will be influenced by behavior and individual vulnerability factors. Existing methods for the estimation of loss of life that have been developed for different types of floods in different regions are briefly discussed. A new method is presented for the estimation of loss of life due to flooding of low-lying areas' protected flood defenses. It can be used to analyze the consequences and risks of flooding and thereby provide a basis for risk evaluation and decision-making. The results of this research can contribute to the development of strategies to prevent and mitigate the loss of life due to floods.

Lin, Shuyeu, Daigee Shaw, and Ming-Chou Ho. 2008. Why are flood and landslide victims less willing to take mitigation measures than the public? *Natural Hazards* 44(2): 305-314.

Almost annually, natural hazards such as floods and landslides cause a great deal of financial loss and human suffering in Taiwan. To gain a better understanding of disaster preparedness, this paper examines several factors in relation to hazard mitigation behavior: social economic status (education, income), psychological vulnerability (sense of powerlessness and helplessness), risk perception (perceived impact and control), and social trust. The statistical analysis reported here is based on the 2004 National Risk Perception Survey of Floods and Landslides in Taiwan. The main findings include: (1) victims are less willing to adopt risk mitigation measures than the public, even though they perceive larger impacts, worry more about the hazard, and pay more attention to hazard information; (2) trust, risk perception and social economic status are positive predictors for mitigation intentions, whereas psychological vulnerability is a negative predictor; and (3) psychological variables are stronger predictors for mitigation intentions than that of socio-economic variables. In light of these findings, the policy implications and intervention strategy are also discussed.

Lumbroso, Darren, David Ramsbottom, and Mathias Spaliviero. 2008. Sustainable flood risk management strategies to reduce rural communities' vulnerability to flooding in Mozambique. *Journal of Flood Risk Management: Online Edition.*

In 2000, Mozambique was hit by widespread flooding that affected some 4.5 million people and cost approximately 20 percent of the country's Gross Domestic Product. In a large, sparsely populated country such as Mozambique, a structural approach to flood risk management cannot be justified on environmental and economic grounds. As a consequence, flood mitigation measures need to focus on non-structural solutions, such as reducing vulnerability to flooding and improving preparedness. This paper details the development of sustainable flood risk management strategies and the production of educational tools to reduce rural communities' vulnerability to flooding. The tools, which were developed in partnership with local stakeholders, included a Source Book on sustainable flood risk management strategies, a series of posters, a manual and a card game aimed at improving schoolchildren's flood preparedness. These tools were piloted in partnership with three rural communities in the Limpopo River basin in order to develop sustainable flood risk management strategies.

Menoni, Scira, and Giulia Pesaro. 2008. Is relocation a good answer to prevent risk? Criteria to help decision makers choose candidates for relocation in areas exposed to high hydrogeological hazards. *Disaster Prevention and Management* 17(1): 33-53.

The purpose of this paper is to illustrate the results of research mandated by the regional government of Lombardia,

Italy. The results identify the criteria used to decide in what situations the relocation from areas subject to high levels of hydrogeological hazards is a viable preventive strategy. In the first part, the state-of-the-art regarding voluntary relocation from hazardous areas supported by governmental funding and incentives has been described, showing that very few examples are available for reference. Therefore, lessons learned from involuntary relocation have been considered especially regarding specific strategies that must be designed to address societal needs. In the second part of the article, the criteria developed to help decision makers decide when and if relocation may be considered a preventive option are described in detail. Finally, it shows what results have been obtained by applying the criteria to the case of the Lombardia region. Four sets of criteria were proposed, shaped according to different geographical scales and to different demands, recognizing that relocation is a rather extreme solution that must be carefully evaluated and proposed to interested parties and citizens. Those criteria have been applied to assess some specific cases in the Lombardia region and to identify potential candidates for relocation in the whole region by querying a complex database that was prepared by integrating layers representing hydrogeological hazards on one side, and exposed settlements on the other. Until now, most of the laws to prevent risks have imposed limitations to building and development in hazardous areas, while rarely focusing on existing settlements. The experience described in this article concerns a region that has decided to design a specific law to promote preventive relocation in the most critical situations, where structural measures have failed a number of times, and losses are frequent and large. The criteria proposed in this paper provide a method and a tool for deciding in what cases and circumstances relocation can be considered a viable preventive option to lessen the risk in particularly critical zones that are exposed to high hydrogeological hazards. In doing so, it shows that relocation can be considered not as an "emergency" and episodic measure, but rather as a part of a more comprehensive policy in which candidates for relocation can be determined on a regional scale respecting basic social, political and economic conditions.

Osti, Rabindra, Shigenobu Tanaka, and Toshikazu Tokioda.

2008. Flood hazard mapping in developing countries: Problems and prospects. *Disaster Prevention and Management* 17(1)1: 104-113.

This paper aims to describe the major causes of massive destruction due to floods in developing countries, elaborating the usefulness of flood hazard maps under the framework of community-based flood management. It shows the usefulness of flood hazard maps and their application. Flood risk management cannot be treated in isolation, but rather should be a part of community development. In this context, it is essential to build a community's capacity to understand its

vulnerabilities, strategies, activities and the role it could play in managing flood risks without relying on external entities. Therefore the proposed community-based flood hazard-mapping technique can be a good solution for addressing current issues. The approach not only will focus on the effective development and application of FHM, it also will correct the defects of the top-down approach in disaster planning and encourage all stakeholders' participation in an integrated and sustainable manner. Based on the findings, it is strongly recommended agencies adhere and incorporate the idea while developing programs and projects for communities. In addition, it is simple to understand and easy to implement by the community. It is hoped that the idea will be beneficial and a catalyst to promote a community's response for flood disaster management in developing countries, thereby helping agencies to develop an operational strategy in advance.

Sauvagnargues-Lesage, Sophie, and Pierre-Alain Ayral. 2007.

Using GIS for emergency management: A case study during the 2002 and 2003 flooding in south-east France. *International Journal of Emergency Management* 4(4): 682-703.

Emergency management has always required tools to get geographic information from the affected area. The objectives are to have a general view of the theater of operations with its geographic characteristics, troops' location, roads and railways, and fighting location. The emergency management of natural hazards is specific because it is necessary to evaluate the appropriate number of emergency units for the dimension and probable evolution of the situation; it is necessary to know how to transport emergency units, to anticipate the outcome of the situation and to give the best missions to the units. Geographic aspects are essential because every minute is important when rescuing people. This paper aims to outline the position of Geographic Information Systems (GIS) for emergency management of natural hazards, and especially during the 2002 and 2003 south-east flooding in France.

Gender and Vulnerable Populations

Babugura, Agnes A. 2008. Vulnerability of children and youth in drought disasters: A case study of Botswana. *Children, Youth and Environments* 18(1): 126-157.

Throughout southern Africa, millions of people, especially children and youth, are affected by drought. Though young people are usually the most affected, they are rarely given the opportunity to voice their concerns and experiences with drought disasters. This study explores the vulnerabilities of children and youth during drought in Botswana, which is highly susceptible to drought disasters. Using face-to-face interviews and participatory rural appraisal (picture drawing and story telling) the researcher collected data from adult caregivers and 30 young people (ages 10-18). The study

demonstrates that the needs of children and youth during drought go well beyond physical survival. Children also experience emotional distress during times of disaster, which emerges from fears of being separated from family, the loss of educational opportunities, mounting tensions and pressures within the household, a lack of emotional support at the family level, and increased workloads. Gender, age, family structure, and roles within the household all affect children's vulnerability and the ways that they cope with drought disaster as well as other stresses related to poverty and HIV/AIDS.

Barnett, Jon, Simon Lambert, and Ian Fry. 2008. The hazards of indicators: Insights from the Environmental Vulnerability Index. *Annals of the Association of American Geographers* 98(1): 102-119.

Since the early 1990s a number of projects have developed indexes to measure vulnerability to environmental change. This article investigates the key conceptual and methodological problems associated with such indexes. It examines in detail an index that explicitly addresses environmental change as an issue of vulnerability, the Environmental Vulnerability Index (EVI) developed by the South Pacific Applied Geoscience Commission (SOPAC). This examination offers some broader lessons for indicator-based projects, all of which require a simple model of complex and uncertain social-ecological systems and entail difficult choices about the selection, standardization, weighting, and aggregation of indicators selected to represent important aspects of those systems. The authors conclude that indexes of vulnerability to environmental change cannot hope to be meaningful when applied to large-scale systems, and so should focus on smaller scales of analysis. The authors also argue that they should be used as the basis for disbursing funds, comparing countries, or for measuring the performance of countries in environmental management. It is also argued that vulnerability is a context-specific rather than a genetic condition. Finally, it is suggested that because vulnerability is about values at risk, there should be more input from a broader array of people when indexes are being developed and tested.

Barrett, Edith J., Carrie Y. Barron Ausbrooks, and Maria Martinez-Cosio. 2008. The school as a source of support for Katrina-evacuated youth. *Children, Youth and Environments* 18(1): 202-236.

When Hurricane Katrina hit, families were disrupted, and many children were left without the steady support of parents or immediate household relatives. This article describes a component of a comprehensive study of the structural, cultural and social conditions that allow youth to adjust to life after a catastrophic event. The purpose of this component of the research is to examine the success of adolescents in coping with the strains of post-Katrina relocation and to discover the sources of support on which they relied to facilitate the

transition. In May 2006, 73 middle and high school students who had been evacuated to the Dallas-Fort Worth metropolitan area completed a survey asking about their emotional and physical well-being, as well as their new support networks. A comparison sample of non-Katrina students completed a similar survey. The findings indicate that many youth turned to school personnel and other significant adults to help them cope with this catastrophic event. Although the evacuated youth did not differ in many ways from their peers, they exhibited some negative symptoms. More importantly, those youths who built a positive relationship with their new school, and those who had garnered positive support from an adult, especially with their teachers, were managing better than those without a positive resource. The article concludes with implications for school-based policies to help distressed children.

Bartlett, Sheridan. 2008. The implications of climate change for children in lower-income countries. *Children, Youth and Environments* 18(1): 71-98.

This article provides a brief overview of the implications for children of climate change both of extreme weather events and more gradual changes, along with the adaptations likely to be made at various levels. Because data on the impacts of climate change tend not to be disaggregated by sub-population or by age, there is insufficient knowledge to present a comprehensive picture of the impacts for this age group. Instead, this paper extrapolates from existing knowledge in a number of related areas to present a picture of the probable implications for children's health, safety, and long-term well being, especially in lower-income countries and communities that are at highest risk from climate change. The article stresses not only children's vulnerability, but also their resilience and capacity as active agents to play a role in addressing challenges related to climate change they confront.

Bartlett, Sheridan. 2008. After the tsunami in Cooks Nagar: The challenges of participatory rebuilding. *Children, Youth and Environments* 18(1): 470-484.

In the context of post-disaster reconstruction, there is growing awareness of the need for more integrated inclusive processes that allow people to resume control of their lives and that ensure practical responses to local conditions. Yet, a range of pressures and challenges conspire to make these approaches appear unworkable. "Participation" in this context, if it happens at all, is often cursory and superficial, whether it involves children or adults. This paper describes an attempt to respond to these challenges in one small community in Tamil Nadu, India after the 2004 Indian Ocean tsunami. The scope for real involvement on the part of children and their families was limited by a number of factors, but in the end they were able to exercise some genuine control over the reconstruction of their homes and neighborhood. The paper

discusses the replicability of this case, and argues for the importance of a process that includes children and adults together.

Cutter, Susan L., and Christina Finch. 2008. Temporal and spatial changes in social vulnerability to natural hazards. *Proceedings of the National Academy of Sciences* 105(7): 2301-2306.

During the past four decades (1960-2000), the United States experienced major transformations in population size, development patterns, economic conditions, and social characteristics. These social, economic, and built-environment changes altered the American hazardscape in profound ways, with more people living in high-hazard areas than ever before. To improve emergency management, it is important to recognize the variability in the vulnerable populations exposed to hazards and to develop place-based emergency plans accordingly. The concept of social vulnerability identifies sensitive populations that may be less likely to respond to, cope with, and recover from, a natural disaster. Social vulnerability is complex and dynamic, changing over space and through time. This paper presents empirical evidence on the spatial and temporal patterns in social vulnerability in the United States from 1960 to the present. Using counties as our study unit, the authors found that those components that consistently increased social vulnerability for all time periods were density (urban), race/ethnicity, and socioeconomic status. The spatial patterning of social vulnerability, although initially concentrated in certain geographic regions, has become more dispersed over time. The national trend shows a steady reduction in social vulnerability, but there is considerable regional variability, with many counties increasing in social vulnerability during the past five decades.

Dolch, Norman A., Daniel L. Meyer, and Angel V. Huval. 2008. Hurricane disaster response by school-based health centers. *Children, Youth and Environments* 18(1): 422-434.

In the summer of 2005, Hurricane Katrina displaced residents from the city of New Orleans and the eastern coastal area of Louisiana, and a month later, Hurricane Rita displaced many residents from the western coastal areas of Louisiana. The middle coastal area of Louisiana served as refuge for many evacuees, and a unique story documenting the health care provided to children emerged from the School-Based Health Center (SBHC) of St. Martin Parish. Quarterly reports filed by the program with the Louisiana Office of Public Health for the 2004-2005 and 2005-2006 school years document an increase in visits and the cost of care provided. Qualitative data document the clinics' experiences responding to the evacuee children and their families. Among the lessons learned was that the presence of a SBHC facilitated the evacuees' transitions and was an integral part of the community response to displaced students and their families.

Ensor, Marisa O. 2008. Displaced once again: Honduran migrant children in the path of Katrina. *Children, Youth and Environments* 18(1): 280-302.

This paper explores the experiences of Honduran migrant children in New Orleans in the aftermath of Hurricane Katrina. Some had migrated to this city after Hurricane Mitch devastated their already poverty-stricken country in 1998, but many of them were forced to relocate again after Katrina. Many others have only recently arrived in New Orleans to join relatives attracted by the construction boom that followed the disaster. Based on ethnographic fieldwork in Honduras and New Orleans, this article examines the contribution of these young migrants to their families' survival strategies, including their participation in post-disaster reconstruction work. Findings counter dominant frameworks that pathologize the experience of disaster survivors, assuming their responses to be maladaptive, and conceptualize children as passive, dependent victims. Instead, it is argued for a holistic approach that puts displaced youth in the broader context of the cultural and socioeconomic factors that prefigured the catastrophe and examines children's resilience, not just their vulnerability.

Lack, Caleb W., and Maureen A. Sullivan. 2008. Attributions, coping, and exposure as predictors of long-term posttraumatic distress in tornado-exposed children. *Journal of Loss and Trauma* 13(1): 72-84.

Previous research has implicated a number of factors in why a child might or might not develop a negative reaction to a traumatic situation. The current study was designed to examine multiple factors and their effect on the long-term distress in children 8 to 12 years old who were exposed to a devastating tornado. The factors of initial exposure to the tornado, attributions about the tornado, and coping style were examined using multiple regression analyses, the number and types of attributions a child makes were found to explain the most amount of variance in long-term distress.

Lauten, Anne Westbrook, and Kimberly Lietz. 2008. A look at the standards gap: Comparing child protection responses in the aftermath of Hurricane Katrina and the Indian Ocean tsunami. *Children, Youth and Environments* 18(1): 158-201. Through work with disaster-affected children throughout the world, the humanitarian community has incorporated child protection as an essential element of a country's first response to crisis. Three principles have emerged. First, responders must be guided by a commitment to both assistance and protection of children. Second, child protection efforts should reflect the principle of family unity. Finally, response and reconstruction must be guided by the continuity principle. This principle focuses on the importance of maintaining the child's existing individual, familial, organizational and com-

munal strengths and resources. Based on the authors' field work in Aceh and Louisiana, this article critically examines the child protection responses post-Indian Ocean Tsunami and post-Hurricane Katrina. The complete lack of attention to child protection concerns post-Katrina contrasts sharply with the nearly textbook child protection response to the tsunami. The evaluation of this contrast reveals the many lessons that developed countries could learn from their counterparts in the developing world.

Leiby, Sandra L. 2008. Caring for the caregivers and patients left behind: Experiences of a volunteer nurse during Hurricane Katrina. *Critical Care Nursing Clinics of North America* 20(1): 83-90.

As a volunteer nurse deployed to New Orleans after Hurricane Katrina, the author observed the need for honest and informative leadership, volunteer flexibility, an "I'll-do anything" mind-set, and more advanced disaster training. This article describes the author's experiences and highlights how she learned those lessons. She advocates learning from the experiences of responders to recent national and international relief efforts to ensure the organizational and personal preparedness needed to deal with the complex ethical, moral, legal, and medical issues during a disaster.

Lombreglia, Melissa. 2008. The calm after the storm: Using mediation to resolve parenting disputes in the wake of natural disasters. *Family Court Review* 46(2): 395-408.

Hurricane Katrina not only tore apart communities along the Gulf Coast, it displaced hundreds of thousands of families throughout the country. Included in the massive numbers of displaced families were children from divorced, separated, or unmarried parents. As a result, many children have since relocated far away from one of their parents without court permission, causing an influx of parenting disputes among the unmarried parents. Litigation concerning parenting disputes that follow natural disasters is not only expensive, but emotionally taxing on both parents and children. It also floods the already over-extended court system. This note discusses alternative ways in which parenting disputes can be resolved following natural disasters. It explains how children are affected by relocating away from one of their parents and how those effects are compounded by natural disasters. Further, it explains how alternative dispute resolution methods help alleviate the effects of parenting disputes, specifically relocation disputes, on children. Finally, this note proposes all parents should be mandated to mediate any parenting disputes following natural disasters.

Manyena, Siambabala Bernard, Maureen Fordham, and Andrew Collins. 2008. Disaster resilience and children: Managing food security in Zimbabwe's Binga district. *Children, Youth and Environments* 18(1): 303-331.

The growing recognition of the vulnerability of children to disasters has added a new impetus to the concept of their involvement in disaster risk reduction programs. Involving children in disaster risk reduction is among those aspects promoted to enhance the resilience of disaster-affected communities in the Hyogo Framework for Action 2005-2015. This article presents the results from a research study that investigated the involvement of children in disaster risk reduction programs focusing on food security in Binga District, Zimbabwe. The results suggest that children are an invaluable part of human agency in disaster contexts, especially in view of increasing numbers of children orphaned by HIV and AIDS. Yet their involvement is still contested. Unless family and cultural pressures imposed on children are recognized and managed in disaster risk programming, the potential of children's involvement is likely to be missed in building disaster-resilient communities.

McLaughlin, Paul, and Thomas Dietz. 2008. Structure, agency and environment: Toward an integrated perspective on vulnerability. *Global Environmental Change* 18(1): 99-111.

This article reviews five perspectives on human vulnerability to environmental change: biophysical, human ecological, political economy, constructivist and political ecology and assess their respective strengths and weaknesses. While each of these perspectives offers important insights, and some theoretical convergence is evident, the field remains divided along a number theoretical fracture lines. Two deeply rooted metatheoretical assumptions, essentialism and nominalism, are hindering the construction of a more integrated perspective on vulnerability, one capable of addressing the inter-related dynamics of social structure, human agency and the environment. It concludes by suggesting that an evolutionary perspective on social change, grounded in a critical realist epistemology, provides the best prospect for avoiding the above pitfalls and advancing our understanding of vulnerability.

Mitchell, Tom, Katharine Haynes, Nick Hall, Wei Choong, and Katie Oveb. 2008. The roles of children and youth in communicating disaster risk. *Children, Youth and Environments* 18(1): 254-279.

Disaster management is dominated by top-down relief efforts that assume children and youth are passive victims with no role in communicating risks or preventing and responding to disasters. This article challenges these assumptions and critically assesses prevailing theoretical models of risk communication using two case studies that highlight the unique needs and potential roles of children and youth as resources or receivers of disaster management information. These studies in El Salvador and New Orleans used various participatory and qualitative techniques with young people, parents and policy makers. The findings suggest that the roles of chil-

dren and youth as potential informants within informal and formal risk communication networks have been significantly underestimated, but their positive role in disaster risk reduction must also be seen in light of its possible burdens.

Morris, Kerry-Ann N., and Michelle T. Edwards. 2008. Disaster risk reduction and vulnerable populations in Jamaica: Protecting children within the comprehensive disaster management framework. *Children, Youth and Environments* 18(1): 389-407.

The Office of Disaster Preparedness and Emergency Management (ODPEM), the disaster management headquarters of the Government of Jamaica, understands that the best approach to take in effectively protecting children during emergency situations is to create a culture of risk reduction in which all involved are aware of local hazards and are actively involved in reducing the resulting risks. This includes the promotion of disaster risk education in schools while integrating children's needs into the Comprehensive Disaster Management framework. This field report describes the efforts of the ODPEM in protecting Jamaican children in emergency situations. This was and continues to be achieved through two main approaches: building a culture of prevention in and through schools and integrating children's rights into disaster management and response.

Peek, Lori. 2008. Children and disasters: Understanding vulnerability, developing capacities, and promoting resilience: An introduction. *Children, Youth and Environments* 18(1): 1-29.

This comprehensive overview of the literature on children and disasters argues that scholars and practitioners should consider more carefully the experiences of children themselves. As the frequency and intensity of disaster events increase around the globe, children are among those most at risk for the negative effects of disaster. Children are psychologically vulnerable and may develop post-traumatic stress disorder or related symptoms; are physically vulnerable to death, injury, illness, and abuse; and often experience disruptions or delays in their educational progress as a result of disasters. Children have special needs and may require different forms of physical, social, mental, and emotional support than adults. However, children also have the capacity to contribute to disaster preparedness, response, and recovery activities. In order to promote children's resilience to disasters, we must improve their access to resources, empower them by encouraging their participation, offer support, and ensure equitable treatment.

Peek, Lori, Jeannette Sutton, and Judy Gamp. 2008. Caring for children in the aftermath of disaster: The Church of the Brethren Children's Disaster Services Program. *Children, Youth and Environments* 18(1): 408-421.

This article extends the discussion of social support for child disaster survivors by providing a case study overview of the primary organization in the United States responsible for caring for young children in the aftermath of natural and human-made disasters—Children's Disaster Services (CDS), which is part of the Brethren Disaster Ministries of the Church of the Brethren General Board. It offers an overview of the history and purpose of the CDS program, describes the training and mobilization process for volunteers, and explains the services that are provided at CDS child care centers. Throughout, the article focuses on the things that CDS does to help children cope and begin the process of recovery following traumatic events, including designing and maintaining a suitable space for child care activities, participating in play-oriented activities that facilitate a sense of safety and trust, and listening to the stories of children as they process their emotional responses. By offering child-centered care, emotional support, and a sense of normalcy, the CDS program helps meet the immediate needs of children, assists family members who may be overwhelmed as they attempt to deal with the effects of disaster, and plays an important role in fostering resiliency among children.

Rhoads, Jacqueline, Timothy Pearman, and Susan Rick. 2008. PTSD: Therapeutic interventions post-Katrina. *Critical Care Nursing Clinics of North America* 20(1): 73-81.

August 29, 2006, brought the largest, most deadly hurricane ever to strike the Gulf Coast. According to reports, the storm killed more than 2000 people and destroyed billions of dollars of property, with winds clocked at 160 to 175 mph. More than a million residents were displaced, many requiring care for chronic conditions who suddenly also needed care for acute stress symptoms. Today, many individuals still struggle to cope with major psychiatric posttraumatic stress disorders (PTSD). Using a case study approach, this article discusses PTSD, including what it is, how it is manifested, how to diagnose it, patient education, and how it can be managed with therapeutic interventions. Special circumstances related to children are briefly presented.

Ronan, Kevin R., Kylie Crellin, David M. Johnston, Kirsten Finnis, Douglas Paton, and Julia Becker. 2008. Promoting child and family resilience to disasters: Effects, interventions, and prevention effectiveness. *Children, Youth and Environments* 18(1): 332-353.

This paper combines the findings of research aimed at assisting children, youth, and families to more effectively cope with the effects of disasters with a review of the relevant literature. The authors briefly review the effects of disasters on children, summarizing theory and research on risk and protective factors, interventions following a hazardous event, and promoting children's resilience. They also look at the role of preventive interventions in assisting children and their

families to prepare both physically and psychologically for disasters. Finally, they summarize findings from evaluation of school-level hazards education programs in New Zealand. Based on promising research to date, the authors highlight factors that may underpin hazard intervention effectiveness.

Sakakibara, H., H. Murakami, S. Esaki, D. Mori, and H. Nakata. 2008. Modeling households' decisions on reconstruction of houses damaged by earthquakes: Japanese case study. *Natural Hazards* 44(2): 293-303.

In this study, households' decisions on reconstruction of damaged houses were modeled using questionnaire data in Japan. Characteristics of households' decisions were investigated using parameter estimation results. The effects of subsidizing policy were evaluated as follows: first, subsidy for rebuilding may be effective for the households where houses were heavily damaged; second, there is a possibility that subsidy accelerated rebuilding of houses by the households with children; third, subsidy for rebuilding may not be effective for elderly people's households and households in depopulated areas.

Shears, Andrew B., and Robert M. Schwartz. 2008. Tornadoes and mobile homes: The geographic data of a stereotype. *Journal of Emergency Management* 6(1): 11-22.

A stereotype that many in the United States share is the idea of a strong spatial relationship between mobile homes and tornado activity. Although the origins of this stereotype are unknown, many possibilities may exist, including a bias in media coverage or the fact mobile homes are susceptible to weaker tornadoes, which occur more frequently. Residents of mobile homes are usually less affluent than those of frame-built homes and have fewer resources to cope with the destruction of their homes. Despite the knowledge these homes are more susceptible and the heightened socioeconomic risk, the residents of these homes face little in terms of spatial coincidence between mobile homes and tornadoes has been studied. Tornado occurrences in the southeastern United States between 1970 and 2000 were spatially compared with the locations of mobile homes in 2000 to determine if mobile homes were located in areas climatologically prone to tornado activity.

Wachtendorf, Tricia, Bethany Brown, and Marcia C. Nickle. 2008. Big Bird, disaster masters, and high school students taking charge: The social capacities of children in disaster education. *Children, Youth and Environments* 18(1): 456-469. Disasters affect segments of the population in different ways. Although age-based vulnerabilities place children at risk, children may offer unique capacities for bolstering disaster resilience. This paper reviews three initiatives that focus on children and disasters, including a Sesame Workshop-produced video aimed at pre-school children, an American Red Cross initiative that focuses on children in kindergarten

through middle school, and a video directed at high school students as part of a student-generated initiative at a Seattle school. The authors use a matrix developed by Anderson and Woodrow (1989) to assess the extent to which these initiatives emphasize youth-based vulnerabilities and capacities with respect to physical/material, social/organizational, and motivational/attitudinal factors. The field report ends with a call for more systematic research to explore the effectiveness of disaster education initiatives that seek to educate youth.

Weissbecker, Inka, Sandra E. Sephton, Meagan B. Martin, and David M. Simpson. 2008. Psychological and physiological correlates of stress in children exposed to disaster: Current research and recommendations for intervention. *Children, Youth and Environments* 18(1): 30-70.

Disasters have increased in incidence worldwide and children are especially vulnerable to their effects. Childhood is a unique period during which physical, mental and social development and growth take place. Psychological damage at this stage can affect children for years to come. To outline the psychological and physiological impacts of disaster on children and shed light on possible interventions, the authors reviewed the empirical literature utilizing search databases such as PsychInfo as well as policy documents and guidelines from major organizations (e.g., the United Nations). This article discusses potential biological mechanisms between stress, physiological dysregulation and subsequent illness in children. In addition, it discusses risk and protective factors and their possible role in buffering children against mental, physiological and health consequences of disasters, and outlines international and cross-cultural perspectives, as well as implications for further research.

Wilson, Samantha L., and Kershaw Mary Ann. 2008. Caring for young children after a hurricane: Florida's childcare workers reflect on support and training needs. *Children, Youth and Environments* 18(1): 237-253.

Although there is increasing awareness of the need for disaster preparedness within elementary and high schools, daycare centers and preschools have largely been overlooked in preparation and recovery plans. The purpose of this project was to identify the presence and use of formal disaster plans for childcare agencies, assess the projected emotional response of childcare personnel to children following a disaster, evaluate the amount of in-service training received in the area of disaster preparedness and emotional recovery, and elicit recommendations from childcare personnel regarding ways to increase awareness of children's emotional needs following a disaster. Sixty-seven surveys were received from center-based childcare personnel in 14 Florida counties. Responses indicated a need and desire for greater support around disaster preparedness, as well as increased avail-

ability for training regarding the emotional needs of children following disasters.

Zahran, Sammy, Lori Peek, and Samuel D. Brody. 2008.

Youth mortality by forces of nature. *Children, Youth and Environments* 18(1): 371-388.

This research note examines children's mortality resulting from forces of nature, including heat exposure, cold exposure, storms and flooding, lightning strikes, avalanches, earthquakes, and volcanic eruptions. Data indicate, in the United States, children's risk of death resulting from natural disasters is relatively low. However, differential risks exist depending on the type of hazard agent involved, as well as between youth populations based on age, gender, and race. Specifically, analyses of mortality data show that risk of death by natural disaster among youth cohorts age 0-24 is highest for infants, the most fragile and dependent segment of our population. The death rate for male children is higher than the death rate for female children across all age cohorts. Data on race indicate that African American male children between the ages of 0-4 are most at risk for death by disaster, while white male children between the ages of 5-24 are most(least?) at risk. In terms of risk by age and hazard type, infants and very young children age 0-4 are most likely to die of exposure to extreme heat, 5-14 year-olds are most likely to die in cataclysmic storms and flood events, and youth age 15-24 are most likely to die of excessive cold. These findings have important implications for future research and policy decisions associated with protecting children and youth in disasters.

Homeland Security and Terrorism

Anderson, Christopher W., Kash Barker, and Yacov Y. Haimes. 2008. Assessing and prioritizing critical assets for the United States Army with a modified RFRM methodology. *Journal of Homeland Security and Emergency Management* 5(1): Online publication.

This paper provides a methodology to filter and prioritize critical assets of a large and complex organization—the United States Army (the Army). The Army provides an excellent test bed in which to develop such a risk strategy because it relies heavily on both public and private assets to meet a wide variety of missions throughout the world. The Army has developed its own regulation for asset risk management, Army Regulation (AR) 525-26 [Department of the Army (DoA) 2004], in response to Department of Defense directives. Combining the high-level guidance of AR 525-26 with both qualitative and quantitative tools, the modified Risk Filtering, Ranking, and Management (RFRM) methodology provides prioritized assets to decision makers for risk management.

Baldwin, Thomas E., Arkalgud Ramaprasad, and Michael E. Samsa. 2008. Understanding public confidence in govern-

ment to prevent terrorist attacks. *Journal of Homeland Security and Emergency Management* 5(1): Online publication.

A primary goal of terrorism is to instill a sense of fear and vulnerability in a population and to erode confidence in government and law enforcement agencies to protect citizens against future attacks. In recognition, the Department of Homeland Security includes public confidence as one of the principal metrics used to assess the consequences of terrorist attacks. Hence, a detailed understanding of the variations in public confidence among individuals, terrorist event types, and as a function of time is critical to developing this metric. In this exploratory study, a questionnaire was designed, tested, and administered to small groups of individuals to measure public confidence in the ability of federal, state, and local governments and their public safety agencies to prevent acts of terrorism. Data was collected from three groups before and after they watched mock television news broadcasts portraying a smallpox attack, a series of suicide bomber attacks, a refinery explosion attack, and cyber intrusions on financial institutions, resulting in identity theft. Findings are: (a) although the aggregate confidence level is low, there are optimists and pessimists; (b) the subjects are discriminating in interpreting the nature of a terrorist attack, the time horizon, and its impact; (c) confidence recovery after a terrorist event has an incubation period; and (d) the patterns of recovery of confidence of the optimists and the pessimists are different. These findings can affect the strategy and policies to manage public confidence after a terrorist event.

Briggs, Lisa T., and Karen A. Mason. 2008. First-responder preparedness in western North Carolina: A preliminary analysis. *Journal of Emergency Management* 6(1): 37-42.

The need for well-prepared emergency response agencies has become more evident since the natural disaster of Hurricane Katrina and the terrorist attacks of Sept. 11, 2001. While political and public attention has focused on the needs of urban areas, the state of preparedness among rural first-responder agencies has not been sufficiently addressed. Rural areas are home to nearly 59 million U.S. citizens and are the sites of critical infrastructure and military facilities. An assessment of emergency-related resources in rural areas is necessary not only to protect these assets but also to support disasters in neighboring urban areas. To better understand the level of preparedness in rural western North Carolina (WNC), this survey measures perceptions of emergency preparedness for natural disasters and terrorist attacks among representatives from first-responder agencies in 18 counties.

Couch, Stephen R., Barb Wade, and Jeffrey D. Kindler. 2008. Victims' groups following the 9/11 terrorist attacks. *Sociology Inquiry* 78(2): 248-257.

Finley, Patrick, James Ramsey, Brad Melton, and Sean A.

McKenna. 2007. Using GIS technology to manage information following a bioterrorism attack. *Journal of Map and Geography Libraries* 4(1): 207-220.

The BROOM system was developed to collect, manage and analyze information from bioterrorist attacks on strategic buildings. GIS features help decision makers and analysts rapidly assess the current status of contaminated facilities and develop optimized cleanup strategies. BROOM consists of networked server, desktop and PDA components. PDAs are deployed to collect samples of suspected bioagents, such as anthrax. Novel geostatistical methods are used to generate contaminant maps and define optimum locations for subsequent sampling. Efficiency and accuracy gains witnessed in field tests show that GIS technology can play a vital role in visualizing, managing and analyzing data from bioterrorism incidents.

Gurpinar, Aybars. 2008. IAEA activities related to on-site management and off-site emergency preparedness involving external events including those of malevolent origin. *International Journal of Risk Assessment and Management* 8(1-2): 32-36.

On-site and off-site measures after the occurrence of a nuclear accident are considered the final layers of defense in depth. On-site measures may vary considerably from one event to another depending on the severity of the accident. Off-site emergency response measures also may vary and, depending on the emergency situation, they may involve administering of iodine tablets, sheltering and various degrees of evacuation. Responsibility for on-site accident management lies with the nuclear power plant, where the off-site emergency response needs to be a coordinated effort involving local and sometimes national authorities, including the regulatory body. These measures are well known and drills take place regularly at nuclear power plants to train the people and organizations involved for good coordination. This paper deals with situations when the accident and the emergency situation are a result of an external event (including the possibility that this event is of malevolent origin).

Persell, Deborah J., and Susan Speraw. 2008. Toward a theory of homeland security nursing. *Journal of Homeland Security and Emergency Management* 5(1): Online publication.

The University of Tennessee, Knoxville has established a masters and PhD in nursing with a concentration in homeland security to meet the need of advanced nursing expertise to provide nursing care in mass casualty incidents related to natural disasters, accidental exposure to toxic agents, war and terrorism or other threats to the homeland. Homeland security nurses will prepare and execute comprehensive plans for major public health emergencies. Using Neuman's Systems Model, the nursing process and goals of the Department of

Homeland Security are compared and contrasted to form the theoretical and practice base for homeland security nursing. An application of homeland security nursing using Neuman's Systems Model is provided.

Rabinowitz, Peter, James Wiley, Lynda Odofin, Matthew Wilcox, and Joshua Dein. 2008. Animals as sentinels of chemical terrorism agents: An evidence-based review. *Clinical Toxicology* 46(2): 93-100.

The goal of this systematic review was to identify evidence that animals could serve as sentinels of an attack with a chemical terrorism agent. The biomedical literature was systematically searched for evidence that wild or domestic animals exposed to certain chemical weapons of terrorism had either greater susceptibility, shorter latency period, or increased exposure risk versus humans. Additionally, the authors searched for documented reports of such animals historically serving as sentinels for chemical warfare agents. For a small number of agents, there was limited evidence that domestic and/or wild animals could provide sentinel information to humans following an airborne attack with chemical agents, usually related to increased potential for environmental exposure. Some of this evidence was based on anecdotal case reports, and in many cases high quality chemical terrorism agent evidence regarding comparative susceptibility, exposure, and latency between humans and sentinel animal species was not found. Currently, there is insufficient evidence for routine use of animals as sentinels for airborne chemical warfare agents. At the same time, Poison Center surveillance systems should include animal calls, and greater communication between veterinarians and physicians could help with preparedness for a chemical terrorism attack. Further analysis of comparative chemical warfare agent toxicity between sentinel animal species and humans is needed.

Hurricanes and Coastal Hazards

Barrett, Edith J., Carrie Y. Barron Ausbrooks, and Maria Martinez-Cosio. 2008. The school as a source of support for Katrina-evacuated youth. *Children, Youth and Environments* 18(1): 202-236.

When Hurricane Katrina hit, families were disrupted, and many children were left without the steady support of parents or immediate household relatives. This article describes a component of a comprehensive study of the structural, cultural and social conditions that allow youth to adjust to life after a catastrophic event. The purpose of this component of the research is to examine the success of adolescents in coping with the strains of post-Katrina relocation and to discover the sources of support on which they relied to facilitate the transition. In May 2006, 73 middle and high school students who had been evacuated to the Dallas-Fort Worth metropolitan area completed a survey asking about their emotional and

physical well-being, as well as their new support networks. A comparison sample of non-Katrina students completed a similar survey. The findings indicate that many youth turned to school personnel and other significant adults to help them cope with this catastrophic event. Although the evacuated youth did not differ in many ways from their peers, they exhibited some negative symptoms. More importantly, those youths who built a positive relationship with their new school, and those who had garnered positive support from an adult, especially with their teachers, were managing better than those without a positive resource. The article concludes with implications for school-based policies to help distressed children.

Dolch, Norman A., Daniel L. Meyer, and Angel V. Huval. 2008. Hurricane disaster response by school-based health centers. *Children, Youth and Environments* 18(1): 422-434.

In the summer of 2005, Hurricane Katrina displaced residents from the city of New Orleans and the eastern coastal area of Louisiana, and a month later, Hurricane Rita displaced many residents from the western coastal areas of Louisiana. The middle coastal area of Louisiana served as refuge for many evacuees, and a unique story documenting the health care provided to children emerged from the School-Based Health Center (SBHC) of St. Martin Parish. Quarterly reports filed by the program with the Louisiana Office of Public Health for the 2004-2005 and 2005-2006 school years document an increase in visits and the cost of care provided. Qualitative data document the clinics' experiences responding to the evacuee children and their families. Among the lessons learned was that the presence of a SBHC facilitated the evacuees' transitions and was an integral part of the community response to displaced students and their families.

Ensor, Marisa O. 2008. Displaced once again: Honduran migrant children in the path of Katrina. *Children, Youth and Environments* 18(1): 280-302.

This paper explores the experiences of Honduran migrant children in New Orleans in the aftermath of Hurricane Katrina. Some had migrated to this city after Hurricane Mitch devastated their already poverty-stricken country in 1998, but many of them were forced to relocate again after Katrina. Many others have only recently arrived in New Orleans to join relatives attracted by the construction boom that followed the disaster. Based on ethnographic fieldwork in Honduras and New Orleans, this article examines the contribution of these young migrants to their families' survival strategies, including their participation in post-disaster reconstruction work. Findings counter dominant frameworks that pathologize the experience of disaster survivors, assuming their responses to be maladaptive, and conceptualize children as passive, dependent victims. Instead, it is argued for a holistic approach that puts displaced youth in the

broader context of the cultural and socioeconomic factors that prefigured the catastrophe and examines children's resilience, not just their vulnerability.

Lauten, Anne Westbrook, and Kimberly Lietz. 2008. A look at the standards gap: Comparing child protection responses in the aftermath of Hurricane Katrina and the Indian Ocean tsunami. *Children, Youth and Environments* 18(1): 158-201. Through work with disaster-affected children throughout the world, the humanitarian community has incorporated child protection as an essential element of a country's first response to crisis. Three principles have emerged. First, responders must be guided by a commitment to both assistance and protection of children. Second, child protection efforts should reflect the principle of family unity. Finally, response and reconstruction must be guided by the continuity principle. This principle focuses on the importance of maintaining the child's existing individual, familial, organizational and communal strengths and resources. Based on the authors' field work in Aceh and Louisiana, this article critically examines the child protection responses post-Indian Ocean Tsunami and post-Hurricane Katrina. The complete lack of attention to child protection concerns post-Katrina contrasts sharply with the nearly textbook child protection response to the tsunami. The evaluation of this contrast reveals the many lessons that developed countries could learn from their counterparts in the developing world.

Leiby, Sandra L. 2008. Caring for the caregivers and patients left behind: Experiences of a volunteer nurse during Hurricane Katrina. *Critical Care Nursing Clinics of North America* 20(1): 83-90.

As a volunteer nurse deployed to New Orleans after Hurricane Katrina, the author observed the need for honest and informative leadership, volunteer flexibility, an "I'll-do-anything" mind-set, and more advanced disaster training. This article describes the author's experiences and highlights how she learned those lessons. She advocates learning from the experiences of responders to recent national and international relief efforts to ensure the organizational and personal preparedness needed to deal with the complex ethical, moral, legal, and medical issues during a disaster.

Lombreglia, Melissa. 2008. The calm after the storm: Using mediation to resolve parenting disputes in the wake of natural disasters. *Family Court Review* 46(2): 395-408.

Hurricane Katrina not only tore apart communities along the Gulf Coast, it displaced hundreds of thousands of families throughout the country. Included in the massive numbers of displaced families were children from divorced, separated, or unmarried parents. As a result, many children have since relocated far away from one of their parents without court permission, causing an influx of parenting disputes among

the unmarried parents. Litigation concerning parenting disputes that follow natural disasters is not only expensive, but emotionally taxing on both parents and children. It also floods the already over-extended court system. This note discusses alternative ways in which parenting disputes can be resolved following natural disasters. It explains how children are affected by relocating away from one of their parents and how those effects are compounded by natural disasters. Further, it explains how alternative dispute resolution methods help alleviate the effects of parenting disputes, specifically relocation disputes, on children. Finally, this note proposes all parents should be mandated to mediate any parenting disputes following natural disasters.

Reams, Margaret A., and Philip J. Chandler. 2008. An examination of FEMA's temporary emergency housing program and the criteria used to make site selections in post-Katrina New Orleans. *Journal of Emergency Management* 6(1): 59-69. The authors examine the Federal Emergency Management Agency's (FEMA's) emergency temporary housing program and its implementation in Orleans Parish during the first months after Hurricane Katrina. They identify environmental and demographic factors that may have influenced the selection of sites for temporary trailer parks. The environmental assessments for each of the sites considered for use were obtained directly from FEMA under the Freedom of Information Act. Socioeconomic characteristics of the communities near the proposed sites were gathered from the U.S. Census Bureau. Using cross-tabulations and difference-of-means tests to make comparisons between the sites selected and those not selected, the authors identify several environmental and socioeconomic factors associated with site selection. None of the selected sites were found to be in an area designated as residential, nor were any sites selected that possessed known hazardous wastes, hazardous materials or that contained habitat critical to endangered species. Also, all of the selected developments involved the installation of fewer than 100 trailers. The analysis suggests that the trailer parks tended to be built in zip codes with slightly lower per capita incomes, although this trend was not reflected in property values. The authors found no evidence that the trailer parks were placed in communities with larger percentages of African American residents. All the sites selected for use passed the environmental reviews as required by the National Environmental Policy Act.

Rhoads, Jacqueline, Timothy Pearman, and Susan Rick. 2008. PTSD: Therapeutic interventions post-Katrina. *Critical Care Nursing Clinics of North America* 20(1): 73-81. August 29, 2006, brought the largest, most deadly hurricane ever to strike the Gulf Coast. According to reports, the storm killed more than 2000 people and destroyed billions of dollars of property, with winds clocked at 160 to 175 mph. More

than a million residents were displaced, many requiring care for chronic conditions who suddenly also needed care for acute stress symptoms. Today, many individuals still struggle to cope with major psychiatric posttraumatic stress disorders (PTSD). Using a case study approach, this article discusses PTSD, including what it is, how it is manifested, how to diagnose it, patient education, and how it can be managed with therapeutic interventions. Special circumstances related to children are briefly presented.

Wilson, Samantha L., and Kershaw Mary Ann. 2008. Caring for young children after a hurricane: Florida's childcare workers reflect on support and training needs. *Children, Youth and Environments* 18(1): 237-253.

Although there is increasing awareness of the need for disaster preparedness within elementary and high schools, daycare centers and preschools have largely been overlooked in preparation and recovery plans. The purpose of this project was to identify the presence and use of formal disaster plans for childcare agencies, assess the projected emotional response of childcare personnel to children following a disaster, evaluate the amount of in-service training received in the area of disaster preparedness and emotional recovery, and elicit recommendations from childcare personnel regarding ways to increase awareness of children's emotional needs following a disaster. Sixty-seven surveys were received from center-based childcare personnel in 14 Florida counties. Responses indicated a need and desire for greater support around disaster preparedness, as well as increased availability for training regarding the emotional needs of children following disasters.

Information and Spatial Technology

Bacon, David P. Ahmad Nash'at N. Dunn Thomas J. Monteith Michael C. Sarma Ananthakrishna. 2008. An operational multi-scale system for hazards prediction, mapping, and response. *Natural Hazards* 44(3): 317-327.

By definition, a crisis is a situation that requires assistance to be managed. Hence, response to a crisis involves the merging of local and non-local emergency response personnel. In this situation, it is critical that each participant: (1) know the roles and responsibilities of each of the other participants; (2) know the capabilities of each of the participants; and (3) have a common basis for action. For many types of natural disasters, this entails having a common operational picture of the unfolding events, including detailed information on the weather, both current and forecasted, that may impact on either the emergency itself or on response activities. The Consequences Assessment Tool Set (CATS) is a comprehensive package of hazard prediction models and casualty and damage assessment tools that provides a linkage between a modeled or

observed effect and the attendant consequences for populations, infrastructure, and resources, and, hence, provides the common operational picture for emergency response. The Operational Multi-scale Environment model with Grid Adaptivity (OMEGA) is an atmospheric simulation system that links the latest methods in computational fluid dynamics and high-resolution gridding technologies with numerical weather prediction to provide specific weather analysis and forecast capability that can be merged into the geographic information system framework of CATS. This paper documents the problem of emergency response as an end-to-end system and presents the integrated CATS-OMEGA system as a prototype of such a system that has been used successfully in a number of different situations.

Finley, Patrick, James Ramsey, Brad Melton, and Sean A. McKenna. 2007. Using GIS technology to manage information following a bioterrorism attack. *Journal of Map and Geography Libraries* 4(1): 207-220.

The BROOM system was developed to collect, manage and analyze information from bioterrorist attacks on strategic buildings. GIS features help decision makers and analysts rapidly assess the current status of contaminated facilities and develop optimized cleanup strategies. BROOM consists of networked server, desktop and PDA components. PDAs are deployed to collect samples of suspected bioagents, such as anthrax. Novel geostatistical methods are used to generate contaminant maps and define optimum locations for subsequent sampling. Efficiency and accuracy gains witnessed in field tests show that GIS technology can play a vital role in visualizing, managing and analyzing data from bioterrorism incidents.

Hsu, Chiehwen Ed, Francisco Soto Mas, Ella T. Nkhoma, Jerry Miller, and William C. Chambers. 2008. Capacity building of biodefense informatics for public health preparedness and response in rural regions: EpiInfo, GIS, and data management training. *Journal of Emergency Management* 6(1): 70-76.

Emergency informatics such as data management and geographic information systems applications have become an important training agenda for enhancing health surveillance and risk communication in public health emergencies. The free EpiInfo/Epimap software developed by the CDC, offering domain knowledge such as health information management, may be particularly useful for preparing nonurban jurisdictions that often confront limited resources in dealing with health emergency events. This article describes the delivery of training workshops to enhance the competencies of health workers in biodefense informatics and discusses its implication for delivering education to rural regions. Three EpiInfo/Epimap workshops titled Biodefense Informatics and Health Surveillance Database Management were delivered

to public health practitioners of rural Texas. Each workshop covered three modules: tabletop exercises, EpiInfo, and EpiMap hands-on training. A web-based training modality was developed to supplement classroom sessions. Training manuals and a CD-ROM were distributed to trainees. Pre-tests and post-tests were administered to evaluate the workshop effectiveness, and descriptive statistics of the results were summarized. Forty regional or local health department staff attended the workshops. The pre- and post-testing indicated that participants enhanced competencies and skills in biodefense informatics and data management. Self-reported evaluation indicated that knowledge increased upon completion of the training. The majority (97 percent) of the participants found the workshops relevant and useful, and many noted that the courses enhance their preparedness efforts. These results support the need of continuing biodefense informatics training for nonurban public health practitioners and provide directions for developing training programs in health preparedness informatics.

Jusoff, Kamaruzaman. 2008. Search and rescue (SAR) operations for the missing Bell 206 Long Ranger helicopter in Sarawak, Malaysia using near real-time airborne hyperspectral imaging system. *Disaster Prevention and Management* 17(1): 94-103.

The aim of this paper is to present the latest advances in real-time airborne hyperspectral sensing applications in identifying and mapping the likely spots to be zeroed in for SAR operations. A Sabah Air GAF Nomad N22B low-altitude, fixed-wing aircraft equipped with an AISA airborne hyperspectral imaging system flew over the steep gradient carved by very narrow valleys, ridges, precipitous escarpments and ravines, extensively covered by the thick virgin forest of the highlands. The study was carried out by an AISA sensor, which is a complete system that consists of a compact hyperspectral sensor head, miniature GPS/INS sensor for precise positioning, data acquisition unit and Caligeo post-processing software. These UPM-APSB's AISA flights demonstrated that quality real-time hyperspectral images could be pre-processed on the aircraft and become accessible to the SAR committee members for quick ground SAR within two hours after the flight. The combined geospatial information technologies were a major breakthrough in the Malaysian SAR real-time imaging technique. It is expected that future precise locations of the suspected targets can be transmitted via very high frequency radio communications and become accessible to the SAR ground members such as the commandos VAT 69. Real-time airborne hyperspectral imaging will benefit strategic SAR and help reduce the loss of lives in future helicopter crashes in the Bario-Ba'Kelalan areas.

Sauvagnargues-Lesage, Sophie, and Pierre-Alain Ayrat. 2007. Using GIS for emergency management: A case study

during the 2002 and 2003 flooding in south-east France. *International Journal of Emergency Management* 4(4): 682-703.

Emergency management has always required tools to get geographic information from the affected area. The objectives are to have a general view of the theater of operations with its geographic characteristics, troops' location, roads and railways, and fighting location. The emergency management of natural hazards is specific because it is necessary to evaluate the appropriate number of emergency units for the dimension and probable evolution of the situation; it is necessary to know how to transport emergency units, to anticipate the outcome of the situation and to give the best missions to the units. Geographic aspects are essential because every minute is important when rescuing people. This paper aims to outline the position of Geographic Information Systems (GIS) for emergency management of natural hazards, and especially during the 2002 and 2003 south-east flooding in France.

Zolfaghari, A., and A. C. Heath. 2008. A GIS application for assessing landslide hazard over a large area. *Computers and Geotechnics* 35(2): 278-285.

A sophisticated GIS application for assessing landslide hazard on a large scale is presented. To assess the landslide hazard, the critical natural slope in a small field of study—200 m x 200 m—is found and the slope is analyzed using a non-circular failure envelope with estimated soil properties, groundwater levels, earthquake, and surcharged loadings. The analysis uses a probabilistic approach, where groundwater, earthquake and soil properties each contribute to the analysis, even though some factors may have a relatively small influence. Landslide hazard can then be estimated within a period of time by analyzing the probabilistic distribution of factor of safety.

Insurance and Economic Impacts

Charpentier, Arthur. 2008. Insurability of climate risks. *The International Association for the Study of Insurance Economics* 33(1): 91-109.

The 2007 Intergovernmental Panel on Climate Change (IPCC) report noted that both the frequency and strength of hurricanes, floods and droughts have increased during the past few years. Thus, climate risk, and more specifically natural catastrophes, are now hardly insurable: losses can be huge (and the actuarial pure premium might even be infinite), diversification through the central limit theorem is not possible because of geographical correlation (a lot of additional capital is required), there might exist no insurance market since the price asked by insurance companies can be much higher than the price householders are willing to pay (short-term horizon of policyholders), and, due to climate change, there is more

uncertainty (and thus additional risk). The first idea discussed in this paper is about insurance markets and climate risks, is that insurance exists only if risk can be transferred, not only to reinsurance companies but also to capital markets (through securitization or catastrophes options). The second one is that climate is changing, and therefore, not only prices and capital required should be important, but also uncertainty can be very large. It is extremely difficult to insure in a changing environment.

Clemo, Kim. 2008. Preparing for climate change: Insurance and small business. *The International Association for the Study of Insurance Economics* 33(1): 110-116.

This paper considers the threat of climate change in the U.K., especially flooding, with regard to the impact that it will have on small and medium-sized enterprises and on the insurance industry itself and the role it plays. It examines the current situation facing the U.K. and then examines the responses being made to this and what can be done in the future to help resolve this issue.

Crichton, David. 2008. Role of insurance in reducing flood risk. *The International Association for the Study of Insurance Economics* 33(1): 117-132.

This paper considers the problems of flood risk management in the context of public and private insurance. It demonstrates the important role of insurance in reducing flood risk with examples from the U.K. and France. It includes a brief description of the 2007 summer floods in England.

Dlugolecki, Andrew. 2008. Climate change and the insurance sector. *The International Association for the Study of Insurance Economics* 33(1): 71-90.

Climate change matters to the insurance sector. In terms of underwriting, in one scenario, the economic cost of weather losses could reach over 1 trillion USD in a single year by 2040. The impacts will be worse in developing countries. The private sector needs to work with the public sector, as part of a "triple dividend" approach that coordinates adaptation, disaster management and sustainable economic development. For asset management the indirect impacts are key. Greenhouse gas emissions have to drop by 60 percent by 2050, which means transforming the energy economy. Finance for renewables will soon reach 100 billion USD a year. Political uncertainty is a serious blockage to market forces, and the re-evaluation of assets and project returns is happening too slowly. Finally, insurers have a duty as ubiquitous players in the economy and society to help to shape climate policies in a responsible and effective way.

Hansson, K., M. Danielson, and L. Ekenberg. 2008. A framework for evaluation of flood management strategies. *Journal of Environmental Management* 86(3): 465-480.

The impact of disasters on society depends on the affected country's economic strength prior to the disaster. The larger the disaster and the smaller the economy, the more significant is the impact. This is clearly seen in developing countries, where weak economies become even weaker after a disaster. Deliberate strategies for the sharing of losses from hazardous events may aid a country or a community in efficiently using scarce prevention and mitigation resources, thus being better prepared for the effects of a disaster. Nevertheless, many governments lack an adequate institutional system for applying cost-effective, reliable technologies for disaster prevention, early warnings, and mitigation. Modeling by event analyses and strategy models is one way of planning ahead, but these models have so far not been linked together. An approach to this problem was taken during a large study in Hungary, the Tisza case study, where a number of policy strategies for spreading of flood loss were formulated. In these strategies, a set of parameters of particular interest were extracted from interviews with stakeholders in the region. However, the study was focused on emerging economies, and, in particular, on insurance strategies. The scope is now extended to become a functional framework also for developing countries. In general, they have a higher degree of vulnerability. The paper takes northern Vietnam as an example of a developing region. The authors identify important parameters and discuss their importance for flood strategy formulations. Based on the policy strategies in the Tisza case, they extract data from the strategies and propose a framework for loss spread in developing and emerging economies. The parameter set can straightforwardly be included in a simulation and decision model for policy formulation and evaluation, taking multiple stakeholders into account.

Maynard, Trevor. 2008. Climate change: Impacts on insurers and how they can help with adaptation and mitigation. *The International Association for the Study of Insurance Economics* 33(1): 140-146.

Climate change is already affecting the global insurance industry. These changes are often seen as being negative, although opportunities also exist. Other areas of insurance coverage may also be affected in addition to property damage. The potential for third-party liability claims from climate change is less well understood but has even greater potential to affect the industry. Financial assets held to meet claims and provide a capital buffer may also be affected. Therefore, the balance sheet of an insurer may be damaged from all sides. Insurers cannot force policy holders to mitigate CO₂ emissions, but they can give them a choice and a number of them are already offering such policies. They can also take steps to reduce their own carbon emissions. Insurance is adaptation; there are a surprisingly large number of small to medium companies that do not have catastrophe coverage, so increasing insurance penetration of these markets would be an adap-

tive measure. Insurers will continue to lobby governments for appropriate weather defenses to keep areas insurable for as long as possible. Non-traditional forms of insurance are available (such as those based on weather indices with parametric triggers) and it may be possible to continue to offer these for longer than traditional insurance. They do bring basic risks with them and therefore possible reputational risk to the industry. Insurers can only pool risk; they cannot insure our way out of this problem, but they can help to spread the impacts where possible.

Suder, Gabriele, and Saynakhone Inthavong. 2008. New health risks and sociocultural contexts: Bird flu impacts on consumers and poultry businesses in Lao PDR. *Risk Analysis* 28(1): 1-12.

Avian flu has been identified as one of the most challenging new risks, global in impact because of the "highly interconnected and integrated world economy along with other unpredictable events such as the Asian financial crisis and global terrorism." This article uses the case of Lao PDR to shed light on an area in which local people consume chicken as one of their staple foods. The researchers analyze consumer behavior, poultry business modification patterns in a high-risk country, and government reaction for business resilience. The geographic choice is motivated by the 2006 EIU report on Catastrophe Risk Management that indicated that Asian-Pacific companies are better prepared for such risks as bird flu than European businesses, despite the many cases found in both regions.

Tatano, Hirokazu, and Satoshi Tsuchiya. 2008. A framework for economic loss estimation due to seismic transportation network disruption: A spatial computable general equilibrium approach. *Natural Hazards* 44(2): 253-265.

This paper presents a framework for assessing the economic impact of disruption in transportation that can relate the physical damage to transportation networks to economic losses. A spatial computable general equilibrium (SCGE) model is formulated and then integrated with a transportation model that can estimate the traffic volumes of freight and passengers. Economic equilibrium under a disruption in the transportation network is computed subject to the condition that the adjustment of labor and capital inputs is restricted. The model reflects slow adjustment of these linked to the state of recovery. As a case study, the model reviews the large Niigata-Chuetsu earthquake of 2004. Considering the damage to the transportation infrastructure, the model indicates the extent of the economic losses arising from the earthquake distributed over regions as a consequence of the intra- and inter-regional trade in a regional economy. The results show that 20 percent of indirect losses occur in the Niigata region, directly affected by the earthquake, whereas 40 percent of total losses are experienced in the Kanto region and non-neg-

ligible losses reach rather remote zones of the country such as Okinawa.

Ward, Robert E. T. Herweijer Celine, Nicola Patmore, and Robert Muir-Wood. 2008. The role of insurers in promoting adaptation to the impacts of climate change.

The International Association for the Study of Insurance Economics 33(1): 133-139.

Scientific evidence of climate change impacting the frequency, intensity and geographical distribution of extreme weather events is accumulating. With these trends likely to continue for the foreseeable future, the insurance industry can help society to adapt by limiting and managing risks associated with extreme weather, thereby maintaining the insurability of potentially vulnerable and exposed populations. There are already examples of the insurance industry promoting efforts to mitigate the impacts of weather hazards by disseminating information about reducing the vulnerability of properties, offering financial incentives to invest in mitigating the impacts of extreme weather, and by working in partnership with policy-makers to establish maximum thresholds of acceptable risk. However, these efforts need to be more widely promoted by insurers to make a significant contribution to society's adaptation to climate change.

Landslides and Avalanches

Lin, Shuyeu, Daigee Shaw, and Ming-Chou Ho. 2008. Why are flood and landslide victims less willing to take mitigation measures than the public? *Natural Hazards* 44(2): 305-314.

Almost annually, natural hazards such as floods and landslides cause a great deal of financial loss and human suffering in Taiwan. To gain a better understanding of disaster preparedness, this paper examines several factors in relation to hazard mitigation behavior: social economic status (education, income), psychological vulnerability (sense of powerlessness and helplessness), risk perception (perceived impact and control), and social trust. The statistical analysis reported here is based on the 2004 National Risk Perception Survey of Floods and Landslides in Taiwan. The main findings include: (1) victims are less willing to adopt risk mitigation measures than the public, even though they perceive larger impacts, worry more about the hazard, and pay more attention to hazard information; (2) trust, risk perception and social economic status are positive predictors for mitigation intentions, whereas psychological vulnerability is a negative predictor; and (3) psychological variables are stronger predictors for mitigation intentions than that of socio-economic variables. In light of these findings, the policy implications and intervention strategy are also discussed.

Zolfaghari, A., and A. C. Heath. 2008. A GIS application for assessing landslide hazard over a large area. *Computers and Geotechnics* 35(2): 278-285.

A sophisticated GIS application for assessing landslide hazard on a large scale is presented. To assess the landslide hazard, the critical natural slope in a small field of study—200 m x 200 m—is found and the slope is analyzed using a non-circular failure envelope with estimated soil properties, groundwater levels, earthquake, and surcharged loadings. The analysis uses a probabilistic approach, where groundwater, earthquake and soil properties each contribute to the analysis, even though some factors may have a relatively small influence. Landslide hazard can then be estimated within a period of time by analyzing the probabilistic distribution of factor of safety.

Public Health, Mental Health, and Emergency Medicine

Brand, Michael W., Dave Kerby, Brenda Elledge, Tracey Burton, Dana Coles, and Amy Dunn. 2008. Public health's response: Citizens' thoughts on volunteering. *Disaster Prevention and Management* 17(1): 54-61.

The aim of this paper is twofold: to delineate the results of the focus groups regarding volunteers and their needs; and to compare the results with pertinent literature regarding volunteerism to determine whether the motivating factors and needs of volunteers still need to be addressed by public health and other professional practitioners. Focus groups were conducted with public health volunteers and content analysis was conducted to identify central themes. Several important themes related to motivation and training emerged from the focus groups. These findings are supported by the sociological, psychological, management and administrative literature on volunteerism. While qualitative, these findings emphasize factors of which public health and emergency management officials need to be cognizant as they prepare, plan and work with volunteers. In order to retain volunteers' public health and emergency management, volunteer programs need to address the social, interpersonal, and educational desires of volunteers. The perceptions, values, interests and motivation of public health volunteers were directly elicited in order to identify factors that facilitate volunteer participation in public health and emergency responses.

Bridges, Elizabeth J., Joseph Schmelz, and Patricia Watts Kelley. 2008. Military nursing research: Translation to disaster response and day-to-day critical care nursing. *Critical Care Nursing Clinics of North America* 20(1): 121-131.

Where to begin? How do you identify nursing care requirements for military operations, disaster, and humanitarian response, and how do you modify care under these unique conditions? This article presents a framework for identifying

areas of critical care nursing that are performed on a day-to-day basis that may also be provided during a contingency operation, and discusses how that care may be changed by the austere conditions associated with a contingency response. Examples from various disasters, military operations, and military nursing research are used to illustrate the use of this framework. Examples are presented of how the results of this military nursing research inform disaster nursing and day-to-day critical care nursing practice.

de Mel, Suresh, David McKenzie, and Christopher Woodruff. 2008. Mental health recovery and economic recovery after the tsunami: High-frequency longitudinal evidence from Sri Lankan small business owners. *Social Science and Medicine* 66(3): 582-595.

A sample of 561 Sri Lankan micro-enterprise owners affected to various extents by the December 2004 Indian Ocean tsunami was surveyed five times at quarterly intervals between March 2005 and April 2006. Mental health recovery was measured through questions on return to normalcy and change in life outlook. Business profits were used to measure livelihoods recovery. The authors find that these mental health process measures correlated with post-traumatic stress disorder and general mental health in a validation survey, and display similar correlates to both in the cross-section. However, socioeconomic factors are not found to be significant in predicting the dynamics of mental health recovery in a fixed effects logistic regression. Mental health recovery from a given initial level therefore appears to depend largely on time since the disaster, and not on economic recovery of an individual's livelihood.

Dolch, Norman A., Daniel L. Meyer, and Angel V. Huval. 2008. Hurricane disaster response by school-based health centers. *Children, Youth and Environments* 18(1): 422-434.

In the summer of 2005, Hurricane Katrina displaced residents from the city of New Orleans and the eastern coastal area of Louisiana, and a month later, Hurricane Rita displaced many residents from the western coastal areas of Louisiana. The middle coastal area of Louisiana served as refuge for many evacuees, and a unique story documenting the health care provided to children emerged from the School-Based Health Center (SBHC) of St. Martin Parish. Quarterly reports filed by the program with the Louisiana Office of Public Health for the 2004-2005 and 2005-2006 school years document an increase in visits and the cost of care provided. Qualitative data document the clinics' experiences responding to the evacuee children and their families. Among the lessons learned was that the presence of a SBHC facilitated the evacuees' transitions and was an integral part of the community response to displaced students and their families.

Greer, Amy, Victoria Ng, and David Fisman. 2008. Climate change and infectious diseases in North America: The road ahead. *Canadian Medical Association Journal* 178(6): Online edition.

Global climate change is inevitable. The combustion of fossil fuels has resulted in a buildup of greenhouse gases within the atmosphere, causing unprecedented changes to the earth's climate. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change suggests that North America will experience marked changes in weather patterns in coming decades, including warmer temperatures and increased rainfall, summertime droughts and extreme weather events (e.g., tornadoes and hurricanes). Although these events may have direct consequences for health (e.g., injuries and displacement of populations due to thermal stress), they are also likely to cause important changes in the incidence and distribution of infectious diseases, including vector-borne and zoonotic diseases, water- and food-borne diseases and diseases with environmental reservoirs (e.g., endemic fungal diseases). Changes in weather patterns and ecosystems, and health consequences of climate change will probably be most severe in far northern regions (e.g., the Arctic). This article provides an overview of the expected nature and direction of such changes, which pose current and future challenges to health care providers and public health agencies.

Hale, Janet Fraser. 2008. Managing a disaster scene and multiple casualties before help arrives. *Critical Care Nursing Clinics of North America* 20(1): 91-102.

As the largest group of health care professionals in the United States and a component of almost every community, nurses may be called upon to initiate the emergency response and provide initial planning for health care until local, national, or federal assistance arrives. This article will assist nurses in anticipating, preparing for, and responding to multi-casualty, high-impact events. It concludes with a discussion of triage of multiple casualties in the face of scarce resources. It includes resources for more in-depth information on prevention, preparedness and planning, and the health system's response.

Hsu, Chiehwen Ed, Francisco Soto Mas, Ella T. Nkhoma, Jerry Miller, and William C. Chambers. 2008. Capacity building of biodefense informatics for public health preparedness and response in rural regions: EpiInfo, GIS, and data management training. *Journal of Emergency Management* 6(1): 70-76.

Emergency informatics such as data management and geographic information systems applications have become an important training agenda for enhancing health surveillance and risk communication in public health emergencies. The free EpiInfo/Epimap software developed by the CDC, offering domain knowledge such as health information manage-

ment, may be particularly useful for preparing nonurban jurisdictions that often confront limited resources in dealing with health emergency events. This article describes the delivery of training workshops to enhance the competencies of health workers in biodefense informatics and discusses its implication for delivering education to rural regions. Three EpiInfo/EpiMap workshops titled Biodefense Informatics and Health Surveillance Database Management were delivered to public health practitioners of rural Texas. Each workshop covered three modules: tabletop exercises, EpiInfo, and EpiMap hands-on training. A web-based training modality was developed to supplement classroom sessions. Training manuals and a CD-ROM were distributed to trainees. Pre-tests and post-tests were administered to evaluate the workshop effectiveness, and descriptive statistics of the results were summarized. Forty regional or local health department staff attended the workshops. The pre- and post-testing indicated that participants enhanced competencies and skills in biodefense informatics and data management. Self-reported evaluation indicated that knowledge increased upon completion of the training. The majority (97 percent) of the participants found the workshops relevant and useful, and many noted that the courses enhance their preparedness efforts. These results support the need of continuing biodefense informatics training for nonurban public health practitioners and provide directions for developing training programs in health preparedness informatics.

Lack, Caleb W., and Maureen A. Sullivan. 2008. Attributions, coping, and exposure as predictors of long-term posttraumatic distress in tornado-exposed children. *Journal of Loss and Trauma* 13(1): 72-84.

Previous research has implicated a number of factors in why a child might or might not develop a negative reaction to a traumatic situation. The current study was designed to examine multiple factors and their effect on the long-term distress in children 8 to 12 years old who were exposed to a devastating tornado. The factors of initial exposure to the tornado, attributions about the tornado, and coping style were examined using multiple regression analyses, the number and types of attributions a child makes were found to explain the most amount of variance in long-term distress.

Littleton-Kearney, Marguerite T., Lynn A. Slepiski. 2008. Directions for disaster nursing education in the United States. *Critical Care Nursing Clinics of North America* 20(1): 103-109.

Because of their diverse education, experience, and practice settings, nurses are uniquely qualified to be first receivers, care givers, and leaders in any large-scale public health emergency. Many nurses, however, continue to feel inadequately prepared to function effectively in these types of situations. Great strides have been made since 2001, but much work

remains to be accomplished. This article focuses on newer approaches used to teach nurses the principles of disaster preparedness. It also addresses the need to incorporate mass casualty care and disaster management skills into undergraduate curricula, continuing nurse education, and advanced degree programs for nurses in the United States.

Pang, Valerie Ooka, Marcelina Madueno, Miriam Atlas, Tamiko Stratton, Jennifer Olinger, and Cindy Page. 2008. Addressing student trauma in the wake of the California wildfires. *Social Education* 72(1):18-24.

The article explores the multiple levels and forms of student trauma brought by natural disasters as well as the impact of wildfires in California during the fall of 2007. The strategies discussed include the use of carefully guided questions, elaboration of human resiliency, encouragement of spending time with family and friends, reestablishment of a routine, and the promotion of dealing with the feelings of loss. The significance of critical thinking as well as community service activities for secondary students is highlighted.

Persell, Deborah J., and Susan Speraw. 2008. Toward a theory of homeland security nursing. *Journal of Homeland Security and Emergency Management* 5(1): Online publication.

The University of Tennessee, Knoxville has established a masters and PhD in nursing with a concentration in homeland security to meet the need of advanced nursing expertise to provide nursing care in mass casualty incidents related to natural disasters, accidental exposure to toxic agents, war and terrorism or other threats to the homeland. Homeland security nurses will prepare and execute comprehensive plans for major public health emergencies. Using Neuman's Systems Model, the nursing process and goals of the Department of Homeland Security are compared and contrasted to form the theoretical and practice base for homeland security nursing. An application of homeland security nursing using Neuman's Systems Model is provided.

Randeree, Ebrahim. 2008. RHIOs as the foundation for emergency disaster management response. *Journal of Emergency Management* 6(1): 49-58.

This research explores the regional health information organization (RHIO) framework and models for organization in response to emergencies. The increasing threats from weather-related phenomenon, disease outbreaks, and bioterrorism have focused the national agenda on emergency management and response. The creation of a national health information network is being replicated with state-level efforts to create a support structure for emergency management. Efforts by state agencies to create statewide health information infrastructure network can be the foundation for a RHIO model. This article will develop RHIO formation models as well as explore data issues on quality and security. Beyond the focus

on stakeholders, RHIOs must establish trust at various levels and provide credible and current information for usage to increase. Stakeholders must be included in RHIO formation. Data must be rich to provide emergency responders with relevant information to coordinate responses. The limited success of RHIOs needs to be reexamined and repositioned as federal and state initiatives to respond to disasters. RHIOs need to be an integral part of the electronic health record (EHR) rollout to physicians to make them more inter-operable and beneficial to regional health planning and response.

Rhoads, Jacqueline, Timothy Pearman, and Susan Rick. 2008.

PTSD: Therapeutic interventions post-Katrina. *Critical Care Nursing Clinics of North America* 20(1): 73-81.

August 29, 2006, brought the largest, most deadly hurricane ever to strike the Gulf Coast. According to reports, the storm killed more than 2000 people and destroyed billions of dollars of property, with winds clocked at 160 to 175 mph. More than a million residents were displaced, many requiring care for chronic conditions who suddenly also needed care for acute stress symptoms. Today, many individuals still struggle to cope with major psychiatric posttraumatic stress disorders (PTSD). Using a case study approach, this article discusses PTSD, including what it is, how it is manifested, how to diagnose it, patient education, and how it can be managed with therapeutic interventions. Special circumstances related to children are briefly presented.

Sadeghi, Naghmeh, and Mohammad H. Ahmadi. 2008.

Mental health preparedness for natural disasters in Iran. *Natural Hazards* 44(2): 243-252.

Appropriate emergency preparedness and response rely on social, economical, cultural, and political infrastructures that vary widely according to the level of the development of each country. Mental health damages are among the consequences of absence of such infrastructure that have not been studied comprehensively until now. In most countries, planning for natural disasters and earthquakes has been mainly focused on physical and economic impacts. However, lessons learned from recent earthquakes in Iran and other countries show that psychological impacts need to be considered more seriously. The first responder to an emergency is really the affected community, which consequently should be mentally prepared by appropriate training programs. These should include simple psychosocial interventions developed for people with an average level of education in a way that is easily understandable and practicable. After the Bam earthquake, local community volunteers have been selected and trained to provide post-disaster mental health services.

Weissbecker, Inka, Sandra E. Sephton, Meagan B. Martin, and David M. Simpson. 2008. Psychological and physiological correlates of stress in children exposed to disaster: Current research and recommendations for intervention. *Children, Youth and Environments* 18(1): 30-70.

Disasters have increased in incidence worldwide and children are especially vulnerable to their effects. Childhood is a unique period during which physical, mental and social development and growth take place. Psychological damage at this stage can affect children for years to come. To outline the psychological and physiological impacts of disaster on children and shed light on possible interventions, the authors reviewed the empirical literature utilizing search databases such as PsychInfo as well as policy documents and guidelines from major organizations (e.g., the United Nations). This article discusses potential biological mechanisms between stress, physiological dysregulation and subsequent illness in children. In addition, it discusses risk and protective factors and their possible role in buffering children against mental, physiological and health consequences of disasters, and outlines international and cross-cultural perspectives, as well as implications for further research.

Wilson, Catherine. 2008. Research considerations when studying disasters. *Critical Care Nursing Clinics of North America* 20(1): 111-119.

Nurses play an integral role during disasters because they are called upon more than any other healthcare professional during disaster response efforts. Consequently, nurse researchers are interested in studying the issues that impact nurses in the aftermath of a disaster. This article offers research considerations for nurse scientists when developing proposals related to disaster research and identifies resources and possible funding sources for their projects.

Wilson, Samantha L., and Kershaw Mary Ann. 2008. Caring for young children after a hurricane: Florida's childcare workers reflect on support and training needs. *Children, Youth and Environments* 18(1): 237-253.

Although there is increasing awareness of the need for disaster preparedness within elementary and high schools, daycare centers and preschools have largely been overlooked in preparation and recovery plans. The purpose of this project was to identify the presence and use of formal disaster plans for childcare agencies, assess the projected emotional response of childcare personnel to children following a disaster, evaluate the amount of in-service training received in the area of disaster preparedness and emotional recovery, and elicit recommendations from childcare personnel regarding ways to increase awareness of children's emotional needs following a disaster. Sixty-

seven surveys were received from center-based childcare personnel in 14 Florida counties. Responses indicated a need and desire for greater support around disaster preparedness, as well as increased availability for training regarding the emotional needs of children following disasters.

Zhang, Ying, Peng Bi, and Janet E. Hiller. 2008. Climate change and the transmission of vector-borne diseases: A review. *Asia-Pacific Journal of Public Health* 20(1): 64-76.

This article reviews studies examining the relationship between climate variability and the transmission of vector- and rodent-borne diseases, including malaria, dengue fever, Ross River virus infection, and hemorrhagic fever with renal syndrome. The review has evaluated the study designs, statistical analysis methods, usage of meteorological variables, and results of those studies. The authors found that the limitations of analytical methods exist in most of the articles. Besides climatic variables, few have included other factors that can affect the transmission of vector-borne disease (e.g., socioeconomic status). In addition, the quantitative relationship between climate and vector-borne diseases is inconsistent. Further research should be conducted among different populations with various climatic/ecological regions by using appropriate statistical models.

Risk and Decision Making

Anderson, Christopher W., Kash Barker, and Yacov Y. Haimes. 2008. Assessing and prioritizing critical assets for the United States Army with a modified RFRM methodology. *Journal of Homeland Security and Emergency Management* 5(1): Online publication.

This paper provides a methodology to filter and prioritize critical assets of a large and complex organization—the United States Army (the Army). The Army provides an excellent test bed in which to develop such a risk strategy because it relies heavily on both public and private assets to meet a wide variety of missions throughout the world. The Army has developed its own regulation for asset risk management, Army Regulation (AR) 525-26 [Department of the Army (DoA) 2004], in response to Department of Defense directives. Combining the high-level guidance of AR 525-26 with both qualitative and quantitative tools, the modified Risk Filtering, Ranking, and Management (RFRM) methodology provides prioritized assets to decision makers for risk management.

Bajek, Robert, Yoko Matsuda, and Norio Okada. 2008. Japan's Jishu-bosai-soshiki community activities: analysis of its role in participatory community disaster risk management. *Natural Hazards* 44(2): 281-292.

Jishu-bosai-soshiki, or Jishubo for short, with a literal meaning of “autonomous organization for disaster reduction,” is a neighborhood association for disaster preparedness and

rescue activity. In this paper, the role of Jishubo in the context of participatory disaster management in Japan is discussed. Although the formation of Jishubo is not legally mandated, local governments exercise a great deal of persuasion on the inhabitants of their community to organize and participate in disaster management activities. Therefore, participants in Jishubo activities tend to be guided and mobilized with a soft touch by local governments rather than being truly self-motivated, with the objective of reducing disaster risks in their residential areas. There have been several studies on community participatory management conducted in a number of countries, including New Zealand, the USA and Europe that will serve as a reference in our study. However interesting, the cultural comparison of the “Western” and “Japanese” approaches to community disaster management, is beyond the scope of this paper, which aims to determine a case of community disaster management in Japan. This paper addresses the background behind the development of Jishubo and discusses the uniqueness and limits of this softly mobilized participatory movement in Japan. Based on a case study in Kishiwada City, Osaka, the motivations driving people to participate in disaster management activities organized for Jishubo members is examined. In conclusion, some policy implications are derived and possible approaches for improving the effectiveness of Jishubo and increasing the motivation of people to participate are suggested. The authors also propose that the roles of administrative bodies in Japan, such as non-profit organizations, be better incorporated into community's participatory disaster reduction activities.

Crichton, David. 2008. Role of insurance in reducing flood risk. *The International Association for the Study of Insurance Economics* 33(1): 117-132.

This paper considers the problems of flood risk management in the context of public and private insurance. It demonstrates the important role of insurance in reducing flood risk with examples from the U.K. and France. It includes a brief description of the 2007 summer floods in England.

Cruz, Ana Maria, and Norio Okada. 2008. Consideration of natural hazards in the design and risk management of industrial facilities. *Natural Hazards* 44(2): 213-227.

Recent chemical accidents precipitated by natural disasters have prompted governments in the United States, Japan, and Europe, among other countries, to re-evaluate current practices in the design and risk management of industrial facilities. This paper presents an overview of natural hazard design considerations and external events risk management requirements in the industrial sector, with particular emphasis on industrial practices in the United States, Japan, and Europe. The analysis shows, although regulations exist to ensure industrial plant structures are built to resist natural

hazards (up to the design level), there are few laws to address the performance of non-structural elements and safety and emergency response measures during a natural disaster. Laws also usually refer to natural hazards only indirectly and provisions to prevent or respond to simultaneous disasters from single or multiple sources concurrent with the natural disaster are usually not present.

Erdik, Mustafa, and Eser Durukal. 2008. Earthquake risk and its mitigation in Istanbul. *Natural Hazards* 44(2): 181-197. Physical and societal vulnerability to earthquakes along with expected physical, social, economic, and industrial losses in Istanbul are outlined. This risk quantification is the basis for the Earthquake Master Plan. Risk-mitigation activity being conducted by several agencies and in different context and sectors is elaborated.

Erdik, Mustafa, Eser Durukal, and Eren Uckman. 2008.

Earthquake risk to industry in Istanbul and its management. *Natural Hazards* 44(2): 199-212.

Istanbul is home to 40 percent of the industrial facilities in Turkey. Thirty percent of the population working in industry lives in the city. Past earthquakes have shown that the structural reliability of residential and industrial buildings in the country is questionable. In the Marmara region, earthquake hazard is very high with a 2 percent annual probability of occurrence of a magnitude 7+ earthquake on the main Marmara fault. These facts make the management of industrial risks imperative for the reduction of socioeconomic losses. In this paper we present a first-order assessment of earthquake damage to the industry in Istanbul and raise issues for better characterization and quantification of industrial losses and management of urban industrial risks.

Guastello, Stephen J., Gus Koehler, Brian Koch, Josh Koyen, Alyssa Lilly, Charlene Stake, and Jennifer Wozniczka. 2008. Risk perception when the tsunami arrived.

***Theoretical Issues in Ergonomics Science* 9(2): 115-123.**

A cusp catastrophe model is proposed for the dynamics of risk perception and decision-making. The model is based primarily on the behavior of spectators at the scene of the tsunami that struck Southeast Asia in December 2004, as depicted in eye-witness photographs. The theoretical model draws on models for the perception of ambiguous stimuli and approach-avoidance conflicts that were previously proposed. The dynamics of social comparison, persuasive arguments and information certainty are thought to contribute to the bifurcation parameter of the risk perception model. The decisionmakers' ability to interpret the visual cues is proposed as the asymmetry parameter.

Ikeda, Saburo, Teruko Sato, and Teruki Fukuzono. 2008.

Towards an integrated management framework for emerging disaster risks in Japan. *Natural Hazards* 44(2): 267-280.

An integrated framework for disaster risk management is presented to cope with the risk of low-probability, high-consequence (LPHC) disasters in urban communities. Since the 2000 Tokai flood in Japan, there has been a shift in the management strategy from disaster prevention with a presumed zero risk to disaster reduction with an acceptable risk. The framework consists of: (1) integration of different categories of risk reduction options in terms of structural and nonstructural measures, regulation and market-oriented measures, (2) strengthening of the capacity of local communities to make their own management choices for LPHC-type disaster risks, and (3) promoting the participation of stakeholders throughout the entire cycle of risk management. The interdisciplinary framework is discussed with reference to lessons learned from two recent major flood disasters (the 2000 Tokai flood and the 2004 Niigata flood). To implement the goals of the integrated framework, a participatory platform for disaster risk communication called "Pafrics" has been developed. Preliminary results of the pilot study of participation and risk communication supported by Pafrics are presented.

Lumbroso, Darren, David Ramsbottom, and Mathias Spaliveiro. 2008. Sustainable flood risk management strategies to reduce rural communities' vulnerability to flooding in Mozambique. *Journal of Flood Risk Management: Online Edition*.

In 2000, Mozambique was hit by widespread flooding that affected some 4.5 million people and cost approximately 20 percent of the country's Gross Domestic Product. In a large, sparsely populated country such as Mozambique, a structural approach to flood risk management cannot be justified on environmental and economic grounds. As a consequence, flood mitigation measures need to focus on non-structural solutions, such as reducing vulnerability to flooding and improving preparedness. This paper details the development of sustainable flood risk management strategies and the production of educational tools to reduce rural communities' vulnerability to flooding. The tools, which were developed in partnership with local stakeholders, included a Source Book on sustainable flood risk management strategies, a series of posters, a manual and a card game aimed at improving schoolchildren's flood preparedness. These tools were piloted in partnership with three rural communities in the Limpopo River basin in order to develop sustainable flood risk management strategies.

Mitchell, Tom, Katharine Haynes, Nick Hall, Wei Choong, and Katie Oveb. 2008. The roles of children and youth in communicating disaster risk. *Children, Youth and Environments* 18(1): 254-279.

Disaster management is dominated by top-down relief efforts that assume children and youth are passive victims with no role in communicating risks or preventing and responding to disasters. This article challenges these assumptions and critically assesses prevailing theoretical models of risk communication using two case studies that highlight the unique needs and potential roles of children and youth as resources or receivers of disaster management information. These studies in El Salvador and New Orleans used various participatory and qualitative techniques with young people, parents and policy makers. The findings suggest that the roles of children and youth as potential informants within informal and formal risk communication networks have been significantly underestimated, but their positive role in disaster risk reduction must also be seen in light of its possible burdens.

Morris, Kerry-Ann N., and Michelle T. Edwards. 2008. Disaster risk reduction and vulnerable populations in Jamaica: Protecting children within the comprehensive disaster management framework. *Children, Youth and Environments* 18(1): 389-407.

The Office of Disaster Preparedness and Emergency Management (ODPEM), the disaster management headquarters of the Government of Jamaica, understands that the best approach to take in effectively protecting children during emergency situations is to create a culture of risk reduction in which all involved are aware of local hazards and are actively involved in reducing the resulting risks. This includes the promotion of disaster risk education in schools while integrating children's needs into the Comprehensive Disaster Management framework. This field report describes the efforts of the ODPEM in protecting Jamaican children in emergency situations. This was and continues to be achieved through two main approaches: building a culture of prevention in and through schools and integrating children's rights into disaster management and response.

Pidgeon, Nick F, Irene Lorenzon, and Wouter Poortinga. 2008. Climate change or nuclear power - No thanks! A quantitative study of public perceptions and risk framing in Britain. *Global Environmental Change* 18(1): 69-85.

The U.K. is witnessing a new line in political debate around new nuclear energy generation as one potential feature of future energy policy, specifically for contributing to climate change mitigation alongside energy security. Little is known about how ordinary citizens might be responding to this reframing. This paper reports the results from a major British survey (n=1491) undertaken in the autumn of 2005. The con-

sistent message is that while higher proportions of the British public are prepared to accept nuclear power if they believe it contributes to climate change mitigation, this is a highly conditional view, with very few actively preferring this over renewable sources given the choice. People see both climate change and nuclear power as problematic in terms of risks and express only a "reluctant acceptance" of nuclear power as a solution to climate changes. The combined data from this survey can also be interpreted as an indication of the complexity surrounding beliefs about energy futures and the difficulty of undertaking simplistic risk-risk tradeoffs within any single framing of the issues; such as nuclear energy versus climate change. The results also indicate it would be unwise, in the U.K., as elsewhere, to simplistically assume there exists any single or stable public opinion on such complex matters. The article concludes with a discussion of the role and implications of the survey evidence for the policy process.

Ritchie, Liesel A., and Duane A. Gill. 2008. The Selendang Ayu shipwreck and oil spill: Considering threats and fears of a worst-case scenario. *Sociology Inquiry* 78(2): 184-206.

On December 8, 2004, the Selendang Ayu, a Malaysian-flagged freighter, ran aground off Unalaska Island in Alaska's Aleutian chain. Despite rescue efforts by the United States Coast Guard, six of the Selendang Ayu's crew members died. In addition to the deaths, more than 300,000 gallons of heavy bulk fuel oil spilled into the sea. Much of the oil washed onto the island's shores, into areas providing cultural, recreational, subsistence, and commercial fishing resources for residents of the renewable resource community of Dutch Harbor/Unalaska. The purpose of this article is to identify and examine different dimensions of risk based on qualitative research conducted in 2005. The authors use a contextual constructionist approach to understand risk, which conceptualizes risk as an objective hazard, threat, or danger mediated through social and cultural processes. Research methods included 31 personal interviews, participatory observation, and a review of media coverage. Findings revealed several dimensions of risk perceived by residents: the incident in relation to Dutch Harbor/Unalaska as a high-risk community and more general current events; threats to the community's annual \$1 billion seafood industry; threats to Alaska Native subsistence culture; and issues of future risk and uncertainty. Interviews and observations support the authors' conclusion that the Selendang Ayu incident represented a "shot across the bow" that could have been a "worst case" if oil had contaminated commercial fish processing. Residents believe that it is only a matter of time before another, more damaging accident occurs. Given this general perception, it is important to more clearly assess risk in Dutch Harbor/Unalaska and help the community increase resilience to the multiple hazards it

faces. More broadly, Dutch Harbor/Unalaska serves as an example all communities could benefit from better risk assessments and increased attention to resiliency.

Todinov, Michael T. 2008. Risk-based design based on limiting the probability of system failure at a minimum total cost. *Risk Management* 10(2): 1041-21.

A basic principle for risk-based design has been formulated: the larger the losses from failure of a component, the smaller the upper bound of its hazard rate, the larger the required minimum reliability level from the component. A generalized version and analytical expression for this important principle have also been formulated for multiple failure modes. It is argued that the traditional approach based on a risk matrix is suitable only for single failure modes/scenarios. In the case of multiple failure modes (scenarios), the individual risks should be aggregated and compared with the maximum tolerable risk. In this respect, a new method for risk-based design is proposed, based on limiting the probability of system failure below a maximal acceptable level at a minimum total cost (the sum of the cost for building the system and the risk of failure). The essence of the method can be summarized in three steps: developing a system topology with the maximum possible reliability, reducing the resultant system to a system with generic components, for each of which several alternatives exist including non-existence of the component, and a final step involving selecting a set of alternatives limiting the probability of system failure at a minimum total cost. An exact recursive algorithm for determining the set of alternatives for the components is also proposed.

Wang, Jing-ai, Pei-jun Shi, Xiang-sheng Yi, Hui-cong Jia, and Lai-yin Zhu. 2008. The regionalization of urban natural disasters in China. *Natural Hazards* 44(2): 169-179.

An integrated urbanization level (CL) index and an integrated natural disaster intensity (QC) index were developed on the basis of Disaster System Theory and China Natural Disaster Database for integrated urban disaster risk assessment. Integrated quantitative assessments of the urban socio-economic system and the intensity of hazards in China were carried out by the Model-Tupu (map series) and inter-feedback process using digital map technology. On the basis of this assessment, China can be regionalized into three regions—coastal urban disaster region, eastern urban disaster region and western urban disaster region, 15 sub-regions and 22 units. These results can provide a scientific basis for determining a city's disaster risk management and natural disaster relief regionalization in China.

Zandvoort, Henk. 2008. Risk zoning and risk decision making. *International Journal of Risk Assessment and Management* 8(1-2): 3-18.

Two requirements for responsible and coherent decision making about and management of risk creating technological activities are presented and defended. These are called the requirement of informed consent and the requirement of strict liability. The requirements are necessary to assure decisions regarding hazardous technology respect ethical principles and result in social progress. The requirements pose important challenges for operators and regulators of risk-creating technological facilities such as nuclear power plants. The following challenges are discussed: How can those subjected to risks be informed properly about the risks? How can credibility of risk assessments be assured? How can consent be obtained of those subjected to the risks? Risk zoning and risk mapping are discussed as possible instruments for informing the public.

Technological Hazards

Alzbutas, Robertas, and Andrea Maioli. 2008. Risk zoning in relation to risk of external events (application to IRIS design). *International Journal of Risk Assessment and Management* 8(1-2): 104-122.

The design basis for any plant and site is closely related to the effects of any postulated external events and the limitation of the plant capability to cope with accidents, that is to perform safety functions. As a prime example of an advanced reactor and nuclear power plant with enhanced safety, the International Reactor Innovative and Secure (IRIS) has been considered. In the used Safety-by-Design™ approach, the Probabilistic Risk Assessment (PRA) plays a key role. Therefore, a preliminary IRIS PRA has been developing along with the design. For the design and pre-licensing process of IRIS, the external events analysis includes both qualitative evaluation and quantitative assessment. As a result of preliminary qualitative analyses, the external events that were chosen for more detailed quantitative scoping evaluation are high winds and tornadoes, aircraft crash, and seismic events. In general, applying the quantitative-assessment bounding site characteristics can be used in order to minimize potential future restrictions on plant siting and risk zoning.

Berkey, Johanna, and Thomas McKenna. 2008. International requirements for the establishment of emergency zones. *International Journal of Risk Assessment and Management* 8(1-2): 19-31.

This paper describes briefly the current international requirements associated with the establishment of emergency planning zones around nuclear or radiological facilities.

It also describes the current guidance in determining the size and other characteristics of these zones.

Carelli, Mario D., Bojan Petrovic, and Paolo Ferroni. 2008. IRIS Safety-by-Design and its implication to lessen emergency planning requirements. *International Journal of Risk Assessment and Management* 8(1-2): 123-136.

International Reactor Innovative and Secure (IRIS) is an integral configuration pressurized light water reactor that has been in development since late 1999 by an international consortium. Its design and safety characteristics have been amply reported. In this paper, the Safety-by-Design™ IRIS philosophy is reviewed to show how the projected safety performance (most accidents either eliminated or inherently mitigated Core Damage Frequency (CDF) due to internal events of the order of 10 to 8 events per year) exceeds the current norm of nuclear reactors. The IRIS project plans to use this enhanced safety response to explore the possibility of lessening, or even eliminating, the off-site emergency planning requirement. A review is given of previous attempts to attain this relaxation of licensing regulations and of current goals for advanced reactors. Finally, the proposed methodology is outlined. It consists of a combined deterministic and probabilistic approach, including an in-depth review of the defense and a risk-informed analysis of a wide spectrum of accidents rather than an evaluation limited to a few design-based accidents.

Cruz, Ana Maria, and Norio Okada. 2008. Consideration of natural hazards in the design and risk management of industrial facilities. *Natural Hazards* 44(2): 213-227.

Recent chemical accidents precipitated by natural disasters have prompted governments in the United States, Japan, and Europe, among other countries, to re-evaluate current practices in the design and risk management of industrial facilities. This paper presents an overview of natural hazard design considerations and external events risk management requirements in the industrial sector, with particular emphasis on industrial practices in the United States, Japan, and Europe. The analysis shows, although regulations exist to ensure industrial plant structures are built to resist natural hazards (up to the design level), there are few laws to address the performance of non-structural elements and safety and emergency response measures during a natural disaster. Laws also usually refer to natural hazards only indirectly and provisions to prevent or respond to simultaneous disasters from single or multiple sources concurrent with the natural disaster are usually not present.

Gurpinar, Aybars. 2008. IAEA activities related to on-site management and off-site emergency preparedness involving external events including those of malevolent origin.

International Journal of Risk Assessment and Management 8(1-2): 32-36.

On-site and off-site measures after the occurrence of a nuclear accident are considered the final layers of defense in depth. On-site measures may vary considerably from one event to another depending on the severity of the accident. Off-site emergency response measures also may vary and, depending on the emergency situation, they may involve administering of iodine tablets, sheltering and various degrees of evacuation. Responsibility for on-site accident management lies with the nuclear power plant, where the off-site emergency response needs to be a coordinated effort involving local and sometimes national authorities, including the regulatory body. These measures are well known and drills take place regularly at nuclear power plants to train the people and organizations involved for good coordination. This paper deals with situations when the accident and the emergency situation are a result of an external event (including the possibility that this event is of malevolent origin).

Navert, Stephan B. 2008. Determination and justification of the reference scenarios and associated source terms for emergency planning in Switzerland. *International Journal Risk Assessment and Management* 8(1-2): 94-103.

For the purpose of planning emergency countermeasures in a nuclear accident, realistic reference scenarios were defined on the basis of general plant features. Three types of scenario cover the accident sequences expected to be the most probable. Time-scales and releases are identical for all Swiss nuclear power plants (NPPs), although the plants differ in inventory, reactor type and age. The expected doses to the public have been assessed by a quasi-probabilistic approach using a puff-Gaussian diffusion model for three diffusion categories, each with wet and dry deposition. Plant-specific level-2 PSA studies were used to justify the reference scenarios. From the full spectrum of release categories, those selected were covered by the releases and time frames postulated in the reference scenarios. For each NPP, the cumulative frequency of sequences not covered by the reference scenarios was calculated. The cumulative frequencies of sequences not covered fulfill the requirements set up by the Swiss Federal Nuclear Safety Inspectorate.

Pepper, Darrell W., and Wang Xiuling. 2008. A self-adapting model for assessing hazardous environmental releases. *Natural Hazards* 44(3): 387-397.

Simulation results are presented by using an h-adaptive mass consistent finite element method (FEM) coupled with a Lagrangian particle transport technique (LPT) for dispersion associated with hazardous atmospheric releases. A three-dimensional wind field first is constructed from the adaptive FEM model. Lagrangian particles that define the contaminant dispersion are then produced with the LPT scheme, employ-

ing a random walk/stochastic approach. The application of FEM permits flow patterns with irregular geometries to be easily simulated, while the LPT permits contaminant particle dispersion patterns to be quickly depicted. The hybrid model is fast, runs on PCs, and appears well suited for emergency response dispersion predictions and assessment.

Perryman, Lindley J. 2008. Risk-informed emergency planning requirements for Koeberg Nuclear Power Station. *International Journal Risk Assessment and Management* 8(1-2): 80-93.

This paper presents an overview of the use of risk insights to aid the derivation of the requirements for the Koeberg Emergency Plan. The methodology and the results are presented. This methodology is based on using the Koeberg risk assessment to the worst credible, severe accident scenario, which then becomes the reference accident. The off-site consequences of this reference accident are then assessed. These off-site consequences are then compared with the criteria for each protective action such as sheltering and evacuation. This approach is a blend of deterministic and probabilistic approaches, which conforms to international standards and can be used to optimize emergency planning. It is also a holistic approach that allows plant modifications that improve plant safety to be balanced against a reduction in the magnitude of the off-site emergency planning requirements.

Qu, Jingyuan, Jiazhu Cao, and Hong Li. 2008. Accident consequence assessment and its implications for emergency planning of the pilot commercial HTR plant in China. *International Journal of Risk Assessment and Management* 8(1-2): 137-144.

An effort has been launched in China to construct a pilot commercial plant using high temperature reactors. This paper presents the major results of accident consequence assessment performed in the framework of a preliminary environmental impact evaluation. Based on this, the implications of this consequence calculation for emergency planning are discussed. Finally, the current regulatory requirements on emergency zoning around nuclear power plants in China and some discussions about the establishment of emergency planning zones around the Taiwan Nuclear Power Plant imported from Russia also are described briefly in this paper.

Ritchie, Liesel A., and Duane A. Gill. 2008. The Selendang Ayu shipwreck and oil spill: Considering threats and fears of a worst-case scenario. *Sociology Inquiry* 78(2): 184-206.

On December 8, 2004, the Selendang Ayu, a Malaysian-flagged freighter, ran aground off Unalaska Island in

Alaska's Aleutian chain. Despite rescue efforts by the United States Coast Guard, six of the Selendang Ayu's crew members died. In addition to the deaths, more than 300,000 gallons of heavy bulk fuel oil spilled into the sea. Much of the oil washed onto the island's shores, into areas providing cultural, recreational, subsistence, and commercial fishing resources for residents of the renewable resource community of Dutch Harbor/Unalaska. The purpose of this article is to identify and examine different dimensions of risk based on qualitative research conducted in 2005. The authors use a contextual constructionist approach to understand risk, which conceptualizes risk as an objective hazard, threat, or danger mediated through social and cultural processes. Research methods included 31 personal interviews, participatory observation, and a review of media coverage. Findings revealed several dimensions of risk perceived by residents: the incident in relation to Dutch Harbor/Unalaska as a high-risk community and more general current events; threats to the community's annual \$1 billion seafood industry; threats to Alaska Native subsistence culture; and issues of future risk and uncertainty. Interviews and observations support the authors' conclusion that the Selendang Ayu incident represented a "shot across the bow" that could have been a "worst case" if oil had contaminated commercial fish processing. Residents believe that it is only a matter of time before another, more damaging accident occurs. Given this general perception, it is important to more clearly assess risk in Dutch Harbor/Unalaska and help the community increase resilience to the multiple hazards it faces. More broadly, Dutch Harbor/Unalaska serves as an example all communities could benefit from better risk assessments and increased attention to resiliency.

Shaluf, Ibrahim Mohamed. 2008. Technological disaster stages and management. *Disaster Prevention and Management* 17(1): 114-126.

This paper aims to provide graduate students, researchers, governmental and independent agencies with an overview on the stages and management of technological disasters. The technological disasters are a subject of concern to the researchers, the academicians, the governmental and independent agencies. The disasters, which involve major hazard installations (MHIs), are known as technological disasters. The information has been collected from several sources such as the technical and general articles, Web sites, and internal reports. The technological disaster definition and stages have been reviewed. This paper presents an overview on the technological disaster management cycle. Technological disasters consist of three stages. The stages are classified into pre-, during and post-disaster stages. Disaster management is a collective term encompassing all aspects of planning for and responding

to disasters, including both pre-disaster and post-disaster activities. Disaster management cycle is an open-ended process. The four phases comprising the cycle begin and end with mitigation. The stages are not mutually exclusive; there is an overlap. The stages of disaster management can be operative concurrently, because those stages are interrelated; they are not independent entities with one stopping and the next following. This paper presents an overview of the technological disaster definition and stages. It provides the MHIs management and the related authority with a background on the technological disaster management cycle. It motivates the members of the MHIs, particularly managerial staff, and the emergency planners to continually improve the control of MHIs. It provides the background and basis for further research in disaster and disaster management.

Sladek, Vladimir, Eduard Metke, and Jan Husarcek. 2008. Emergency zoning around nuclear power plants in Slovakia. *International Journal Risk Assessment and Management* 8(1-2): 60-68.

This paper presents summary information on emergency preparedness and planning in Slovakia. Safety policy, current and possible future requirements to the emergency on-site plans, off-site plans and emergency transport orders, as well as to the documentation, their regular updating and review are summarized. National emergency preparedness organization, zones used, and special and technical facilities are briefly described. PSA requirements, applications and interface between deterministic and probabilistic analyses in support of emergency planning are given. A legislative background and the approach to the determination of Emergency Planning Zones (EPZs) around the nuclear facilities are provided. Trends and future plans for redefinition of emergency zones are outlined.

van Hienen, Jan F. A. 2008. Reference scenarios and emergency zoning for nuclear facilities in The Netherlands. *International Journal Risk Assessment and Management* 8(1-2): 69-79.

This paper discusses the approach used to establish the emergency zones around nuclear facilities in The Netherlands. The policy of using risk analyses in spatial planning, such as the introduction of risk zones around industrial sites, was officially established in 1988. However, there is a long history of risk-based spatial planning in The Netherlands, such as calculation of flooding risks related to physical planning in large polders and near river embankments. Presently, risk zones are established around large chemical industries, fuel storage facilities and nuclear facilities, as part of the policy for external safety. For large nuclear facilities, emergency zones were established on the basis of a probabilistic assessment of the consequences of a reference release scenario (enveloping

source term). In the Netherlands reference (release) scenarios also are used during the early phase of the emergency response.

Tornadoes

Lack, Caleb W., and Maureen A. Sullivan. 2008. Attributions, coping, and exposure as predictors of long-term posttraumatic distress in tornado-exposed children. *Journal of Loss and Trauma* 13(1): 72-84.

Previous research has implicated a number of factors in why a child might or might not develop a negative reaction to a traumatic situation. The current study was designed to examine multiple factors and their effect on the long-term distress in children 8 to 12 years old who were exposed to a devastating tornado. The factors of initial exposure to the tornado, attributions about the tornado, and coping style were examined using multiple regression analyses, the number and types of attributions a child makes were found to explain the most amount of variance in long-term distress.

Shears, Andrew B., and Robert M. Schwartz. 2008. Tornadoes and mobile homes: The geographic data of a stereotype. *Journal of Emergency Management* 6(1): 11-22.

A stereotype that many in the United States share is the idea of a strong spatial relationship between mobile homes and tornado activity. Although the origins of this stereotype are unknown, many possibilities may exist, including a bias in media coverage or the fact mobile homes are susceptible to weaker tornadoes, which occur more frequently. Residents of mobile homes are usually less affluent than those of frame-built homes and have fewer resources to cope with the destruction of their homes. Despite the knowledge these homes are more susceptible and the heightened socioeconomic risk, the residents of these homes face little in terms of spatial coincidence between mobile homes and tornadoes has been studied. Tornado occurrences in the southeastern United States between 1970 and 2000 were spatially compared with the locations of mobile homes in 2000 to determine if mobile homes were located in areas climatologically prone to tornado activity.

Sikka, D. R. and P. Sanjeeva Rao. 2008. The use and performance of mesoscale models over the Indian region for two high-impact events. *Natural Hazards* 44(3): 353-372.

High-impact mesoscale weather events, occurring in different parts of India in all seasons, lead to major weather- and climate-related disasters. Several research groups and operational weather forecasting centers in India have adopted mesoscale models for research and operational usage. This paper reviews the work done by different groups with respect to two specific events, (1) unprecedented locally heavy rainfall near Mumbai (Santa Cruz) on July 26 and 27, 2005 and (2) the

Orissa super-cyclone of October 29 and 30, 1999 from its incipient stage on October 24 and 25, 1999. Considerable variability in the prediction of the intensity and location of mesoscale heavy rainfall, as well as in the intensity and path of the super-cyclone, are found. To reduce uncertainty in dynamic prediction, it is necessary that the model dynamics, physics, resolution, boundary conditions and availability of data on land–ocean surface processes are tuned separately to the specific event types, such as heavy monsoon rainfall, tropical cyclone genesis and movement and severe local thunderstorms, as the processes controlling such types of events may require suitable treatments for their proper simulations through appropriate dynamics, physics and resolution.

Tsunamis

Alongi, Daniel M. 2008. Mangrove forests: Resilience, protection from tsunamis, and responses to global climate change. *Estuarine, Coastal and Shelf Science* 76(1): 1-13.

This review assesses the degree of resilience of mangrove forests to large, infrequent disturbance (tsunamis) and their role in coastal protection, and to chronic disturbance events (climate change) and the future of mangroves in the face of global change. From a geological perspective, mangroves come and go at considerable speed with the current distribution of forests a legacy of the Holocene era, having undergone almost chronic disturbance as a result of fluctuations in sea-level. Mangroves have demonstrated considerable resilience over timescales commensurate with shoreline evolution. This notion is supported by evidence that soil accretion rates in mangrove forests are currently keeping pace with mean sea-level rise. Further support for their resilience comes from patterns of recovery from natural disturbances (storms, hurricanes) which coupled with key life history traits, suggest pioneer-phase characteristics. Stand composition and forest structure are the result of a complex interplay of physiological tolerances and competitive interactions leading to a mosaic of interrupted or arrested succession sequences, in response to physical/chemical gradients and landform changes. The extent to which some or all of these factors come into play depends then on width. The magnitude of energy absorption strongly depends on tree density, stem and root diameter, shore slope, bathymetry, spectral characteristics of incident waves, and tidal stage upon entering the forest. The ultimate disturbance, climate change, may lead to a maximum global loss of 10 to 15 percent of mangrove forest, but must be considered of secondary importance compared with current average annual rates of 1 to 2 percent deforestation. A large reservoir of below-ground nutrients, rapid rates of nutrient flux and microbial decomposition,

complex and highly efficient biotic controls, self-design and redundancy of keystone species, and numerous feedbacks, all contribute to mangrove resilience to various types of disturbance.

Bartlett, Sheridan. 2008. After the tsunami in Cooks Nagar: The challenges of participatory rebuilding. *Children, Youth and Environments* 18(1): 470-484.

In the context of post-disaster reconstruction, there is growing awareness of the need for more integrated inclusive processes that allow people to resume control of their lives and that ensure practical responses to local conditions. Yet, a range of pressures and challenges conspire to make these approaches appear unworkable. "Participation" in this context, if it happens at all, is often cursory and superficial, whether it involves children or adults. This paper describes an attempt to respond to these challenges in one small community in Tamil Nadu, India after the 2004 Indian Ocean tsunami. The scope for real involvement on the part of children and their families was limited by a number of factors, but in the end they were able to exercise some genuine control over the reconstruction of their homes and neighborhood. The paper discusses the replicability of this case, and argues for the importance of a process that includes children and adults together.

Berke, Philip R., Ratana Chuenpagdee, Kungwan Juntarashote, and Stephanie Chang. 2008. Human-ecological dimensions of disaster resiliency in Thailand: Social capital and aid delivery. *Journal of Environmental Planning and Management* 51(2): 303-317.

This study focuses on the human-ecological dimension of disaster resilience after the 2004 tsunami. It examines how concepts of social capital and external aid delivery influence community performance in conservation of mangrove ecosystems. Experiences are reported through the words of local informants in six villages in Thailand. Findings indicate that social capital represents a potential for collective action, but design of aid programs may prevent such action. Programs that emphasized bottom-up aid delivery mobilized local social capital and directed it toward obtaining resources that fit local needs and capabilities. Alternatively, top-down aid programs provided significant resources, but oppressed mobilization of social capital. Implications are that disaster stricken communities should be treated as active participants, rather than the more common perspective that views them as vulnerable and in a state of helplessness.

de Mel, Suresh, David McKenzie, and Christopher Woodruff. 2008. Mental health recovery and economic recovery after the tsunami: High-frequency longitudinal evidence

from Sri Lankan small business owners. *Social Science and Medicine* 66(3): 582-595.

A sample of 561 Sri Lankan micro-enterprise owners affected to various extents by the December 2004 Indian Ocean tsunami was surveyed five times at quarterly intervals between March 2005 and April 2006. Mental health recovery was measured through questions on return to normalcy and change in life outlook. Business profits were used to measure livelihoods recovery. The authors find that these mental health process measures correlated with post-traumatic stress disorder and general mental health in a validation survey, and display similar correlates to both in the cross-section. However, socioeconomic factors are not found to be significant in predicting the dynamics of mental health recovery in a fixed effects logistic regression. Mental health recovery from a given initial level therefore appears to depend largely on time since the disaster, and not on economic recovery of an individual's livelihood.

Guastello, Stephen J., Gus Koehler, Brian Koch, Josh Koyen, Alyssa Lilly, Charlene Stake, and Jennifer Wozniczka. 2008. Risk perception when the tsunami arrived. *Theoretical Issues in Ergonomics Science* 9(2): 115-123.

A cusp catastrophe model is proposed for the dynamics of risk perception and decision-making. The model is based primarily on the behavior of spectators at the scene of the tsunami that struck Southeast Asia in December 2004, as depicted in eye-witness photographs. The theoretical model draws on models for the perception of ambiguous stimuli and approach-avoidance conflicts that were previously proposed. The dynamics of social comparison, persuasive arguments and information certainty are thought to contribute to the bifurcation parameter of the risk perception model. The decisionmakers' ability to interpret the visual cues is proposed as the asymmetry parameter.

Lauten, Anne Westbrook, and Kimberly Lietz. 2008. A look at the standards gap: Comparing child protection responses in the aftermath of Hurricane Katrina and the Indian Ocean tsunami. *Children, Youth and Environments* 18(1): 158-201. Through work with disaster-affected children throughout the world, the humanitarian community has incorporated child protection as an essential element of a country's first response to crisis. Three principles have emerged. First, responders must be guided by a commitment to both assistance and protection of children. Second, child protection efforts should reflect the principle of family unity. Finally, response and reconstruction must be guided by the continuity principle. This principle focuses on the importance of maintaining the child's existing individual, familial, organizational and communal strengths and resources. Based on the authors' field work in Aceh and Louisiana, this article critically examines the child protection responses post-Indian Ocean Tsunami

and post-Hurricane Katrina. The complete lack of attention to child protection concerns post-Katrina contrasts sharply with the nearly textbook child protection response to the tsunami. The evaluation of this contrast reveals the many lessons that developed countries could learn from their counterparts in the developing world.

Warnings and Evacuations

Chen, X., and F. B. Zhan. 2008. Agent-based modeling and simulation of urban evacuation: Relative effectiveness of simultaneous and staged evacuation strategies. *Journal of the Operational Research Society* 59(1): 25-33.

This study investigates the effectiveness of simultaneous and staged evacuation strategies using agent-based simulation. In the simultaneous strategy, all residents are informed to evacuate simultaneously, whereas in the staged evacuation strategy, residents in different zones are organized to evacuate in an order based on different sequences of the zones within the affected area. This study uses an agent-based technique to model traffic flows at the level of individual vehicles and investigates the collective behaviors of evacuating vehicles. The authors conducted simulations using a microscopic simulation system called Paramics on three types of road network structures under different population densities. The three types of road network structures include a grid road structure, a ring road structure, and a real road structure from the City of San Marcos, Texas. Default rules in Paramics were used for trip generation, destination choice, and route choice. Simulation results indicate that (1) there is no evacuation strategy that can be considered as the best strategy across different road network structures, and the performance of the strategies depends on both road network structure and population density; (2) if the population density in the affected area is high and the underlying road network structure is a grid structure, then a staged evacuation strategy that alternates non-adjacent zones in the affected area is effective in reducing the overall evacuation time.

Johnson, Chris W. 2008. Using evacuation simulations for contingency planning to enhance the security and safety of the 2012 Olympic venues. *Safety Science* 46(2): 302-322.

In July 2005, London was awarded the right to host the 2012 Olympic and Paralympics games. The decision of the International Olympic Committee triggered considerable public enthusiasm across the U.K. At the same time, it also created a host of logistical and technical challenges. Among these, the first concern is to ensure the safety and security of competitors and of the public. This paper extends "lessons learned" techniques to analyze security incidents at previous games. This analysis of previous incidents is used to identify key issues that complicate the organization of Olympic events. For example, there is a danger that concern

over previous incidents, such as the Munich attack or the Atlanta bombing, will obscure other forms of attack. Conversely, it is difficult to validate risk-based approaches that consider the likelihood of threats which have yet to be realized. The closing sections argue that computer simulation techniques can be used early in planning to help envisage those scenarios that compromise the safety and security of Olympic events. They can also be used closer to the games, as training tools to rehearse key tactics and standard operating procedures before live drills are conducted.

Nozawa, M., Watanabem T., N. Katada, H. Minami, and A. Yamamoto. 2008. Residents' awareness and behavior regarding typhoon evacuation advice in Hyogo Prefecture, Japan. *International Nursing Review* 55(1): 20-26.

When residents are confronted with disaster, it is often difficult for them to realize the danger and take protective action. In 2004, an evacuation advisory alert was issued on the approach of the season's 23rd typhoon in Japan, but only 5.1% of the residents actually evacuated. Therefore, the authors felt it necessary to elucidate the awareness and behavior of residents during the period. To clarify the awareness, behavior and related factors of residents who were issued an evacuation advisory alert for the 2004 season's 23rd typhoon. One questionnaire per one household was distributed to 2,818 households in the area where the evacuation advisory alert was issued. A total of 481 responses were returned (a response rate of 17.1%). Residents who evacuated made their decision because they felt the situation was dangerous; they recognized the extent of the danger. There was a pattern of agreement that it had been wise to do so. For those who didn't evacuate, many cited as the reason for their behavior that their houses didn't flood. Non-evacuees also felt it was all right to stay at home and valued the merits of staying home. Related factors were housing structures, routine disaster-preparedness, a sense of personal danger and the impact of mass media news. Although the participation rate was only 17.1%, this study was successful in uncovering aspects of awareness and behavior of residents in the designated area. It also provided insight into what is needed for future disaster-preparedness, equipment and education.

Wildfires

deWolfe, Victor G., Paul M. Santi, J. Ey, and Joseph E. Gartner. 2008. Effective mitigation of debris flows at Lemon Dam, La Plata County, Colorado. *Geomorphology* 96(3-4): 366-377.

To reduce the hazards from debris flows in drainage basins burned by wildfire, erosion control measures such

as construction of check dams, installation of log erosion barriers (LEBs), and spreading of straw mulch and seed are common practice. At Lemon Dam, these methods were effective as cubic meters of debris traveled down channel where it was intercepted by debris racks. These mitigation measures, therefore, reduced the debris volume by several orders of magnitude.

Nitschke, Craig R., and John L. Innes. 2008. Climatic change and fire potential in South-Central British Columbia, Canada. *Global Change Biology* 14(4): 841-55.

The incidence and severity of forest fires are linked to the interaction between climate, fuel and topography. Increased warming and drying in the future is expected to have a significant impact on the risk of forest fire occurrence. An increase in fire risk is linked to the synchronous relationship between climate and fuel moisture conditions. A warmer, drier climate will lead to drier forest fuels that will in turn increase the chance of successful fire ignition and propagation. This interaction will increase the severity of fire weather, which, in turn, will increase the risk of extreme fire behavior. A warmer climate will also extend fire season length, which will increase the likelihood of fires occurring over a greater proportion of the year. In this study of the North Okanagan area of British Columbia, Canada, the impacts of climate change of fire potential were evaluated using the Canadian Forest Fire Danger Rating System and multiple climate scenario analysis. Utilizing this approach, a 30% increase in fire season length was modeled to occur by 2070. In addition, statistically significant increases in fire severity and fire behavior were also modeled. Fire weather severity was predicted to increase by 95% during the summer months by 2070 while fire behavior was predicted to shift from surface fire-intermittent crown fire regimes to a predominantly intermittent-full crown fire regime by 2070 onwards. An increase in fire season length, fire weather severity and fire behavior will increase the costs of fire suppression and the risk of property and resource loss while limiting human-use within vulnerable forest landscapes. An increase in fire weather severity and fire behavior over a greater proportion of the season will increase the risks faced by ecosystems and biodiversity to climatic change and increase the costs and difficulty of achieving sustainable forest management.

Pang, Valerie Ooka, Marcelina Madueno, Miriam Atlas, Tamiko Stratton, Jennifer Oliger, and Cindy Page. 2008. Addressing student trauma in the wake of the California wildfires. *Social Education* 72(1):18-24.

The article explores the multiple levels and forms of student trauma brought by natural disasters as well as the impact of wildfires in California during the fall of 2007.

The strategies discussed include the use of carefully guided questions, elaboration of human resiliency, encouragement of spending time with family and friends, reestablishment of a routine, and the promotion of dealing with the feelings of loss. The significance of critical thinking as well as community service activities for secondary students is highlighted.

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

Bacon, David P. Ahmad Nash'at N. Dunn Thomas J. Monteith Michael C. Sarma Ananthakrishna. 2008. An operational multi-scale system for hazards prediction, mapping, and response. *Natural Hazards* 44(3): 317-327.

By definition, a crisis is a situation that requires assistance to be managed. Hence, response to a crisis involves the merging of local and non-local emergency response personnel. In this situation, it is critical that each participant: (1) know the roles and responsibilities of each of the other participants; (2) know the capabilities of each of the participants; and (3) have a common basis for action. For many types of natural disasters, this entails having a common operational picture of the unfolding events, including detailed information on the weather, both current and forecasted, that may impact on either the emergency itself or on response activities. The Consequences Assessment Tool Set (CATS) is a comprehensive package of hazard prediction models and casualty and damage assessment tools that provides a linkage between a modeled or observed effect and the attendant consequences for populations, infrastructure, and resources, and, hence, provides the common operational picture for emergency response. The Operational Multi-scale Environment model with Grid Adaptivity (OMEGA) is an atmospheric simulation system that links the latest methods in computational fluid dynamics and high-resolution gridding technologies with numerical weather prediction to provide specific weather analysis and forecast capability that can be merged into the geographic information system framework of CATS. This paper documents the problem of emergency response as an end-to-end system and presents the integrated CATS-OMEGA system as a prototype of such a system that has been used successfully in a number of different situations.

Belatos, Spyros. 2008. Progress in the study and management of river ice jams. *Cold Regions Science and Technology* 51(1): 2-19.

River ice jams can cause extreme flood events with major consequences to infrastructure, riverside communities, and aquatic life. Yet, it is only in the last few decades that concerted efforts have been made to understand and predict ice-jam occurrence and severity. Building on a 1990s state-of-the-art review, new physical knowledge, prediction capabilities, and management methods are discussed herein. The thick-

ness and hydraulic roughness of ice jams have been elucidated, and flow through ice-jam voids quantified. Under-ice transport of frazil ice, which can lead to enormous freeze up accumulations, has been placed on a more rigorous footing while heat exchange with the water flowing under a jam can be predicted with some confidence. Systematic field measurements have produced new understanding of the waves that are generated by ice-jam releases. Increased understanding of the physical processes has enhanced confidence in older numerical models and motivated development of more sophisticated ones, leading to two-dimensional dynamic algorithms based on continuum as well as discrete element approaches. Ice-jam management and control continue to be difficult tasks, but new structural and non-structural techniques offer promising avenues, at least in the case of relatively small rivers. The emerging issue of climate change and the growing appreciation of related ecological linkages have led to important, but still few, insights on how ice jamming regimes can be modified by altered climatic conditions and what the repercussions might be on river ecology. Despite the progress, there are still major unknowns, particularly related to the conditions of formation and release of ice jams.

Greer, Amy, Victoria Ng, and David Fisman. 2008. Climate change and infectious diseases in North America: The road ahead. *Canadian Medical Association Journal* 178(6): Online edition.

Global climate change is inevitable. The combustion of fossil fuels has resulted in a buildup of greenhouse gases within the atmosphere, causing unprecedented changes to the earth's climate. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change suggests that North America will experience marked changes in weather patterns in coming decades, including warmer temperatures and increased rainfall, summertime droughts and extreme weather events (e.g., tornadoes and hurricanes). Although these events may have direct consequences for health (e.g., injuries and displacement of populations due to thermal stress), they are also likely to cause important changes in the incidence and distribution of infectious diseases, including vector-borne and zoonotic diseases, water- and food-borne diseases and diseases with environmental reservoirs (e.g., endemic fungal diseases). Changes in weather patterns and ecosystems, and health consequences of climate change will probably be most severe in far northern regions (e.g., the Arctic). This article provides an overview of the expected nature and direction of such changes, which pose current and future challenges to health care providers and public health agencies.

Goyette, Stephane. 2008. Development of a model-based high-resolution extreme surface wind climatology for Switzerland. *Natural Hazards* 44(3): 329-339.

An innovative methodology aimed at establishing a numerical model-based, high-resolution climatology of extreme winds over Switzerland is described that makes use of the Canadian Regional Climate Model where a new wind gust parameterization has been implemented. Self-nesting procedures allow windstorms to be studied at resolution as high as 2-km. The analysis of 10 major windstorms concludes that the average spatial pattern and magnitude of the simulated wind speeds are well captured and the areas that experienced extreme winds correspond well with observations and to the location where forest damage was reported following the last two of these storms. This climatology would eventually serve to form risk assessment maps based on the wind speed thresholds exceeded. There is, however, a need for further investigations to encompass the full range of potential extreme wind cases. The ultimate goal of this methodology is to assess the change in the behavior of extreme winds for a climate forced by enhanced greenhouse gas concentrations, and the impact of future windstorms over the Alpine region at high resolution.

Sikka, D. R. and P. Sanjeeva Rao. 2008. The use and performance of mesoscale models over the Indian region for two high-impact events. *Natural Hazards* 44(3): 353-372.

High-impact mesoscale weather events, occurring in different parts of India in all seasons, lead to major weather- and climate-related disasters. Several research groups and operational weather forecasting centers in India have adopted mesoscale models for research and operational usage. This paper reviews the work done by different groups with respect to two specific events, (1) unprecedented locally heavy rainfall near Mumbai (Santa Cruz) on July 26 and 27, 2005 and (2) the Orissa super-cyclone of October 29 and 30, 1999 from its incipient stage on October 24 and 25, 1999. Considerable variability in the prediction of the intensity and location of mesoscale heavy rainfall, as well as in the intensity and path of the super-cyclone, are found. To reduce uncertainty in dynamic prediction, it is necessary that the model dynamics, physics, resolution, boundary conditions and availability of data on land-ocean surface processes are tuned separately to the specific event types, such as heavy monsoon rainfall, tropical cyclone genesis and movement and severe local thunderstorms, as the processes controlling such types of events may require suitable treatments for their proper simulations through appropriate dynamics, physics and resolution.

