Dealing with Disaster

Issues and Ideas Papers
Presented During a
PERI Internet Symposium

Presented October 1999

Published by the Public Entity Risk Institute
On the Web at: www.riskinstitute.org

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About PERI's Internet Symposium Programs

These Issues and Ideas Papers were presented during one of PERI's "virtual" Symposium Programs, programs that are conducted entirely via the Internet. The Dealing with Disaster Symposium was presented in October 1999.

This publication is also available electronically on PERI's Web site at www.riskinstitute.org and on the Risk Management Resource Center at www.eriskcenter.org.

How We Conduct a Symposium

Our programs consist of specially commissioned papers, and an open, threaded discussion. Participation in the discussion is free and open to anyone interested in the subject of the Symposium.

Each day during a PERI Symposium, we present an Issues and Ideas Paper (or Papers) written by recognized experts. Each paper addresses a different aspect of the subject of the Symposium.

The papers are intended to be thought-provoking -- raising risk management issues about the week's subject -- and practical -- offering useful ideas and solutions.

Papers are posted each morning of the Symposium for reading. We also send the papers via e-mail each morning to participants who sign up ahead of time.

The discussion portion of the Symposium is a threaded discussion, in which comments and replies are posted in our Symposium Center, and are accessible by all. Anyone can view or post comments.

Our Symposium Programs are an important way for us to meet our goal of facilitating the delivery of education and training on all aspects of risk management. Participation in the programs is free and open to anyone interested in the subject.

Future Programs

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Dealing with Disaster: Examining Approaches for Small Public Entities, Non-Profit Organizations and Businesses to Reduce Losses and Overcome the Effects of Extreme Events

By Laurie Johnson and Felix Kloman

During the week of September 13th, Atlantic coastal residents watched anxiously as Hurricane Floyd gained strength and size, and blew through the Bahamas as a Strong Category 4[1]. It threatened to cover a portion of the U.S. that was larger than the entire state of Florida with winds of 125 mph or greater and heavy rains. As Floyd trekked northward, coastal homeowners and businesses in Florida, Georgia, South Carolina, and North Carolina, successively prepared for the potential landfall, boarding up windows and participating in this country's largest-ever peace-time evacuation.

When Floyd finally hit near Cape Fear, North Carolina, on the morning of Thursday, September 16th, the storm's wind intensities had decreased substantially. However, the storm surge and tremendous rainfall have caused some of the worst flooding in that state's history, and also resulted in substantial losses in Virginia, Maryland, New Jersey, and New York. People who live far from the landfall portion of North Carolina's coast now find themselves the principal victims of this catastrophic disaster. And, while the insured wind- and storm surge-related losses from Floyd are expected to be between $1 and $2 billion, flood-related losses from this disaster will substantially increase the total economic loss and recovery is expected to take many months, even years (Risk Management Solutions, 1999).

Floyd comes in a year of frequent and severe disaster events around the world. Some of the most significant U.S. events include Hurricane Bret, this summer's wild fires in California and the Pacific Northwest, and the super tornado outbreak that began in Oklahoma City and Kansas in early May. The Insurance Services Office's Property Claim Services unit (PCS) reports that U.S. insurers paid $3.7 billion for catastrophe losses in the third quarter of 1999, bringing total catastrophe losses for the first nine months of this year to $8.3 billion (ISO, 1999). Insurers' 1999 catastrophe losses are more than 3 times greater than the total $2.6 billion for all of last year.

There is the strong evidence that the frequency and severity of disaster events have increased in recent years, and that current warming trends will produce more severe meteorological events in the years ahead. Seven of the 10 most costly U.S. disasters (based on dollar losses) occurred in a 5-year period, between 1989 and 1994. Five of these events caused more than $75 billion in damages, half of which was in residential

[1] On the Saffir-Simpson scale of hurricane intensity 1 to 5, a category 4 has maximum sustained wind speeds of at 131 - l55 miles per hour, and a minimum central pressure of 920 – 945 millibars.

structures -- 200,000 housing units destroyed or severely damaged, and another 600,000 damaged and in need or repair[2] (Comerio, 1998).

As daunting as these predictions and statistics may sound, natural disasters remain low probability events. Furthermore, the U.S. has some of the best building construction quality in the world, we are experiencing unprecedented economic prosperity, and our disaster prevention and loss financing programs (both public and private) are both comprehensive and generous. Compared with all the pressing daily matters (such as sales income, market competition, politics, taxes, employee needs, and wage issues), we are challenged to consider why the risk of natural disasters should rank high on the organizational agendas of small public entities, non-profit organizations, and businesses.

The goal of the Public Entity Risk Institute's (PERI) Internet symposium is to look carefully at the vulnerabilities (both physical and economic) of local entities, small businesses, and non-profit organizations to natural disasters and to identify practical steps that can be taken to manage the risks that natural disasters pose. This symposium is structured to promote a two-way dialogue between PERI's constituents and experts in the fields of risk and disaster and management. Each day's dialogue will begin with a paper prepared to initiate discussion on various aspects of disaster management.

In framing the issues for this week long dialogue, we want first briefly to consider some of the questions that you may have about disasters and disaster management: *What makes a disaster? How are disaster-related risks managed? Why are disaster costs increasing? Why existing disaster prevention and loss financing programs may not be enough?* This will be followed by an overview of the papers that will be presented during the symposium and some thoughts on logistics and expected outcomes.

What Makes a Disaster?

Hurricanes, floods, earthquakes, wildfire, tornadoes and hailstorms are all unintended yet not wholly unanticipated natural phenomena. When these phenomena result in significant physical, social and/or economic consequences, they become disasters. And, when the consequences exceed our capacities to meet the resulting demands, disasters become catastrophic. But, by definition, disasters, and (even more so) catastrophic disasters, are highly scale dependent. The severity of impact is relative to the totality at risk. A flash flood or tornado is often a highly localized disaster, perhaps, completely destroying everything in its path. For those individuals or businesses, it may be catastrophic, yet its overall effects on the city or county in which they reside may not be significant.

In the U.S., local governments have primary responsibility for supplying the resources for disaster response and recovery. A federal disaster is declared when the scale of the impact exceeds the capacity of local and state emergency management

[2] For context, these figures are roughly equivalent to the total number of housing units in the city of Houston or metropolitan Seattle, and it is more than half of all new housing starts in the U.S. in a single year.

systems to manage the situation and outside assistance is required. A federal disaster declaration opens the doors for federal, post-disaster individual and public assistance programs.

How are Disaster-related Risks Managed?

In preparing for disasters, we are essentially trying to manage our exposure to the unanticipated consequences that disasters pose. We attempt to build resiliency into our existing systems (i.e. physical, social, or economic) so we can sustain the potential consequences. Traditionally, individuals, businesses, and institutions have bought into resilience through the pooling of risk, which comes largely in two forms: private insurance and federal disaster financing programs.

In the U.S., the total insured value for wind- and fire-related risks of both residential and commercial exposures is over $30 trillion (Risk Management Solutions, 1999). This is approximately 90% of all residential exposures and 80% of all commercial exposures, and does not reflect the insured value of government facilities and infra-structure. The U.S. is the largest property and casualty insurance market in the world, and it also has one of the world's highest insurance penetration rates[3].

The total insured values for earthquake-related risks in the U.S. are significantly less, about $3.7 trillion, partially because the risk is not as widespread and also because the penetration rates are substantially lower (average of 8%) (Risk Management Solutions, 1999). Furthermore, the amount of insurance coverage for business inter-ruption-related losses is also significantly lower than what may actually be needed to sustain a business when recovering from a disaster. On average, commercial business interruption coverage amounts to less than 10% of the total policy coverage value and about 20% of the total building value.

Federal disaster financing programs include the National Flood Insurance Program and a variety of federal agency-specific, loan and grant programs, designed generally to meet the needs of a specific constituent group (e.g. individuals, homeowners, business owners). The National Flood Insurance Program is the only federally-backed disaster insurance program in the U.S. It is administered by the Federal Insurance Administration and pays out about $200 million annually to cover flood-related losses in the U.S. Other key federal programs are the Federal Emergency Management Agency's (FEMA) individual and family grants and public assistance programs; the Small Business Administration's (SBA) post-disaster loan program for individuals and businesses; the Department of Housing and Urban Development's (HUD) community development block grants; and assistance programs from the Economic Development Administration (EDA) and the Department of Agriculture.

In theory, by pooling disaster-related risks, every individual, business, or institution contributes a proportionally smaller amount (spread out over time) to the total

[3] Insurance penetration rates describe the percentages of eligible property holders who purchase insurance coverage.

cost of disaster-related consequences. For private insurance, this pooling comes in the form of premium income that each participant pays for building, contents, and other types of policy coverages. For federal programs, this pooling comes mostly from income taxes paid annually by individuals and corporations.

Why are Disaster Costs Increasing?

The recent publication, Disaster by Design, summarizes the results of more than 5 years of research on the state of natural hazards research and applications in the U.S. It concludes that recent high disaster losses are primarily the result of where and how we choose to live (Mileti, 1999). Populations in disaster-prone areas, particularly along coasts and rivers, have increased exponentially in recent decades. Furthermore, the density and sophistication of our urban fabric (e.g. public utilities, transportation systems, communications, and buildings) is also increasing, raising the potential for loss. These conclusions challenge some long-held paradigms of the risk management and engineering fields:

1) Our land use and building construction practices are not as resistant to the natural forces applied by extreme events, particularly large hurricanes and earthquakes, and
2) Our present system of disaster recovery financing (a mix of private insurance to compensate individual's losses and federal dollars to fund infrastructure and public buildings repairs) can adequately support urban reconstruction following future events (Comerio, 1999).

Why Existing Disaster Prevention and Loss Financing Programs May not be Enough

Until Hurricane Hugo hit South Carolina and the mid-Atlantic states in 1989, causing $4.2 billion in insured losses, no hurricane had resulted in claims in excess of $1 billion (III, 1999). And before Hurricane Andrew struck South Florida in 1992, experts predicted that the worst possible windstorm would not exceed $8 billion in insured property damage. Yet, the ultimate price tag for Hurricane Andrew was $15.5 billion, and it was soon followed by the 1994 Northridge earthquake which has an official reconstruction price tag of $25 billion and full economic loss projections of $40 billion (Johnson, 1999).

Andrew and Northridge were far more destructive than similar U.S. natural disasters in the past, but insurers and government officials are no longer assuming that these events are "worst case" scenarios for the future. The 1995 Kobe (magnitude 6.9) earthquake was a moderate seismic event, similar to the Northridge (magnitude 6.7) earthquake, but it caused a vastly different scale of loss. Economic losses from the Kobe earthquake were officially estimated at $89 billion, and some economists suggest that private expenditures increase the total loss to $150 billion (Johnson, 1999). Experts now predict that if a major hurricane or earthquake hit the urbanized center of a major metropolitan area, such as Miami, San Francisco, or Los Angeles, damage claims would

almost certainly exceed $50 billion. Scenarios for a great earthquake in the Los Angeles area estimate up to 5,000 deaths, 15,000 serious injuries, and $250 billion in direct economic losses (Mileti, 1999). Another scenario estimates that more than 100,000 housing units will be destroyed when a catastrophic earthquake hits the San Francisco Bay Area (Comerio, 1998).

Even though insurance continues to be the backbone of our post-disaster recovery financing, the escalating increases in losses suggest that we are creating liabilities, and we are seeing costs, that are out of scale with the contributions we make through the pooling of risks. The insurance industry is sending a definite call for legislative relief. During the 1999 sessions, Congress considered several significant pieces of proposed disaster insurance legislation. One piece under consideration in late July, the Homeowners Insurance Availability Act (H.R. 21), proposed creation of a federal system to back up catastrophe risk pool programs, such as the California Earthquake Authority and the Florida Hurricane Catastrophe Fund (Dow Jones, 1999). The legislation proposed capping annual payouts that these pools could make at $25 billion, meaning that if claims exceeded that amount in a given year, each claimant would only receive a pro-rated portion of the $25 billion. It is easy to imagine how, if more than one catastrophic disaster in the same year depleted the reinsurance fund, government officials would be placed in a difficult political position with victims who had been denied benefits.

Now more than ever, we need to view insurance as one of many available risk management tools, and we need to accept that our current disaster financing practices may not meet the real post- disaster recovery demands. Insurance payments for the Northridge earthquake are estimated at $12.5 billion, or 30 to 50% of the total economic loss, making this one of the most significant insurance payouts in world history. Furthermore, federal, state and local recovery packages for this event were also quite significant. But, even so, more than 5 years later, many individuals and businesses have not been able to rebuild. In particular, multifamily residential building owners, small businesses, and condominium resident associations fell through the gaps in our public and private recovery finance programs (Olshansky et al., 1999).

Recent studies conclude that small organizations, particularly small businesses, suffer disproportionately in disasters (Tierney et al., 1998). Their risk is greater because they typically have lower financial reserves, operate in single locations so that their risk is not geographically distributed, are less likely to be insured, and have less money to invest in mitigation and preparedness. Studies of disaster damage also show that disasters tend to exascerbate pre-existing economic and social conditions (Johnson, 1999). For example, serious disaster damage nearly destroyed the then-marginal downtown districts in Xenia, Ohio (tornado, 1974); Coalinga, California (earthquake, 1983); Watsonville and Santa Cruz, California (earthquake, 1989), south Dade County, Florida (hurricane, 1992), and Grand Forks, North Dakota (flood, 1997).

How Can Small Localities, Non-profit Organizations, and Businesses Deal with Disasters?

The potential consequences of disaster damage can extend well beyond the direct impacts that a disaster can have on businesses and residents. The community at-large (e.g. local jurisdiction, region and state economies, and even the national economic community) may be forced to address a range of consequential recovery-related problems including loss of good and services as well as jobs, declining land values and property and sales tax revenues, and temporary and permanent relocations of residents and businesses. It is this interconnectedness that makes us all vulnerable to disasters in our communities and beyond. Furthermore, it is this interconnectedness that compels us to consider, during this symposium, what practical steps each organization can take to prepare communities for disasters.

The first paper is "Coping with Disasters by Building Local Resiliency," by Mary Fran Myers, Co-Director, and Jacqueline Monday, Research Associate, of the Natural Hazards Research Applications and Information Center at the University of Colorado. In this paper, the authors urge us to understand that localities will bear a larger responsibility for coping with disasters in the future, and therefore need to be more self-sufficient in the face of disasters. They propose a more comprehensive and holistic approach for PERI's constituency organizations to take in fostering disaster-resiliency and long-term sustainability. We are challenged to consider how this approach can be institutionalized in our day-to-day management and planning activities, such as local land use policies, infrastructure maintenance programs, and local building construction practices.

The next paper is by, John Pine, Associate Professor at the Institute for Environmental Studies and the Management Department at Louisiana State. In "How Small Localities, Businesses And Non-Profit Organizations Can Assess and Manage the Ripple Effects of Disasters," he leads us beyond the obvious risks posed by disasters by examining the latent effects on large and small organizations in a disaster. He emphasizes how traditional disaster planning efforts tend to overemphasize direct impacts and consequently overlook the indirect impacts caused by road closures preventing employees and supplies from coming to and from a business, hazardous chemical releases at nearby properties, utility outages, bank and service organization closures, and damaged data records. We are challenged to think more broadly about critical links in our business activities, to utilize computer mapping tools, such as geographic information systems, to understand the risks (such as hazardous materials releases) posed by neighboring properties and within our communities, and to plan for business continuity following a disaster.

Next, John Clizbe, Vice-President of the American Red Cross (ARC), in his paper entitled "Making Disaster Mitigation Personal," reports on ARC activities in promoting individual and business mitigation and preparedness. He describes successful outcomes of three of the ARC's core mitigation strategies, to promote awareness and education, work directly with communities, and undertake advocacy efforts. We are challenged to

consider partnering actions that PERI and its constituency organizations can take to integrate within the many successful programs underway across the country, including leading by example; organizing, joining, or strengthening community coalitions; serving as a resource; and negotiating the delicate advocacy balance.

Finally, Howard Kunreuther, Professor, Wharton School at the University of Pennsylvania, in his paper entitled "Linking Insurance and Mitigation: The Need for Public-Private Partnerships," describes some of the reasons why insurance is not a cost-effective risk mitigation measure. He then proposes three types of public-private partnership programs that can encourage the purchase of insurance and adoption of mitigation measures: 1) auditing and inspecting property, 2) well-enforced building codes, and 3) insurance premium reductions linked with long-term loans for mitigation. And, we are challenged to consider how to overcome some of the regulatory issues, uncertainty issues, and economic needs for implementing such a program.

References

- Comerio, Mary, 1998, Disaster Hits Home, University of California Press.
- Dow Jones & Company, Inc, 1999, Dow Jones CustomClips, July 30.
- Insurance Information Institute, 1999, Press Release, Aug. 2, 1999, New York, NY.
- Johnson, Laurie A., 1999, Kobe at Four Years: A Look at Reconstruction Following Urban Earthquake Catastrophes, in Exposure: The Risk Management Solutions Magazine, Summer 1999, Vol. 4.
- Johnson, Laurie A., 1999, Empowering Local Governments in Disaster Recovery Management: Lessons from Watsonville and Oakland in Recovery from the 1989 Loma Prieta Earthquake and Other Recent Disasters, Earthquake Engineering Research Institute: Oakland, CA.
- Kloman, H. Felix, "Considering Catastrophes," Risk Management Reports, Sept/Oct 1993
- Mileti, Dennis S., 1999, Disasters by Design, A Reassessment of Natural Hazards in the United States, Joseph Henry Press, Washington, D.C.
- Olshansky, Robert, 1999, Year 1 Progress Report on Post-Disaster Redevelopment: Lessons from Kobe and Northridge, National Science Foundation Award #9730137, May 15, 1999.
- Risk Management Solutions, 1999, U.S. Industry-wide Exposure Data and Loss Summary, developed in January 1997 and updated to reflect 1999 estimates.
- Risk Management Solutions, 1999, Event Notifications #1-8 and Press Releases on Hurricane Floyd, September 1999.
- Tierney, Kathleen J., 1998, "Chapter 5. Earthquake Vulnerability and Emergency Preparedness Among Businesses," in Engineering and Socioeconomic Impacts of Earthquakes: An Analysis of Electrical Lifeline Disruptions in the New Madrid Area, Multidisciplinary Center for Earthquake Engineering Research, Monograph Number 2, State University of New York, Buffalo, NY.

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Coping with Disasters by Building Local Resiliency

By Jacquelyn L. Monday and Mary Fran Myers
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The old view of disasters as isolated, unpredictable phenomena, gave rise to policies, programs, and activities that actually fostered risk-taking; subsidized hazardous development; took an adversarial stance toward the natural environment; and adopted a narrow, short-sighted view of the world. Recent experience and research have suggested that the increasingly costly and complex natural disasters of the last decade are in large part the result of trying to cope with hazards in isolation from the broader social, economic, environmental, psychological, and political factors that shape our world. In some cases, these external factors have helped to create existing levels of risk and vulnerability in the first place. (See Mileti, 1999 for a full discussion.)

This new interpretation of the causes of disasters has significant implications for local governments. For one thing, it suggests that localities need to acknowledge that they have been creating their own disasters -- not single-handedly, of course, but in collaboration with other governmental, social, and economic policies, norms, and forces.

Second, localities are going to need to bear a larger responsibility for coping with disasters that strike them in the future. Although the disaster aid provided by the federal government has gotten widespread attention in the last five years or so -- and perhaps has even come to be expected by localities and individuals -- in fact such aid is forthcoming only in large disasters, it covers only a portion of the true cost of coping with a disaster (both short and long-term), and it is increasingly resented by taxpayers, who ultimately foot the bill. Further, as disasters become more complex and the amount of losses they cause increases, there may well be cutbacks even in the amount of aid the federal government is willing and/or able to provide.

More and more, the informed thinking on this situation is concluding that the best remedy lies in people and localities becoming more self-sufficient in the face of disasters. To accomplish this, communities and the nation must fully integrate disaster management, mitigation, and recovery with underlying societal and environmental conditions to produce sustainable localities and, ultimately, a sustainable world.

Sustainability

The precepts of sustainability are the subject of much debate, but there is general agreement that it is characterized, at a minimum, by economic vitality, a healthy environment, social equity, resilience in the face of disasters, and a concern for future generations. A key component of the process of building sustainability is a participatory approach that uses consensus-building instead of a "majority rules" mindset, and which begins with grass roots concerns and efforts. Sustainability is consistent with the popular

slogan, "Think Globally, Act Locally." It also encompasses the idea of "smart growth," which lately has been embraced by many localities.

Prudent communities nationwide are working to build their own disaster resilience. They are finding that, if they incorporate the ideals of sustainability into their ongoing community development plans, policies, and actions, both before and after disasters, they can minimize disaster losses and simultaneously enhance their economic viability, preserve the health of their natural environment, improve the quality of life of their residents, and tackle other community concerns as well.

For example, in Berkeley, California, mitigation is becoming a "social value." Sustainable hazard mitigation, particularly for risks presented by earthquakes, is being incorporated into the city's general development plans for housing, transportation, and land use. In Tulsa, Oklahoma, local officials have combined flood loss reduction efforts with stormwater management and recreational programs to meet not one, but three goals. In Deerfield Beach, Florida, under the auspices of the Federal Emergency Management Agency's (FEMA) "Project Impact" initiative, city officials, in cooperation with corporate partners, are offering courses for local homeowners on steps they can take to protect against future hurricane damage.

Ideas for Localities

The transition to sustainable, disaster-resilient local entities will be a gradual one. But there are many small steps that can be taken now to move toward a comprehensive approach that adopts the precepts of sustainability. From a public policy perspective, communities can consider the following ideas:

- Improve local building codes and construction practices, and add mitigation measures to ongoing infrastructure maintenance programs.
- Find ways to mainstream sustainability and disaster resilience into (1) day-to-day activities and decisions about land use, historic preservation, public safety, urban development, stormwater drainage, housing upgrades, energy efficiency, and economic development; (2) emergency and disaster planning; and (3) plans for post-disaster recovery
- Move citizens out of harm's way whenever possible, even a few buildings at a time. A long-range plan for vacating hazardous areas will eventually reduce risk and damage, and make the local housing stock safer and more desirable overall.
- Promote the purchase of earthquake and flood insurance by community residents, and make sure that public buildings are adequately insured against these and other perils. Insurance improves the ability to bounce back after a disaster.
- Use recovery after an actual disaster to take big steps toward sustainability.

It is important to note that achieving disaster resiliency will only be successful with an evenly balanced set of approaches. Over-reliance on one technique, e.g.,

insurance or building codes, is likely to detract from, rather than add to, a community's sustainability.

In order to ensure that all possible avenues are explored, communities should initiate local conversations on sustainable development and hazard mitigation, and share information and expertise among localities, especially those that have experienced disasters and have adopted long-term sustainable approaches. Another way to approach this would be to form partnerships with federal, state, and regional agencies, as well as the private sector and nonprofit entities. They can provide technical, financial, and political support. Further, they are allies.

There are many examples of such partnerships. FEMA's "Project Impact" initiative referenced above has provided funds to communities in every state to build these partnerships. FEMA has also created "Project Impact Partners" with the private sector and non-governmental organizations at the national level. The results of these unions, however, emanate at the local and individual level. For example, as a Project Impact Partner, Fannie Mae offers special loans to homeowners for implementing retrofitting projects (e.g., replacing roofing with fire-resistant materials, or waterproofing exterior walls). The Institute for Business and Home Safety (IBHS) is promoting a partnership to retrofit the nation's child care centers. In Evansville, Indiana, seven of 36 centers already have been retrofitted with volunteer labor and donated supplies and materials.

Building Sustainability after Disaster

Localities that are struck by a serious natural disaster often have an unparalleled chance to take great strides toward sustainability. The period of rebuilding and recovery is an opportune time for change. Not only are residents and local officials more willing to consider alternative approaches to the pre-disaster status quo, but also, under the current scheme, there is often an influx of money and expertise after a disaster that can be targeted toward activities and projects that will build sustainability and future disaster resilience. (See Natural Hazards Center and Disaster Research Institute, 1999, for a discussion of some recovery assistance that helped build disaster resiliency after a major flood.)

Such an opportunity cannot be seized without prior thought and planning, however. Localities should consider the following actions:

- Get training in sustainable recovery for key local officials and staff.
- At a minimum, the community (both citizens and public staff) should anticipate using a post-disaster period for making some changes. They should acknowledge that a return to the status quo after a disaster will not necessarily be the wisest long-range choice.
- The community should at least be receptive to the idea of receiving (and working hard with) outside expertise after a disaster. Although too few in number, there are experts in recovery, reconstruction, and sustainability who can be hired by the community to help its staff plan, orchestrate, and find

funding for a sustainable recovery. In addition, a handful of federal agencies (like the U.S. Department of Housing and Urban Development, the U.S. Department of Energy, and the U.S. Department of Commerce's Economic Development Administration) and organizations (e.g., the Urban Land Institute) sometimes offer technical planning expertise for sustainable redevelopment.

- A community should set up some new post-disaster policies ahead of time, even if it cannot formulate a comprehensive plan for long-term recovery. For example, it could establish a law or policy calling for a moratorium on certain kinds of rebuilding after a disaster. Policies that are "on the books" before disaster strikes are easier to defend and implement in the actual event. (See the City of Los Angeles, 1995, for an example of this kind of planning.)
- In an ideal situation, a community would do a full-fledged, comprehensive plan for its disaster recovery and long-term reconstruction, focusing on sustainability -- BEFORE the disaster occurs. (See Schwab et al., 1998 for a thorough description of this process.)

Some Gaps in Fostering Local Sustainability

Not all action toward local sustainability lies in the province of communities. Two notable gaps must be remedied by higher levels of government and other entities:

- State and federal recovery assistance -- both financial and technical -- needs to be better targeted toward building long-term disaster resilience at the local level, rather than just putting things back the way they were.
- There is a tremendous need for training in sustainable recovery, both for localities who are working on getting there on their own, and for state, local, and federal officials and other experts.

Easier Said than Done

This shift toward disaster resiliency and sustainability makes intuitive sense. So why is it the exception and not the rule in this country? Some obstacles are easy to identify, for example, economic and institutional barriers to holistic policies. Others are less easy to define. Key questions that need to be addressed are:

- How, exactly, does a community incorporate hazards issues into day-to-day business?
- Who decides what disaster resilience actually is, i.e., how does a community set an "acceptable level of risk?"
- Who is ultimately responsible for that decision?
- How does one measure the effectiveness of any one or combination of mitigation technique(s)?

References

- Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities. Washington, D.C.: The Joseph Henry Press. 368 pp. Also available at http://www.NAP.EDU/books/0309063620/html/index.html
- City of Los Angeles, 1995. The City of Los Angeles Recovery and Reconstruction Plan. Los Angeles, CA: City of Los Angeles.
- Mileti, Dennis S. 1999. Disasters by Design: A Reassessment of Natural Hazards in the United States. Washington, D.C.: The Joseph Henry Press. 351 pp. Also available at http://www.NAP.EDU/books/0309063604/html/
- Natural Hazards Center and Disaster Research Institute. 1999. An Assessment of Recovery Assistance Provided after the 1997 Floods in the Red River Basin: Impacts on Basin-wide Resilience. Prepared for the International Red River Basin Task Force, International Joint Commission. Ottawa, Canada: International Joint Commission. 66 pp. Also available at http://www.ijc.org/boards/rrb/Rec_Ass.pdf
- Schwab, Jim, Kenneth C. Topping, Charles C. Eadie, Robert E. Deyle, and Richard A. Smith. 1998. Planning for Post-Disaster Recovery and Reconstruction. Planning Advisory Service Report No. 483/484. Chicago, Illinois: American Planning Association. 346 pp. Table of contents available at http://www.planning.org/bookstore/Description.asp?Index=P483
- Wetmore, French and Gil Jamieson, 1999. "Flood Mitigation Planning: The CRS Approach," Natural Hazards Informer No. 1 (July). 16 pp. Also available at http://www.colorado.edu/hazards/informer/infrmr1a.htm

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Looking Beyond the Obvious Risks: How Small Localities, Businesses and Non-profit Organizations Can Assess and Manage the Ripple Effects of Disasters

By John C. Pine, Associate Professor
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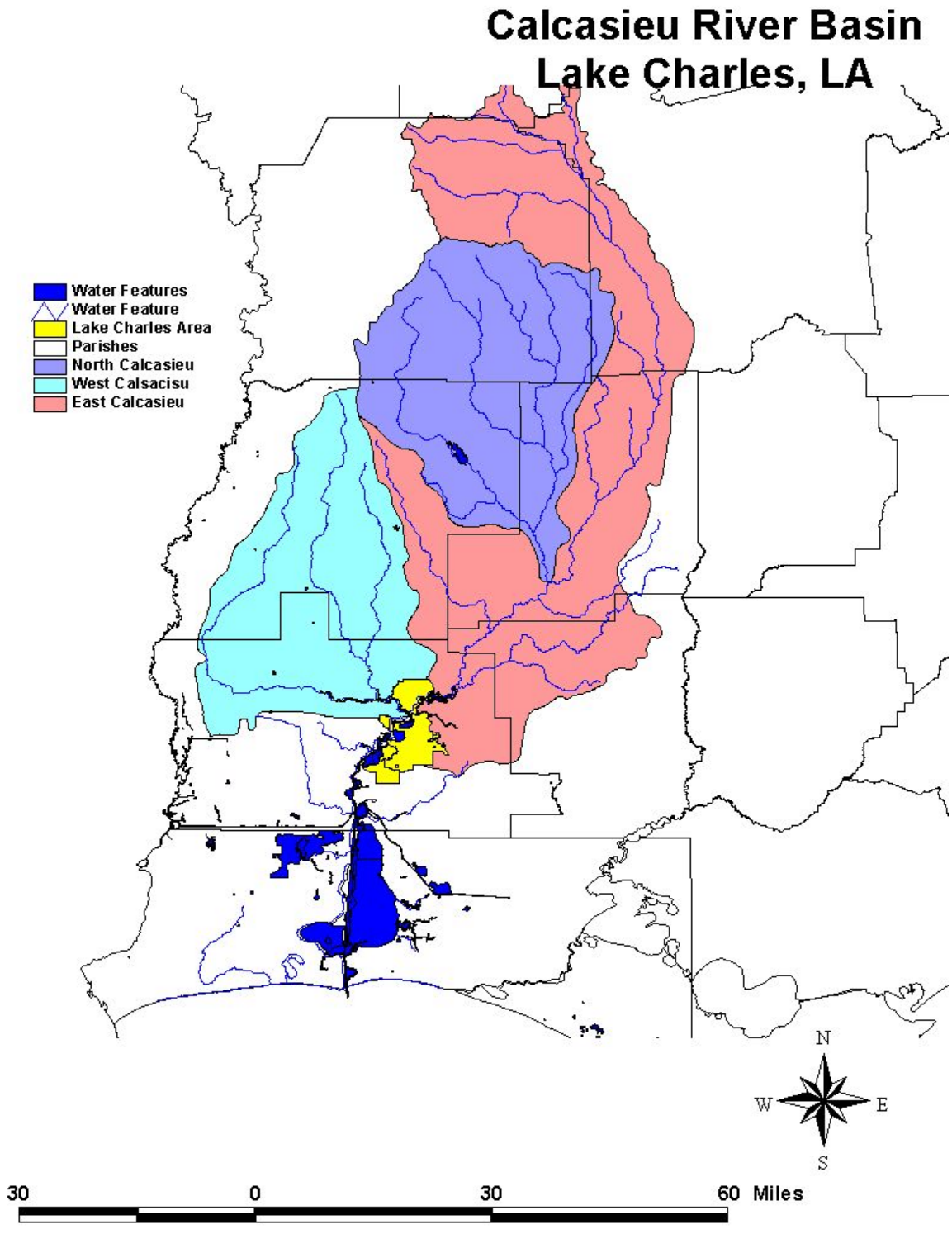
Current initiatives to avert organizational computer support problems in the transition to the year 2000 (Y2K) illustrate an increasing emphasis for emergency planning activities for large and small public, non-profit, and private organization. Efforts to prepare for disasters and enhance response, recovery, and mitigation strategies are seen in national hurricane, earthquake, and chemical emergency program initiatives. NOAA's National Weather Service, the national and local media, and even local emergency planning committees stress the importance of being prepared.

Although disaster planning and mitigation efforts are increasing, large and small organizations should look beyond the obvious risks and examine the latent or ripple effects of disasters. Traditional wind, wildfire, or hurricane planning efforts stress early risk or storm identification, community warning, and coordination of community response activities. This approach tends to focus on the obvious risk and fails to appreciate the latent effects of a natural disaster on large and small organizations in a community.

Latent Impact of Hurricanes

Hurricane response plans tend to emphasize the threat of high winds and storm surge but seldom account for the potential affects of flooding associated with a hurricane. Communities away from the coastal hurricane impact zone may be impacted by flooding. As a result, small organizations in these communities need to look at how flooding could impact their operations. An illustration of the latent impacts of a hurricane is offered here.

Wind and rain from a storm could quickly move through a coast area. As the winds subside, heavy rainfall is collected in the inland river basin. The rain from this heavy rainfall then flows through the basin to the coast. Although communities in the coastal region may be initially spared from wind and storm surge damage, flooding could occur a few days later from heavy rains in the river basin. [Editor's Note: Please view the figures in the PERI Symposium Center.] Figure No. 1: Calcasieu River Basin, shows the extent of the river basin and how it flows through Lake Charles to the Gulf of Mexico. Figure No. 2 shows how parts of the Calcasieu Basin meet and flow into the Lake Charles, LA area.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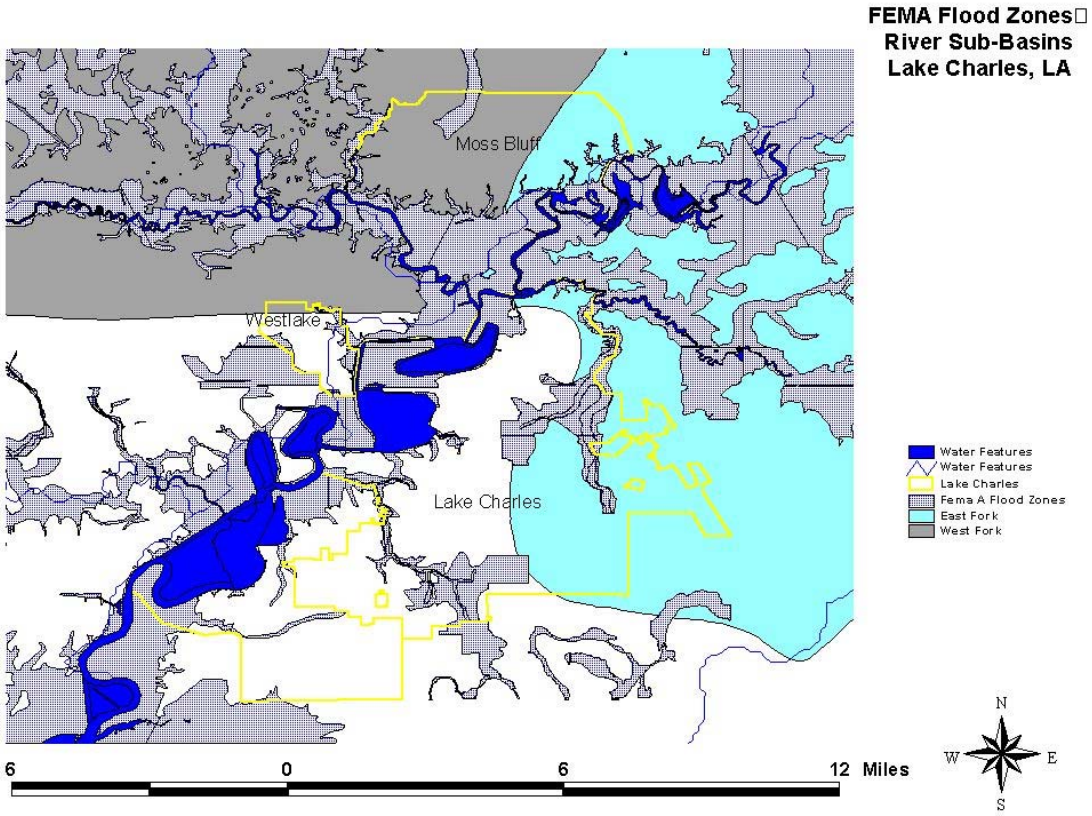
FEMA Flood Zones
River Sub-Basins
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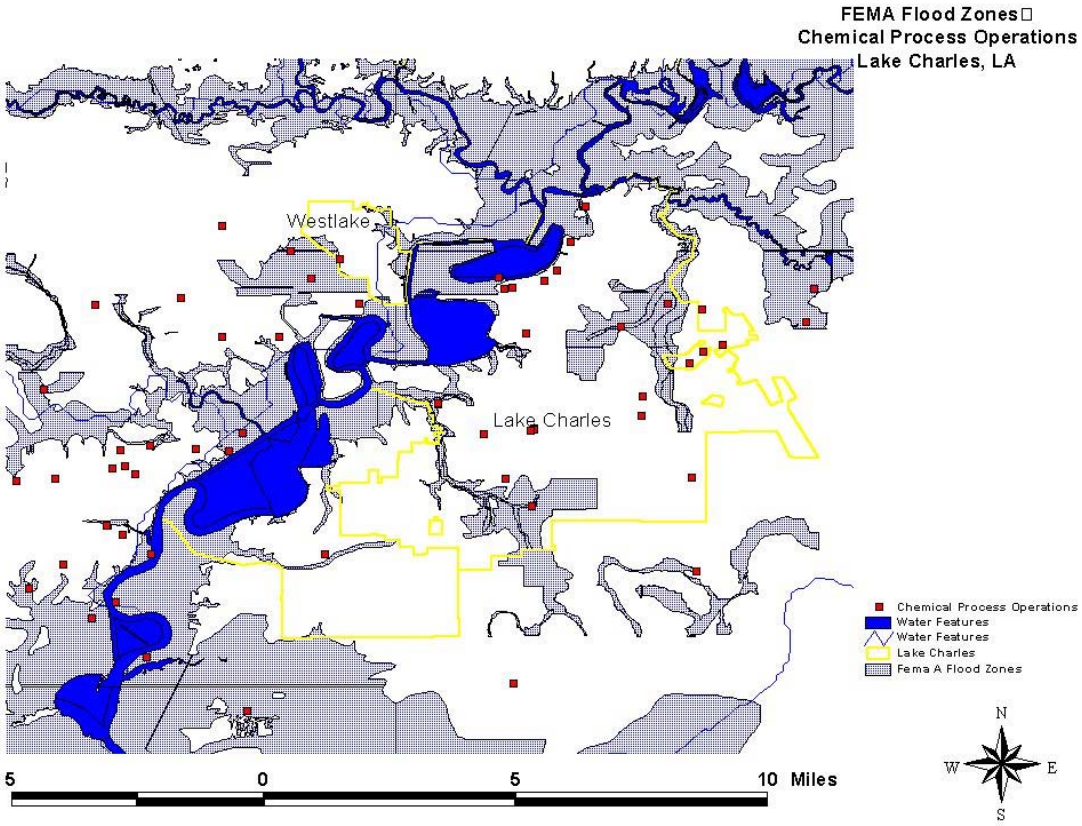
In this situation, employees may be prevented from getting to work in a timely manner by road closures due to high water on major highways. Flooding could also affect the shipment of materials and supplies. Communication systems could be vulnerable to extensive flooding as well as electrical or gas utilities. The loss of normal communications or power could impact large and small operations even though the disaster did not directly affect the local area. Computer records could be vulnerable to physical structural damage to a business.

Hurricanes and Chemical Hazards

A hazardous chemical incident is just one of the many ripple effects of high winds, storm surge, or flooding associated with a hurricane. Traditional emergency planning and mitigation efforts examine scenarios that involve accidents resulting from the operational chemical process production units rather than factors from the external environment (EPA 1987; NRT 1987; Patton 1993). As a result, organizations may fail to examine the nature and extent of risks associated with chemical accidents caused by, or significantly affected by, a hurricane, wildfire, tornado, or earthquake.

To understand the latent impact of a disaster requires a broader view of business risks. Risk identification should include scenarios which are based on dual hazards from extreme weather conditions and hazardous chemical processing incidents. Figure No 3: FEMA Flood Zones and Chemical Processing Operations, and Figure No. 4: Storm Surge and Chemical Processing Operations, show that businesses that produce, store, or transport hazardous chemicals could be vulnerable to flooding or storm surge from hurricanes.

(Text continued after Figures 3 and 4)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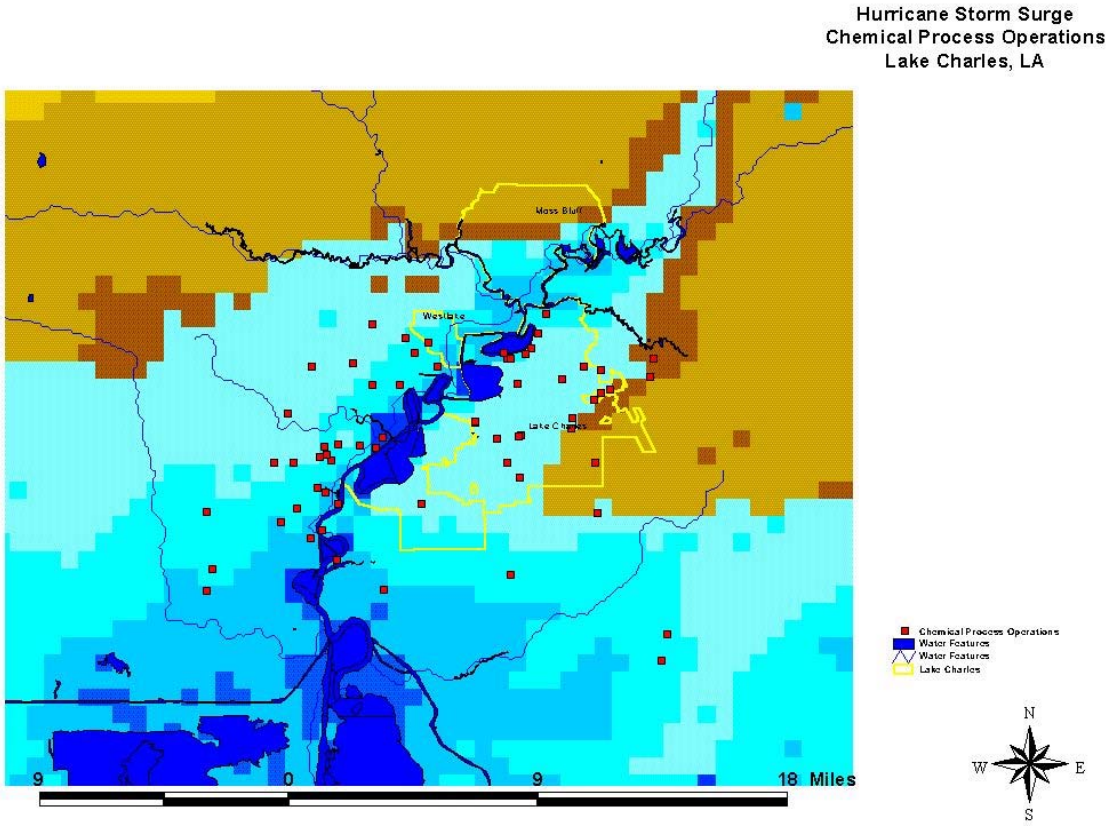
Hurricane Storm Surge
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The storm surge image reveals that a specific site could have up to three to six feet of water in their area (Vibhas and Suhayda, 1999). In addition, small businesses or non-profits located near a chemical processing operation could be affected by an accidental release. Local transportation routes could be closed or the evacuation of the small business could be required in the event of a release.

The implications for small business and communities are significant. When a hazardous materials event occurs during a natural disaster, access to facilities may be restricted, waterlines for fire suppression may be broken, and response personnel and resources may be limited. The potential threat of an event can be magnified by winds, thunderstorms, ice, fog, or floods which can spread contamination quickly, threatening the local water supply, agriculture, and the air (FEMA 1997).

Recommendations

In order to reduce ripple effects, such as chemical incidents in hurricane-related flooding, businesses and communities should take a broad view in their emergency planning and mitigation efforts. Some specific suggestions are offered here.

- FEMA has initiated a comprehensive effort to assist communities in improving emergency management in their communities. The Disaster Resistant Communities Program attempts to include large and small businesses in emergency planning and mitigation efforts in the community. Encourage your community to be involved in this effort; suggest that local emergency management officials adopt the principles behind Disaster Resistant Communities. Large and small businesses have a significant investment in their community; become involved in the emergency management process. Look for the ripple effects of disasters in your community.
- Have a broader view of risks; this is critical to small operations. Even if your organization is located outside a flood or coastal hazard zone, it may depend on transportation, communication, or utility networks that would be impacted by a natural disaster. In a disaster, could local transportation networks limit your employees access to your site? Would road closures impact shipping and receiving? Could communication backup systems be affected by a disaster? Could alternative work sites be established to allow the organization to function in a disaster?
- Recognize that risks associated with chemical hazards could be impacted by natural disasters. The extensive flooding along the Missouri and Mississippi Rivers impacted sewerage treatment and municipal water facilities. One and two ton chemical storage tanks were shown on the national news floating in the waterways. A large chemical pipeline fire in the Houston River Channel was caused by extensive flooding. We are lucky that few such incidents have occurred during natural disasters. Ask for assistance by the Local Emergency

Planning Committee to help identify high risk areas (e.g. facilities and transportation routes for hazardous chemicals).

- How will your organization's operation be impacted indirectly by a natural or chemical disaster? Could you be inundated with requests for services or products? Could you make plans for expanding your services or products in a disaster? Would your resources (suppliers), customers, or clients be adversely impacted by a disaster? Does your business continuity plan include strategies to address these issues?
- Take advantage of computer tools such as geographic information systems (GIS) to understand the risks in the area (Johnson 1997). Some mapping systems have been supported by federal agencies and available free of charge. LandView developed by the U.S.EPA and the Census Bureau was designed to be self taught and thus easy to use. LandView maps are available for each county in the United States.

Conclusions

Comprehensive emergency plans must address the obvious risks to an organization, as well as the latent, unintended, unrecognized, and generally unanticipated consequences of actions (Merton 1957). In preparing for or responding to a disaster, small communities, non-profits, and businesses must consider the ripple effects of organizational actions or inaction. An appreciation for the nature of risks and appropriately selected emergency management strategies can be the determining factor in the operational survival of your business.

References

- Britton, Neil R. and John Lindsey (1995). "Demonstrating the Need to Integrate City Planning and Emergency Preparedness: Two Case Studies." *International Journal of Mass Emergencies and Disasters*. Vol. 13 No. 2 pp. 161-178.
- EPA (1987). *Technical Guidance for Hazards Analysis: Emergency Planning for Extremely Hazardous Substances.* US EPA, DOT, FEMA. Washington DC.
- FEMA(1997). *Multi Hazard: Identification and Risk Assessment: The cornerstone and the National Mitigation Strategy*. A report prepared in support of the International Decade for Natural Disaster Reduction.
- Johnson, Nan, O. Gerald Uba, Michael McGuire, Jeffrey Milheizler, Philip Schneider, and Mark Whitney (1997). "Fire flood, quake, wind! GIS to the rescue: how new mapping systems are being used to cope with natural disasters. *Planning*, Vol. 63 No. 7.
- Merton, Robert K. (1957). *Social Theory and Social Structure*. Illinois: The Free Press.
- National Response Team (NRT) (1987). *Hazardous Materials Emergency Planning Guide*. NRT-1. Washington, DC.
- Patton, Dorothy E. (1993). "The ABCs of risk assessment." *EPA Journal*. Vol. 19 No. 1.

- Pine, John C. (1999). "Risk Assessment of Natural and Technological Hazards: A look at Calcasieu Parish," *Hurricanes and Chemical Hazards*, an Internet Conference, Public Entity Risk Institute, Fairfax, VA. See: the Internet Conference "Hurricanes and Chemical Hazards at http://hurricane.lsu.edu
- Vibhas, Aravamuthan, Joseph N. Suhayda (1999). "Real Time Forecasting of Hurricane Winds and Flooding," *Hurricanes and Chemical Hazards*, an Internet Conference, Public Entity Risk Institute, Fairfax, VA. See: the Internet Conference "Hurricanes and Chemical Hazards at http://hurricane.lus.edu

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Making Disaster Mitigation Personal: An American Red Cross Approach

By Dr. John Clizbe
Vice President
American Red Cross

Introduction

Just as every disaster is ultimately intensely personal, the American Red Cross has found that a commitment to making our homes and communities safer also can and should be personal. This paper provides an overview of the initiatives that the Red Cross has launched to help make families and neighborhoods safer from the ravages of hurricanes, floods, earthquakes, and other natural hazards. It also suggests possible ways that other small non-profit public and private organizations can promote and encourage disaster mitigation where it counts—in communities across the nation.

Role of the Red Cross in Disaster Preparedness and Mitigation

Most Americans are very familiar with the fact that the American Red Cross has been at the cutting edge of disaster relief activities for more than one hundred years. Each year, our paid and volunteer staff respond to more than 60,000 incidents ranging from fires that affect single families to massive hurricanes that devastate entire regions. Regardless of the magnitude or kind of disaster, the Red Cross is there to provide food, clothing, shelter as well as mental health counseling to help people cope with the searing emotional trauma caused by a disaster.

Until or unless a disaster strikes near home, however, people often forget that the Red Cross is also working in communities across the country, before disasters strike, to help people prepare for disasters and other emergencies. Our far-reaching Community Disaster Education (CDE) program uses electronic, printed, and video materials as well as community presentations to provide people with the vital information they need to protect themselves and stay safe when a disaster threatens.

Complimenting our extensive disaster preparedness program, we have made disaster mitigation a top priority. In doing so, we have joined forces with the Federal Emergency Management Agency (FEMA), the Institute for Business and Home Safety (IBHS), the Habitat for Humanity, the Association of State Flood Plain Managers, and many other public and private sector partners to achieve our shared objective of making disaster preparedness and mitigation personal values and institutional priorities.

We have taken this step because we are very concerned about the soaring social and economic costs of disasters. In addition, we also know from experience that these costs are dramatically reduced when families, businesses and communities take proactive steps and measures to reduce their vulnerability.

Examples of Current Red Cross Disaster Mitigation Activities

While there is much more that needs to be done, the Red Cross is working hard across the country to raise the public's awareness of the hazards that threaten them and to provide them the information they need to better protect themselves and their homes from those hazards. A few of the many examples of these efforts and our three core mitigation strategies are described below.

Awareness and Education

- The **Southwestern Indiana Chapter** in Evansville together with its local partners: added disaster preparedness and mitigation tips to the local phone book; created a disaster safety calendar for each household that focuses on a different preparedness or mitigation measure each month and; worked with Meals on Wheels and Habitat for Humanity to make client's homes safer.

- **Florida chapters** are playing an active role in the *Florida Alliance for Safe Homes* (*FLASH*) program designed to saturate the public with information on how to protect their homes from hurricanes. Also, because we believe that before communities can become more resistant to disasters, mitigation needs to begin at home and in neighborhoods. Therefore, we are a piloting a Disaster Resistant Neighborhood program in a number of communities in Florida that is designed to provide residents with the life and property safety information that they need as well as to unite neighbors together to take actions in this important effort.

- The **Central Florida Chapter** in Orlando worked hand-in-hand with local voluntary agencies and private sector partners to sponsor a "Hurricane Home Make-over" drawing during "Hurricane Week." The winning home was equipped with hurricane shutters and storm-rated garage doors. Nearby trees were trimmed to prevent damage from falling branches. A TV station videotaped the retrofit and used it to inform citizens what they should do to protect their homes.

Direct Activities

- The **Cincinnati Area Chapter** in Ohio works with its community partners including Habitat for Humanity to help low income people whose homes have been repeatedly flooded to elevate or move water heaters, washers and dryers out of harm's way.

- The **Bay Area Chapter in Oakland, California** is an excellent example of how the Red Cross is supporting FEMA's *Project Impact* program, the IBHS *Showcase Community* initiative, and other programs across the country that are designed to make communities more resistant to disasters. The chapter teamed up with other community-based organizations in an ongoing program

to perform non-structural earthquake retrofits to the homes and apartments of low-income senior citizens. Latches are applied to kitchen cabinet doors; bookshelves are bracketed to wall studs, and water heaters are anchored to protect them from earthquake damage. Over 300 homes have been retrofitted thus far.

Advocacy

- **The Red Cross is Serving as a Strong Advocate for Mitigation** at the local, state, regional, and national levels by supporting the adoption and enforcement of effective building codes, prudent land-use policies, and other policies that reduce the vulnerability of people to disasters. For example, chapters throughout Florida are urging the state to enact a statewide building code to help ensure homes and other buildings are able to withstand hurricane force winds.

Challenges

Although mitigation has been around a long time as a concept, it has yet to be fully embraced as a practice. We in the Red Cross believe that mitigation will only become a practice when the public personalizes their risk and realizes that there are often simple and inexpensive things they can do to minimize that risk. It's also important that they understand that mitigation measures are cost-effective, pay long-term dividends, and that the consequences of failing to mitigate are severe, unaffordable, and unacceptable. Then and only then, will America begin to break the vicious, costly and destructive disaster-rebuild-disaster cycle.

Keys to Success and Opportunities

We strongly believe that partnerships and a local or grass-roots approach are the keys to mitigation. No single organization has the time, people or financial resources to do all that needs to be done. However, by combining our efforts, talents, skills, strengths and resources, we can truly do what is necessary to contain the soaring social and economic costs of disasters. Also, our experience shows that the most effective mitigation initiatives are those that begin with community based campaigns that educate and motivate the public to take mitigation actions. Therefore, it is clear that there are a myriad of opportunities for small non-profit public and private organizations to forge proactive community-based efforts to limit the harm that disasters inflict on people and communities. Possible roles include:

- **Leading by example—**by taking steps to reduce the vulnerability of your own facilities. Also, by training and educating your employees about disaster safety in the workplace and encouraging them to make their homes safer.

- **Organizing, joining or strengthening community disaster preparedness and mitigation coalitions—**by identifying and working closely with other

local public and private stakeholders and interested organizations to assess the level of exposure of the community to natural hazards and to develop local mitigation strategies to reduce disaster losses.

- **Creating or serving as a resource center for "how-to" mitigate information for the public—**by collecting and sharing information that raises the public's awareness of the risks that threaten them and that tells them what they can and should do to reduce their vulnerability. (The Red Cross, FEMA, the U.S. Geological Survey and the National Weather Service have excellent brochures that are available in print or electronic form.) In addition, it's also important to capture and share success stories that demonstrate that disaster preparedness and mitigation pay off—they save lives, reduce injuries, and lessen property damage.

- **Working closely with community partners to link or integrate mitigation initiatives into other important community priorities—**such as enhancing the quality of life of citizens, improving the environment, and strengthening the economy.

- **Addressing the issue of how to make those who are most at risk to disasters safer.** All too often, the economically disadvantaged are the most severely affected by natural hazards—yet they have the fewest means available to reduce their vulnerability. This sobering fact warrants more discussion in a number of circles.

- **Courageously negotiating the delicate advocacy balance** between the best interests of the overall community and the special interests of important constituencies.

Conclusion

For our part, we in the American Red Cross strongly believe that doing more to promote and support disaster mitigation initiatives across the nation is an important way for us to accomplish our vision of "*helping more people better anticipate, survive, and recover from disasters.*" Therefore, we genuinely look forward to working closely with our national, state and local partners across our great nation in this critically important undertaking.

- End -

Linking Insurance and Mitigation: The Need for Public-Private Partnerships

By Howard Kunreuther
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Nature of the Problem

There is considerable empirical evidence that most property owners in hazard-prone areas will not purchase insurance voluntarily either because they believe that the disaster will not happen to them and/or they feel the cost of coverage is too expensive. Communities and municipalities have little incentive to invest in these measures with respect to their public facilities, because they know they can rely on the federal government for assistance following a major disaster.

Homeowners, apartment owners, and small businesses are also not interested in investing in cost-effective risk mitigation measures (RMMs), because they have short time horizons and/or severe budget constraints which either reduce their perceived net benefits from these measures or simply prevent them from making the investments. In addition these individuals appear to believe that investing in such loss reduction measures will not increase their residence's property value.

By a cost-effective RMM we mean that the discounted expected benefits over the life of the structure exceeds the cost of the mitigation measure. For example, a measure such as strapping a water heater with simple plumbers tape can normally be done by residents for less than $5 in materials and one hour of their own time. This mitigation measure can reduce damage by preventing the heater from toppling during an earthquake, creating gas leaks and causing a fire.

Insurers have little reason to encourage mitigation in hazard-prone areas if they feel that the rates they are allowed to charge by state regulators are inadequate. Due to regulatory constraints on pricing, insurers will *not* voluntarily provide these incentives unless they are *required* to provide coverage to individuals in hazard-prone areas. Otherwise they would prefer to charge the same rates with and without mitigation and hope that some policyholders decide not to renew their insurance policy. In fact, the insurer wants to do everything it can to make the policyholder leave them. On the other hand, if rates in hazard-prone areas are based on risk, then insurers would want to encourage cost-effective loss reduction measures by reducing premiums.

Public Private Partnership Programs

We propose three types of public private partnership programs that can encourage the purchase of insurance and adoption of mitigation measures:

- auditing and inspecting property,
- well-enforced building codes, and
- insurance premium reductions linked with long-term loans for mitigation.

These programs involve key interested parties from both the public and private sector and can be viewed as part of a package for helping to reduce losses from future natural disasters.

Auditing and Inspecting Property

One way to determine the ability of a structure to withstand the impact of natural disasters would be to inspect the property carefully. Banks and financial institutions could require that structures be inspected and certified against natural hazards as a condition for obtaining a mortgage. This inspection, which would be a form of buyer protection, is similar in concept to termite and radon inspections normally required when property is financed. One way to formalize this proposal would be to include the ability of the structure to withstand specific natural hazards as part of the standard mortgage inspection process, and could include remediation recommendations. The success of such a program requires the support of the building industry, of realtors, and of a cadre of inspectors, well-qualified to provide accurate information on the condition of the structure.

Well-Enforced Building Codes

Well-enforced building codes help correct misinformation that property owners may have regarding structural safety while leveling the playing field for constructing buildings. One reason that property owners misperceive risks is because the real estate community has limited interest in providing information on the nature of hazards, because these data do not sell houses. Engineers and builders have limited economic incentives for designing safer structures since doing so normally means incurring costs that they feel will hurt them competitively.

There is an additional rationale for building codes. When a building collapses it may create externalities in the form of economic dislocations and other social costs that are beyond the economic loss suffered by the owners. These may not be taken into account when the owners evaluate the importance of adopting a specific mitigation measure. For example, if a building topples off its foundation after an earthquake, it could break a pipeline and cause a major fire that would damage other homes not affected by the earthquake in the first place. In other words, there may be an additional annual expected benefit from mitigation over and above the reduction in losses to the specific structure adopting this loss reduction measure. All financial institutions and insurers who are responsible for these other properties at risk would favor building codes to protect their investments.

One way to encourage the adoption of building codes is for banks and financial institutions to provide a seal of approval to each structure that meets or exceeds specified standards. The Institute for Business and Home Safety (IBHS) Showcase Community

Program is a concerted effort with local businesses, financial institutions, the construction industry, and other community leaders to encourage the adoption of cost-effective mitigation measures to reduce future losses from natural disasters affecting their area.[1] Structures that meet predefined criteria would receive a certificate of disaster resistance. Upon receipt of that certificate, there would be a set of incentives provided by banks (e.g. lower mortgage rates), contractors, and insurers. The success of such a program requires a solid audit and inspection program. If banks require disaster insurance coverage as a condition for a mortgage, then most property owners will be protected against losses from a disaster. The only ones who may not be protected are those who have paid off their mortgage. Insurers may also want to limit coverage only to those structures that are given a seal of approval so as to encourage mitigation.

Insurance Premium Reductions Linked with Long-Term Loans

Suppose homeowners are reluctant to incur the up-front cost of mitigation due to budget constraints. Then one way to make this measure financially attractive to the property owner is for the bank to provide funds for mitigation through a home improvement loan with a payback period identical to the life of the mortgage. For example, suppose that a mitigation measure costs $1,500 and reduces expected losses by $200 per year. [2]. A 20-year loan for $1,500 at an annual interest rate of 10% would result in payments of $145 per year. If the annual insurance premium reduction reflected the expected benefits of the mitigation measure (i.e. $200), then the insured homeowner would have lower total payments by investing in cost-effective mitigation than by not doing so. For insurers to be interested in reducing premiums for those who mitigate, rates should be based on risk. Premiums can now be determined more accurately today than five years ago due to improved scientific modeling of the risks from natural disasters such as earthquakes, floods, hurricanes, and tornadoes. [3]

Many poorly constructed homes are owned by low-income families who cannot afford the costs of mitigation measures on their existing structure nor pay for the costs of reconstruction should their house suffer damage from a natural disaster. Equity considerations argue for providing this group with low interest loans and grants for the purpose of adopting cost- effective mitigation measure or for them to relocate to a safer area. Since low-income victims are likely to receive federal assistance after a disaster, subsidizing these mitigation measures can also be justified on efficiency grounds.

Implementation Challenges

This paper has proposed an approach for managing natural disasters which stresses the importance of private insurance as a catalyst for reducing losses in the future and covering much of the losses. The success of the proposed disaster management program requires the active involvement of a number of interested parties from the private sector such as insurers, banks and financial institutions, realtors, builders and contractors. It also requires that government officials enforce building codes. Public sector agencies have a role in providing assistance to low-income families so that they can adopt cost-effective

mitigation measures. State insurance commissioners have to be sympathetic to risk-based premiums for coverage against natural disaster losses.

With respect to implementing such a program, there is need for specifying the types of cost-effective mitigation measures that could be applied to new and existing structures should be specified. Only then can insurers, builders, and financial institutions work together to incorporate these measures as part of building codes and provide property owners with appropriate rewards for adopting them. Questions remain about the use and enforcement of building codes, and about the types of incentives insurers can provide to individuals who invest in loss mitigation measures.

There are also a set of open questions which need to be addressed in trying to implement features of the above program. Some of these questions are:

Regulatory Issues: What impact would state rate restrictions on premiums that insurers are allowed to charge in hazard-prone areas have on availability of coverage and their incentive to encourage mitigation?

Uncertainty Issues: There is considerable uncertainty in estimating the probability of disasters of different magnitudes occurring and the magnitude of the resulting losses. How can you incorporate these uncertainties in an analysis of which mitigation measures are cost-effective?

Economic Incentives for Mitigation: Is there sufficient knowledge about natural hazard risks to incorporate the effectiveness of mitigation alternatives into the insurance underwriting process? What types of economic incentives aside from premium reductions (e.g. lower deductibles, higher limits of coverage) are likely to be attractive to policyholders to encourage them to adopt mitigation measures? What would be the most effective ways of providing subsidies to low-income families to encourage them to adopt cost-effective mitigation measures?

This is a very exciting time for the insurance industry to explore new opportunities for dealing with risks from natural hazards. If insurance can be used as a catalyst to bring other interested parties to the table, then this policy tool will have served an important function in reducing losses and providing protection against damage from earthquakes, floods, hurricanes, and other natural disasters.

Notes

1. The Institute for Business & Home Safety (IBHS) is an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters. For more details on the activities of the IBHS, go to its web site at http://www.ibhs.org.
2. By expected annual loss reduction, we mean the probability of a disaster multiplied by the reduction in losses. For example, suppose a hurricane had a 1/100 chance of occurring and causing damage to your property, and a mitigation

measure would reduce losses by $20,000 is such a hurricane occurred. If this was the only hurricane that would ever damage your home, then the expected annual loss reduction would be $200 (1/100 times $20,000).

3. It would be even easier to link loans with insurance if some type of "perpetual" homeowner's insurance were available with a term identical to the life od the mortgage. If mitigation were undertaken after the insurance was issued, there would be a reduction in the premiums paid to reflect the lower expected loss from future disasters.

References

- Cohen, Linda and Noll, Roger (1981) "The Economics of Building Codes to Resist Seismic Structures" Public Policy Winter 1-29.
- Heinz Center for Science, Economics, and the Environment. (in press) The Hidden Costs of Coastal Hazards: Implications for Risk Assessment and Mitigation. Washington, DC: Island Press.
- Kunreuther, Howard and Roth, Richard, Sr. ed. 1998 Paying the Price: The Status and Role of Insurance Against Natural Disasters in the United States Washington, D.C: Joseph Henry Press
- Levenson, Leo (1998) "Residential Water Heater Damage and Fires Following the Loma Prieta and Big Bear Lake Earthquakes" Earthquake Spectra 8:595-604.
- Litan, Robert, Krimgold, Frederick, Clark, Karen and Khadilkar, Jayant (1992) Physical Damage and Human Loss: The Economic Impact of Earthquake Mitigation Measures (New York: Insurance Information Institute Press).
- May, Peter, Burby, Ray and Kunreuther, Howard (1998) "Policy Design for Earthquake Hazard Mitigation: Lessons from Energy Conservation, Radon Reduction, and Termite Control" Earthquake Spectra

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