The Recovery Phase of Emergency Management

Background Paper

Prepared for the
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Preface

This paper was prepared for the Intermodal Freight Transportation Institute (ITFI) at the University of Memphis to help advance research, education, and outreach related to intermodal freight transportation. The primary audience for the paper includes IFTI faculty, staff, and students as well as representatives of the public and private organizations that support IFTI.

The paper is part of an ITFI initiative to improve mutual understanding between the public and private sectors relative to intermodal freight transportation. Many of the referenced documents are available online, and links are provided in the text or in the list of references.

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The author is solely responsible for the content, findings, and conclusions.

Abstract

Emergency management is often described in terms of phases or components, using terms such as mitigation, preparedness, response, and recovery. Some sources add or substitute different terms, but virtually every source—policy documents, plans, manuals, textbooks, journals, and research reports—agree that "recovery" is an essential part of emergency management. This paper examines disaster "recovery," focusing on the complexity of issues, multiple stakeholders, distinctions between short- and long-term recovery, conceptual models of community recovery, and the recovery of businesses impacted by disasters. The purpose is to provide background information for transportation researchers and practitioners.

The paper also addresses the question of whether "recovery" has been neglected by researchers, practitioners, and policy makers. Part of the answer seems to be that the current focus is more on eliminating or reducing the *need* for recovery. The public sector is emphasizing prevention, protection, reduced vulnerability, increased sustainability, and improved resilience. Likewise, the private sector is giving increased attention to risk management and related concepts.

Nonetheless, disasters will occur and recovery will be required. Whether or not recovery has been the most neglected phase of emergency management in the past, transportation researchers and practitioners now have important opportunities to influence research and policy development related to recovery.

The Recovery Phase of Emergency Management

The purpose of this paper is to provide an overview of the "recovery" phase of emergency management in the United States and to identify sources and potential topics for more focused research. In this context, recovery is one of multiple phases or components, usually described as:

- Mitigation
- Preparedness
- Response
- Recovery

Some sources add "prevention" or "protection" as separate components. Others modify "mitigation" to "mitigation and prevention." Others expand or integrate the notion of phase or components with concepts such as disaster-resistance, sustainability, and resilience. The private sector is more likely to use terms like contingency planning, business continuity, and risk management.[1]

The word "phase" is used in this paper interchangeably with "component," "activity," "aspect" and "function." The term "emergency management" is used here to encompass all of the activities carried out by the federal, state, and local agencies that are referred to as "emergency management agencies (EMAs)," and, more broadly, the efforts of the public and private sectors to deal with hazards, risks, and disasters of all types.

Alternative definitions are examined for a few other key terms used in the paper, but many terms are used without offering specific definitions. Readers should be alert for unusual or multiple meanings. Words and phrases that have specific meanings among emergency management practitioners may have different meanings in the transportation arena. In addition, since emergency management is an interdisciplinary field of study, the languages of multiple disciplines are intertwined. Since the primary audience for the paper is focused on transportation, transportation examples and comparisons are used in many sections.

This paper is divided into five sections, beginning on the next page:

RECOVERY IS COMPLEX AND HAS MANY STAKEHOLDERS

[1] A companion background paper, "The 'Phases' of Emergency Management," provides definitions and descriptions for all of the phases/components of emergency management and examines related concepts.

Virtually every source examined—policy documents, plans, manuals, textbooks, journals, and research materials—agree that "recovery" is an essential part of emergency management. These sources also agree that successful recovery, however defined, is very dependent on what happens during the other phases. Most sources even agree, at least generally, on the goals of recovery—something along the lines of returning the community, business, or other entity to conditions the same or better than existed before the disrupting event.

Most sources also agree that the "recovery" component of emergency management is more complex than the other components and involves a much larger group of diverse stakeholders with sometimes-conflicting objectives. The *Introduction to Emergency Management* makes these observations about recovery:

> Unlike the response function, where all efforts have a singular focus, the recovery function or process is characterized by a complex set of issues and decisions that must be made by individuals and communities. Recovery involves decisions and actions relative to rebuilding homes, replacing property, resuming employment, restoring businesses, and permanently repairing and rebuilding infrastructure. The recovery process requires balancing the more immediate need to return the community to normalcy with the longer-term goal of reducing future vulnerability. . . .
>
> Because the recovery function has such long-lasting effects and usually high costs, the participants in the process are numerous. They include all levels of government, the business community, political leadership, community activists, and individuals. Each of these groups plays a role in determining how the recovery will progress. (Haddow 2008)

The following is from a summary of the October 17, 2007 *Workshop of the Disasters Roundtable* sponsored b the National Academies:

> Disaster recovery is a complex and challenging process that involves all sectors of a community as well as outside interests. In many cases, it is not even clear if and when recovery has been achieved because of varying stakeholder goals for the community, for example with some wanting it returned to what is considered its pre-disaster status and others wanting it to undergo change to realize a vision in which advances are made in risk reduction and other areas. (Anderson 2008)

The choice between "snap back" (Rubin 2009) and a more visionary approach is only one of the possible conflicts that have to be addressed. Others include setting priorities on neighborhoods and other geographic areas (e.g., neighborhood A or neighborhood B or downtown) and deciding which types and sections of infrastructure come first, which human services are most important, and what assistance will be provided for businesses. Will demolition be allowed at will? Where will debris be placed? Will building codes, zoning regulations, or subdivision regulations be revised? And, of course, where will the money come from? And, who will benefit and who will pay?

FEMA's guidelines for state and local emergency plans, *Developing and Maintaining State, Territorial, Tribal, and Local Government Emergency Plans, Comprehensive Preparedness Guide 101,* defines *"*recovery" as including all of the following:

- The development, coordination, and execution of service- and site-restoration plans
- the reconstitution of government operations and services
- individual, private-sector, nongovernmental, and public assistance programs to provide housing and to promote restoration
- long-term care and treatment of affected persons
- additional measures for social, political, environmental, and economic restoration
- evaluation of the incident to identify lessons learned
- post incident reporting
- development of initiatives to mitigate the effects of future incidents. (FEMA 2009)

Note especially the bulleted item near the middle of the list, "additional measures for social, political, environmental, and economic restoration." The FEMA document does not elaborate on those additional measures, but the possibilities are extensive, especially following a major disaster that affects a large geographic area.

Daniel Alesch developed the schematic shown in Figure 1 to illustrate what he calls the "cascading consequences" of extreme events. The immediate consequences of an extreme event are often relatively easy to quantify and comprehend. However, the "systemic community consequences" depend on a number of secondary events and the "reverberations" in the community and the "outside world."

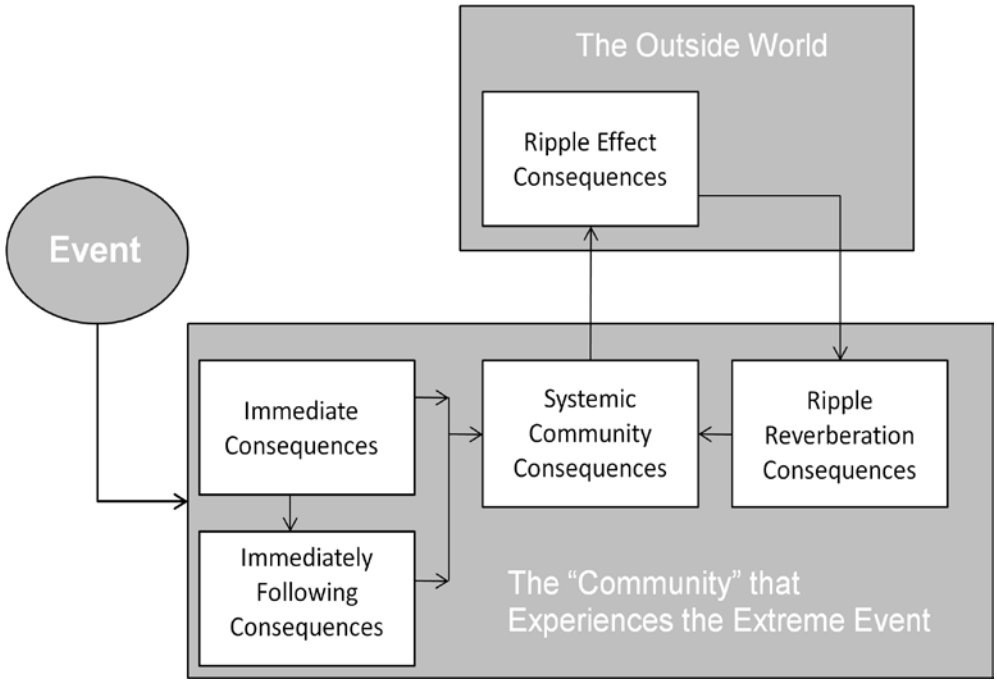

Figure 1. Relationships Among the Cascading Consequences of Extreme Events (Alesch 2007)

Katrina came ashore over a wide section of the Gulf Coast causing immediate consequences—damage to infrastructure, homes, and businesses—but the systemic community consequences were different in

different communities over different periods of time, affected by immediately following events, ripple effect consequences, and ripple reverberation consequences.

Table 1 addresses more completely the relationships between the magnitude of events and the challenges faced during recovery. This table divides the challenges into five categories: social and psychological needs, housing, economic sector, environment, and infrastructure and lifelines. For each of the five categories, the table describes the range of challenges for events for each of three levels of severity: small scale, normal, and catastrophic.

It should be noted that the worst-case category in Table 1 is a "catastrophic event" using Katrina as an example. One of the precepts of emergency management has been that "all disasters are local," meaning that disasters have a reasonably well defined spatial "impact area," and the impacted local governments have the responsibility for first response and the ultimate responsibility for recovery. State and federal governments, in that order, are called on to assist. Katrina was catastrophic because the damage was so severe, it covered such a large geographic area, and the resources of multiple local and state governments were overwhelmed so quickly.

However, some have suggested that the basic assumptions about "disasters" should be revisited and that society should prepare for additional layers of complexity. In *Crisis Management in the Twenty-First Century: "Unthinkable" Events in "Inconceivable" Contexts,* Patrick Lagadec, argues that:

> Two dynamic elements have combined to create a new crisis universe. First, the agents are increasingly serious, with qualitative jumps in severity, speed, frequency, complexity, and so forth. Second, and much more importantly, specific events occur in extremely unstable, interlinked, and sensitive contexts. They can trigger fuzzy domino processes and dramatic vortex. The "butterfly effect" is no longer a merely theoretical discussion. These changes have required response to switch from single agent comprehension and management to holistic approaches and policies. The challenge is how to simultaneously maintain and develop our capacity to handle single agent disasters and to be able to face the unknowns of a complex world prone to wander on the brink of chaos (Cooper 2005; Lagadec 2007).

In another chapter in the same book (*Handbook of Disaster Research*), Quarantelli, Lagadec, and Boin discuss some of the same issues and coin two new phases: Trans-System Social Ruptures (TSSRs) and Social Amplifications of Disasters and Crises (SACDs). The authors identify six characteristics of TSSRs, including large numbers of actual or potential victims. Another characteristic is that "traditional local community 'solutions' are not obvious" (contrary to the notion that all disasters are "local") and the "prime and first locus of planning and managing cannot be the local community." Examples given for TSSRs are SARS and worldwide computer viruses. (Quarantelli 2007)

SACDs, as the name implies, recognizes that the relationship between the event and the social setting. As one set of examples, the authors cite specific instances of heat waves that resulted in large numbers of deaths, especially among "socially isolated older persons" and "bureaucratic indifference, and mass

Table 1. Relationship between Magnitude of Event and Type of Recovery Challenges

Recovery challenges	Small scale event (earthquake magnitude 5.0 or less; F2 tornado of limited length)	Normal disaster (F3 tornado of several miles; flash flooding to less than 5 feet)	Catastrophic event (Hurricane Katrina, massive damage to broad region)
Social and psychological needs	Usually short-term effect; opportunity to involve schools and agencies in proactive response.	Usually short-term effect, but stress debriefing and counseling should be made available.	Potential for significant impact on employees and staff (of government, organizations, businesses, schools) and on families.
Housing	Dozens of homes with minor damage; weaker structures badly damaged; up to 2 years for recovery.	Thousands affected; most residents able to return home in 2-3 years. Federal, state, and local governments able to handle most housing with help from voluntary sector.	Massive and widespread losses; hundreds of thousands of homes destroyed or damaged; 5-10 years anticipated for recovery. All governmental levels overrun and unable to assist all households.
Economic sector	Limited impact to economic sector unless a direct hit.	Larger businesses return most quickly; smaller businesses challenged to return.	Massive disruption to employees and businesses; small businesses unlikely to return; all businesses hit heavily.
Environment	Minimal impact; opportunity to improve tree density, address stormwater, increase public awareness.	Opportunity to significantly improve local environmental, conditions: increase open space, preserve floodplains, consider density transfers.	Massive damage, undermining local ecosystems; disaster often exacerbated by neglect to environment before disaster.
Infrastructure and lifelines	Usually a rapid return.	Up to years depending on the event; most resources quickly recover.	Months to years to repair roads, bridges, hospitals and other key institutions; some never recover.

Source: Phillips, Brenda D. and David M. Neal. 2007. Recovery, Chapter 11 in *Emergency Management: Principles and Practice for Local Government (Second Edition)* (Phillips 2007, 212)

media uncertainty." Presumably, the authors would classify some of the results of Katrina in lower-income New Orleans neighborhoods as a SADC event.

The final illustration of complexity focuses on trying to take advantage of the most basic kinds of assistance. Figure 2 highlights the fact that different community "subunits" damaged or displaced by a disaster must follow different paths to permanent solutions. The dashed line for Path D indicates that "affected businesses pass through a slightly different sequence because they can suspend operations . . . until they find a temporary operating location." (Lindell 2006)

This seems to be an over simplification for most businesses, but the author's point is still valid—

businesses have to follow a path that is different from other subunits. In fact, anyone with direct, personal experience might argue that Figure 2 understates the complexity for every path. The figure is from *Chapter 11, Community Disaster Recovery* in the *Fundamentals of Emergency Management,* and that text provides more detailed descriptions of the separate "paths" for (a) household recovery, (b) infrastructure restoration, (c) the disaster declaration process, and (d) business recovery. (Lindell 2006) Link

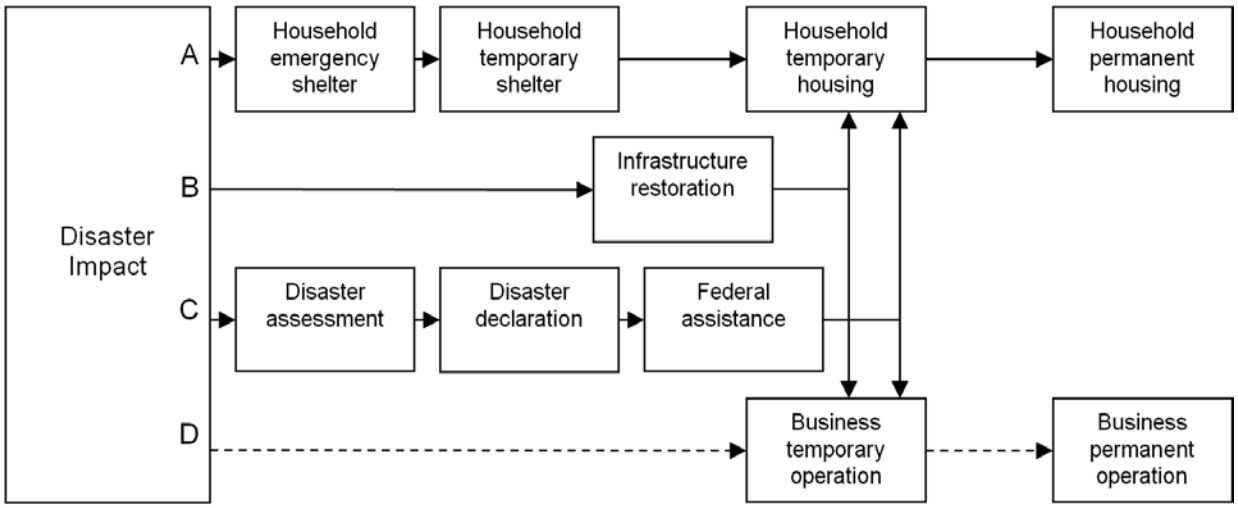

Figure 2. The Recovery Management Process. (Lindell 2006, 318)

SHORT-TERM VERSUS LONG-TERM RECOVERY

Many of the sources examined as part of this research, especially government documents, refer to "response and recovery" as a combined, inseparable activity. Others see a difference between the two, but describe "recovery" as a relatively short-term process focused on restoring essential governmental functions as the final stage of "response." Others divide recovery into at least two stages—short-term and long-term.

The seminal National Governors' Association (NGA) report in 1979 distinguished between short-term and long-term this way:

> Short-term recovery activities return vital life-support systems to minimum operating standards (for example, cleanup, temporary housing).
>
> Long-term recovery activities may continue for a number of years after a disaster. Their purpose is to return life to normal or improved levels (for example, redevelopment loans, legal assistance, and community planning). (NGA 1979, 13)

In a textbook published in 2000, William Waugh describes recovery as follows, focusing on activities that would usually occur in a relatively short period following a disaster, but recognizing a growing interest in longer-term issues:

> *Recovery* is those activities that continue beyond the emergency period to restore lifelines. Examples include providing temporary shelter, restoring power, critical stress debriefing for emergency responders and victims, job assistance, small business loans, and debris clearance…
>
> The process normally stops short of reconstructing the community, although there is growing interest in developing disaster resistant, resilient, and sustainable communities. (Waugh 2000, 49)

The *National Response Framework (NRF)* published by the Department of Homeland Security in 2008 describes short-term and long-term recovery as follows:

> **Short-term recovery** is immediate and overlaps with response. It includes actions such as providing essential public health and safety services, restoring interrupted utility and other essential services, reestablishing transportation routes, and providing food and shelter for those displaced by the incident. Although called "short term," some of these activities may last for weeks.
>
> **Long-term recovery**, which is outside the scope of the *Framework*, may involve some of the same actions but may continue for a number of months or years, depending on the severity and extent of the damage sustained. For example, long-term recovery may include the complete redevelopment of damaged areas. (DHS 2008, 45)

Another document, the *Disaster Recovery Plan for the State of Tennessee* describes recovery this way:

> *Recovery* is concerned primarily with rebuilding the infrastructure and restoring the social and economic life of the community with the incorporation of mitigation measures as a major goal. In the short-term, it involves restoring essential services such as power, communications, water and sewage, and transportation and providing for basic human needs like food, clothing, shelter

and medical assistance. Short-term Recovery also includes meeting the societal needs of the individual and the community such as the rule of law, and crisis counseling. Once stability is achieved, long-term recovery efforts focus on restoring economic activity, community facilities and individual housing. It is the responsibility of the state to ensure repair and/or replacement of damaged eligible facilities according to the fulfillment of the policies of the Stafford Act. Recovery beyond the Stafford Act is the responsibility of the applicant, i.e., local governments. (TEMA 2006)

In Table 2, "Disaster Recovery Functions" are divided into four categories that span overlapping periods. The author explains the four categories as follows:

> The recovery phase's *disaster assessment* function should be integrated with the emergency response phase's emergency assessment function in identifying the physical impacts of the disaster. *Short term recovery* focuses on the immediate tasks of securing the impact area, housing victims, and establishing conditions under which households and businesses can begin the process of recovery. *Long term reconstruction* actually implements the reconstruction of the disaster impact area and manages the disaster's psychological, demographic, economic, and political impacts. Finally, *recovery management* monitors the performance of the disaster assessment, short term recovery, and long term reconstruction functions. It also ensures they are coordinated and provides the resources needed to accomplish them. (Lindell 2006)

Table 2. Disaster Recovery Functions

Disaster Assessment	
• Rapid assessment	• Victims' needs assessments
• Preliminary damage assessment	• "Lessons learned"
• Site assessment	
Short Term Recovery	
• Impact area security	• Emergency demolition
• Temporary shelter/housing	• Repair permitting
• Infrastructure restoration	• Donations management
• Debris management	• Disaster assistance
Long Term Reconstruction	
• Hazard source control and area protection	• Infrastructure resilience
• Land use practices	• Historic preservation
• Building construction practices	• Environmental recovery
• Public health/mental health recovery	• Disaster memorialization
• Economic development	
Recovery Management	
• Agency notification and mobilization	• Public information
• Mobilization of recovery facilities and equipment	• Recovery legal authority and financing
• Internal direction and control	• Administrative and logistical support
• External coordination	• Documentation

Source: *Fundamentals of Emergency Management*; Michael K. Lindell, Carla S. Prater, Ronald W. Perry, with a contribution by William C. Nicholson, 2006, p. 308.

Table 3 focuses not on the timing of disaster recovery *activities* but on the importance of a long-term *perspective*. The table compares the characteristics and expected outcomes of a short-term perspective on disaster recovery with the characteristics and outcomes of a long-term perspective. (Smith 2004)

Table 3. Short-Term vs. Long-Term Perspectives on Disaster Recovery: Characteristics and Outcomes

Short-Term Perspective	Long-Term Perspective
Characteristics – Ad-hoc recovery – Issuing building permits without adequate review of reconstruction implications – Limited public participation – Rebuilding to pre-disaster conditions – Over-reliance on state and federal recovery funding	**Characteristics** – Developing a recovery plan – Establishing a temporary building moratorium – Conducting an in-depth damage assessment – Integrating hazard mitigation techniques into reconstruction – Identifying local resources – Involving the public – Identifying sustainable recovery objectives – Linking recovery objectives with existing community goals
Outcomes – Reduced economic viability – Increased hazard vulnerability – State or federal paternalism – Out migration of residents – Declining tax base – Declining sense of place	**Outcomes** – Greater economic viability – Reduced hazard vulnerability – Greater environmental well being – Enhanced public health – Enhanced community self-reliance – Increased tax base – Enhanced sense of place

Source: Adapted from Gavin Smith, *Holistic Disaster Recovery: Creating a More Sustainable Future,* Session 3: Dimensions of Recovery, FEMA. (Smith 2004)

Finally, consider again these excerpts from previous pages:

- Waugh's statement that "the process normally stops short of reconstructing the community" (page 7)
- The *National Response Framework* statement that long-range recovery is "outside the scope of the *Framework"* (page 7)
- The TEMA statement that "Recovery beyond the Stafford Act is the responsibility of the applicant, i.e., local governments" (page 8)

These statements point to what might be a more meaningful distinction than "short-range" and "long-range." Perhaps the distinction should be between the aspects of recovery that are the responsibility of "EMAs" and those aspects of recovery for which others are responsible.

The responsibilities of EMAs are reasonably well-defined in laws and ordinances, and most of those responsibilities fit into the "short-term" category. The financial assistance for recovery that flows through the EMAs is defined by the Stafford Act and focuses on damage repair and replacement.

Therefore, instead of (or perhaps in addition to) distinguishing between "short-term" and "long-term" it might be useful to distinguish between the roles of EMAs and those of other governmental organizations and the private sector. FEMA and the state and local EMAs may be knowledgeable about all aspects of recovery and may be able to contribute to successful recovery in all respects and over all time periods, but the EMAs cannot provide significant, tangible assistance beyond their legal authority and their available resources. (This topic is revisited at the end of the paper relative to whether "recovery" has been neglected relative to other phases of emergency management.)

CONCEPTUAL MODELS OF RECOVERY

This section provides a cursory description of some of the conceptual models developed to help understand disasters and to guide emergency management decisions. A few paragraphs at the end of the section are devoted to quantitative models.

One of the earliest recovery models, developed in the late 1970s, describes recovery (actually using the term "reconstruction") in terms of "four overlapping periods that emphasize the dominant activities in any period of time, realizing that other related and concurrent activities are going on at the same time." The concept is illustrated in Figures 3 and 4. Figure 3 is from *Reconstruction Following Disaster*, a book published in 1977. (Kates 1977) Figure 4 is from an article following Hurricane Katrina.

The caption for the figure in the Katrina article (Figure 4) explains that the curves depict "actual experience (solid lines) and sample indicators for the first year along a logarithmic time line of weeks after the disaster. The long-term projections (dashed lines) are based on an emergency period of 6 weeks, a restoration period of 45 weeks, and a 10-fold historical experience for reconstruction." (Kates et al 2006)

Note that the time scale is logarithmic in both figures, and "each of the first three periods lasts approximately 10 times longer than the previous one." Also, the curves have a normal distribution. "Within each interval the distribution of coping activity is approximately normal." (Kates 1977)

The authors in 1977 stressed that the model was hypothetical, and used it to examine and compare historical case studies from San Francisco (1906) and Anchorage (1964) along with what were then recent studies of Managua (1972) and Rapid City (1972). The results were four curves that differed in some important ways from the hypothetical, but still seemed to provide a useful tool for analysis and to have predictive value.

Kates offered this conclusion in 1977 regarding the factors affecting the rate of disaster recovery:

> There is evidence for an ordered rate of recovery, and for variations within that order. The rate of recovery is directly related to the magnitude of the damage. The resources available for recovery, the prevailing predisaster trends and such qualities as the leadership, planning, and organization for reconstruction may also be important. (Kates 1977, 12)

In another chapter of the same book, Kates concludes "an exceptional performance in any one of the major recovery periods can reduce the time required for that activity by as much as half." (Kates 1977b, 263)

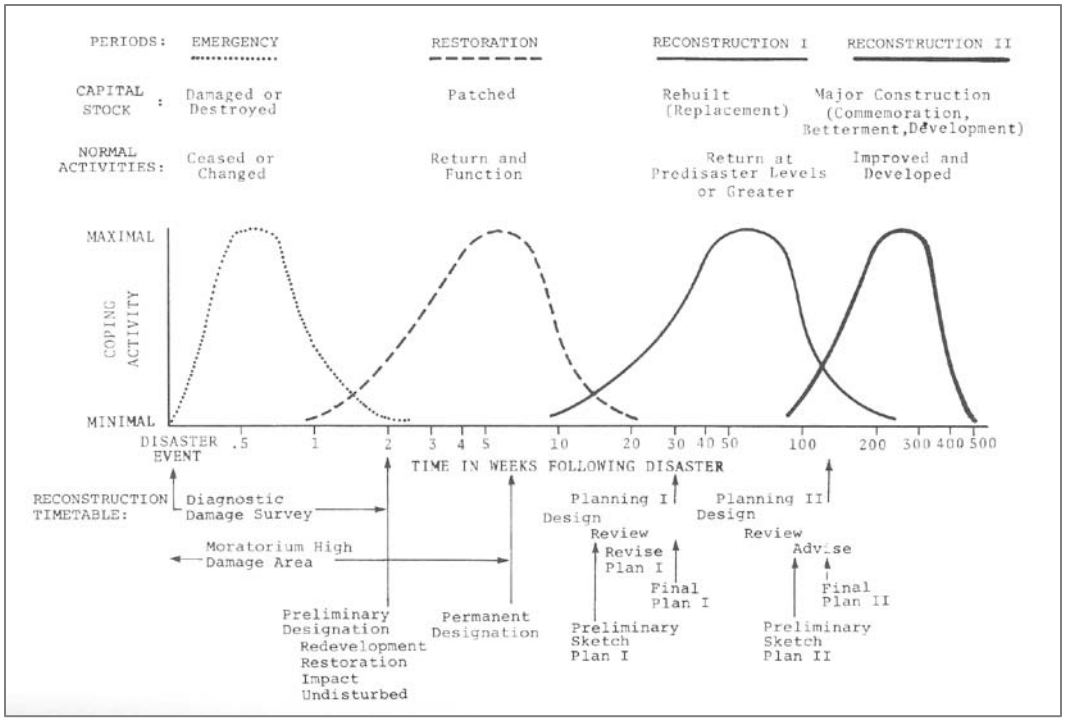

Figure 3. Timetable of Reconstruction (Kates 1977)

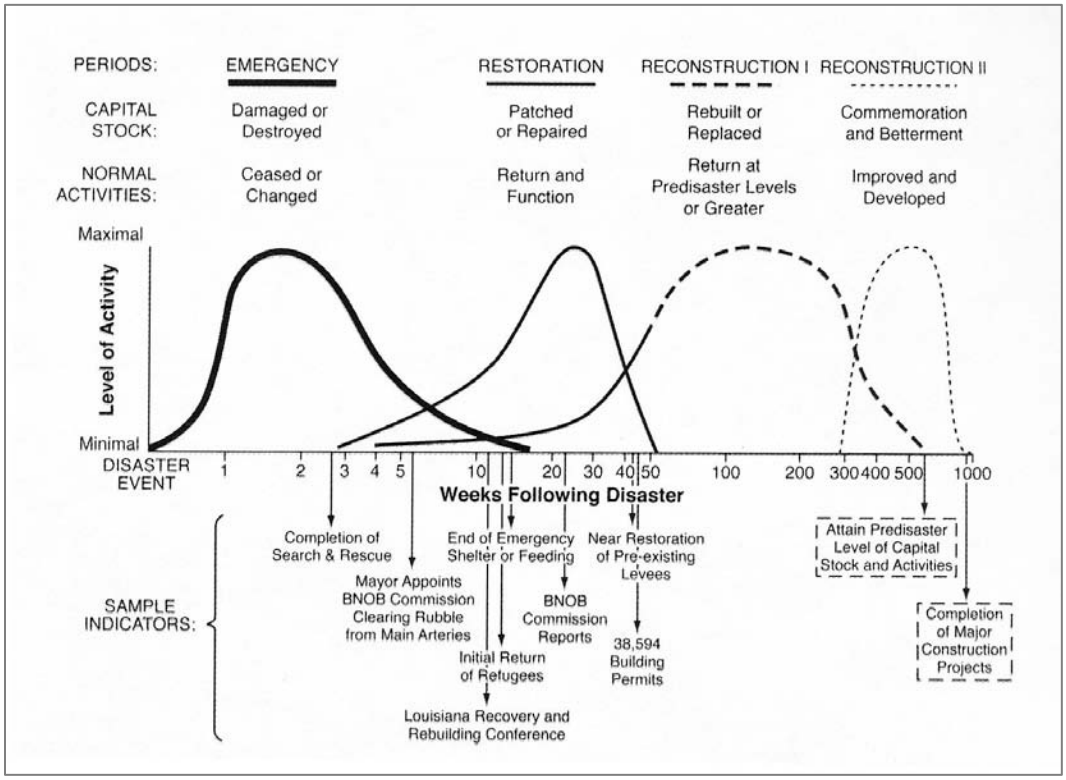

Figure4. Sequence and Timing of Reconstruction After Katrina in New Orleans (Kates 2006)

A similar depiction of recovery phases, from David Alexander, is shown in Figure 5. The vertical scale in this figure measures costs rather than level of activity, and Alexander adds a feature showing the duration of "emergency management" on the time scale. In this model, "emergency management," covers all of the "relief" activities and part of "rehabilitation," but does not extend beyond a period of less than two months. Alexander does not elaborate on this, but it reinforces the notion that the responsibilities of "emergency managers" may extend only a relative short period beyond the disaster.

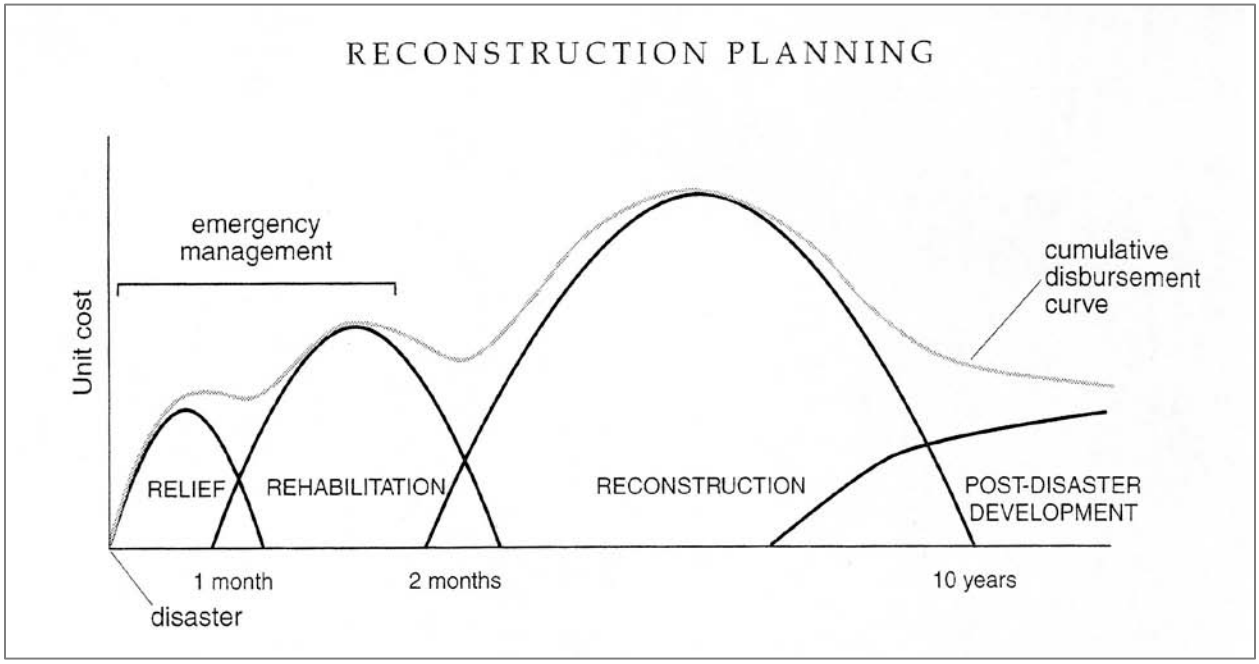

Figure 5. Phases of Recovery in the Aftermath of Disaster (Alexander 2002)

Figure 6 is from the D*isaster Recovery Plan for the State of Tennessee,* and reflects a different view of the phases and of the distribution of activity within the phases. Only the initial "emergency phase" has a normal distribution. From a conceptual perspective, this diagram illustrates that the total level of effort (area under the curves) is often easier to predict for the "emergency" and "sustained emergency/ restoration phase" than for the "recovery and reconstruction" phase. At what point in time will the "recovery and restoration" curve (doted green line) return to zero?

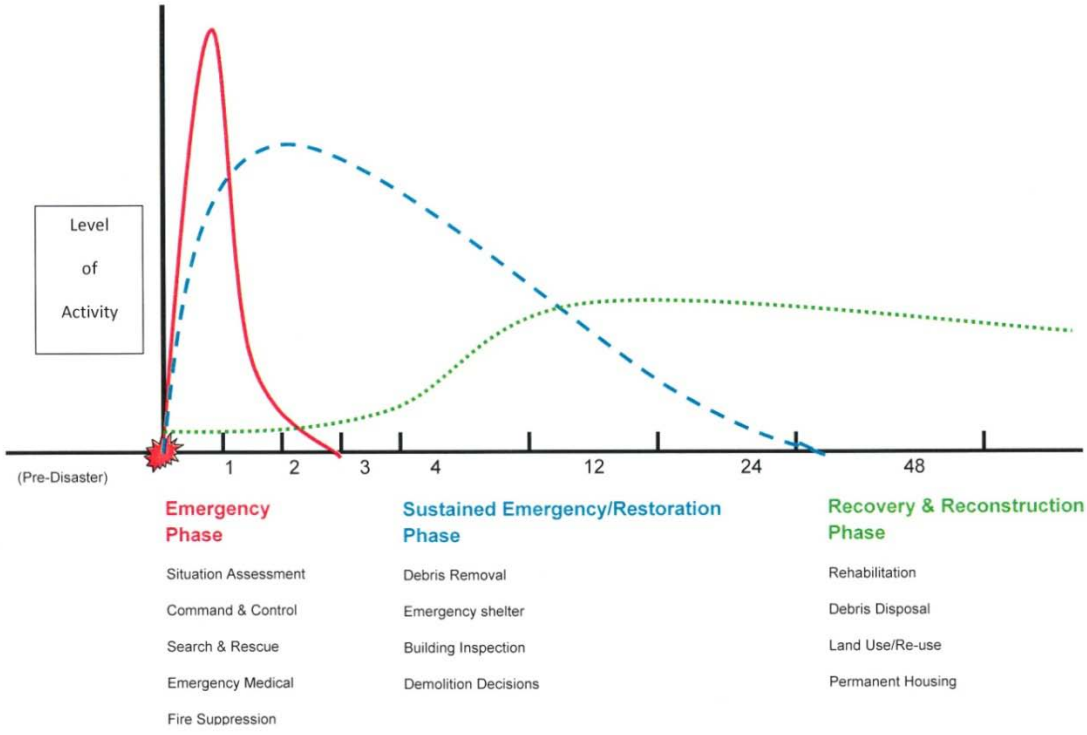

Figure 6. Level of Activity Over time (TEMA 2006)

Another conceptual model is from Claire Rubin, and is shown as Figure 7. This model is based primarily on research in the 1980s, including case studies of 14 communities that had experienced a major disaster. According to the author:

> One major finding of the research was a conceptual graphic that portrayed the findings regarding the knowledge, skills, and abilities needed at the local level to guide effective recovery. The main product or outcome of the research was a simple chart depicting three not-so-simple components of efficient and effective recovery. (Rubin 2009, 4)

Rubin suggests that at least two of the three critical components —leadership, ability to act, and knowledge of what to do—are essential, and that all three apply at every level of government:

> Each of the three components is necessary, but not sufficient by itself for effective recovery at the community level. In short, at least two of the components must be in place to achieve a satisfactory outcome.
>
> These three components apply not only to local governments, but also to state government efforts regarding long-term recovery. While federal policy may influence or dictate . . . the state and local decisions are overwhelmingly powerful. (Rubin 2009, 6)

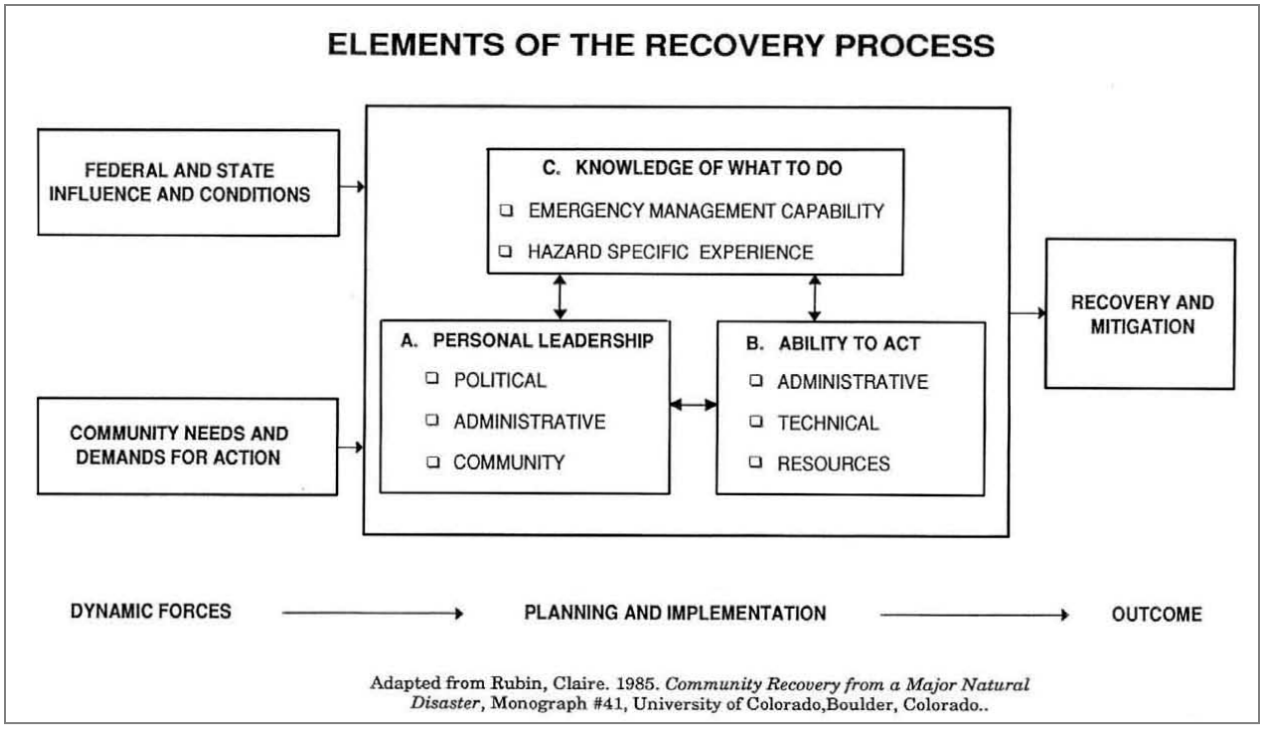

Figure 7. Elements of the Recovery Process (Rubin 2006)

Multiple sources refer to the ways in which disasters accelerate pre-disaster trends. Growing communities tend to recover quickly. Disasters tend to exacerbate problems in struggling communities, and downward trends are often accelerated. (Haas 1977; Drabek 2010)

Figure 8 is a unique model that takes into account the severity of the events, the resilience of the community, and the effectiveness of the assistance received (internal and external). The model also recognizes the effects of "cumulative natural disasters" (e.g., earthquakes followed by landslides, repeated severe floods) and the secondary events following technological disasters (e.g. legal action, demolition, resettlements).

The author describes the model as follows:

> I propose here a unifying model of human reaction to disaster as the culture of response—the traditionally embedded resilience to a disaster event of a population as influenced by: 1) prior social memory of disasters, 2) available social-economic response and recovery resources, and 3) the local political economy of disaster aid, that is, the application or withholding of disaster aid as purposeful strategies of external power brokers. At one extreme on a culture of response continuum is the Phoenix Effect—a sustainable improvement in the social and economic resilience of a community or organization arising from the strategic investment of capital resources after a disaster event. The other extreme, Punctuated Entropy, is a permanent decline in the adaptive flexibility of a human ecosystem and its associated economies brought on by lack of appropriate aid combined with the cumulative impact of periodic and repeated disaster events. (Dyer 2009, 313)

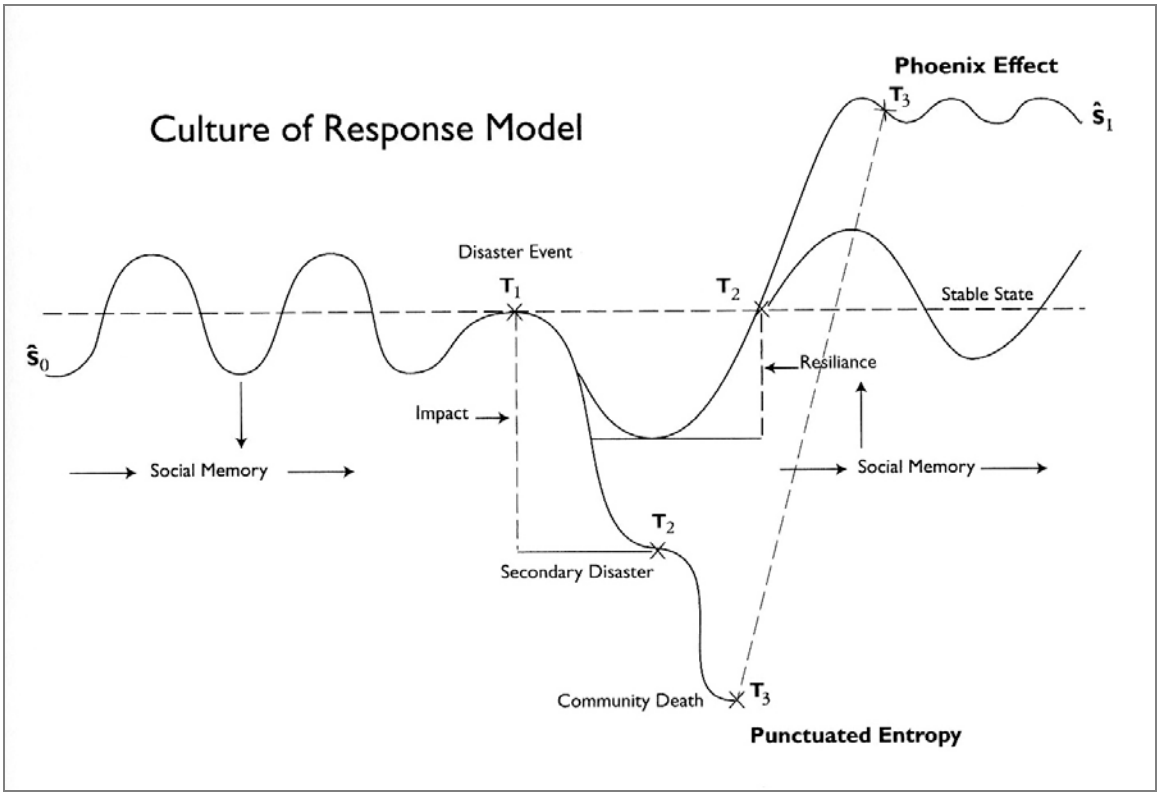

Figure 8. Culture of Response Model (Dyer, 2009)

A number of quantitative models have been developed by economists, urban planners, and disaster researchers to help estimate the damage caused by disasters and to point toward more effective strategies and public policies. A book entitled *Modeling Spatial and Economic Impacts of Disasters,* published in 2004*,* provides a comprehensive description and assessment of disaster-related modeling. The book, edited by Yasuhide Okuyama and Stephanie Chang, is divided into three sections:

- Conceptual and Modeling Issues
- Economic Models
- Integrative Models

Two of the chapters in the section on integrative models address the interrelationships between transportation and economic impacts following a damaging earthquake. (Okuyama2004)

A third chapter, by Stephanie Change and Scott Miles, describes a simulation model for disaster recovery that emphasizes interactions between households, businesses, infrastructure systems, neighborhoods, and the larger community. The chapter, "The Dynamics of Recovery: A Framework," begins with an overview of the underlying conceptual model, shown in Figure 9.

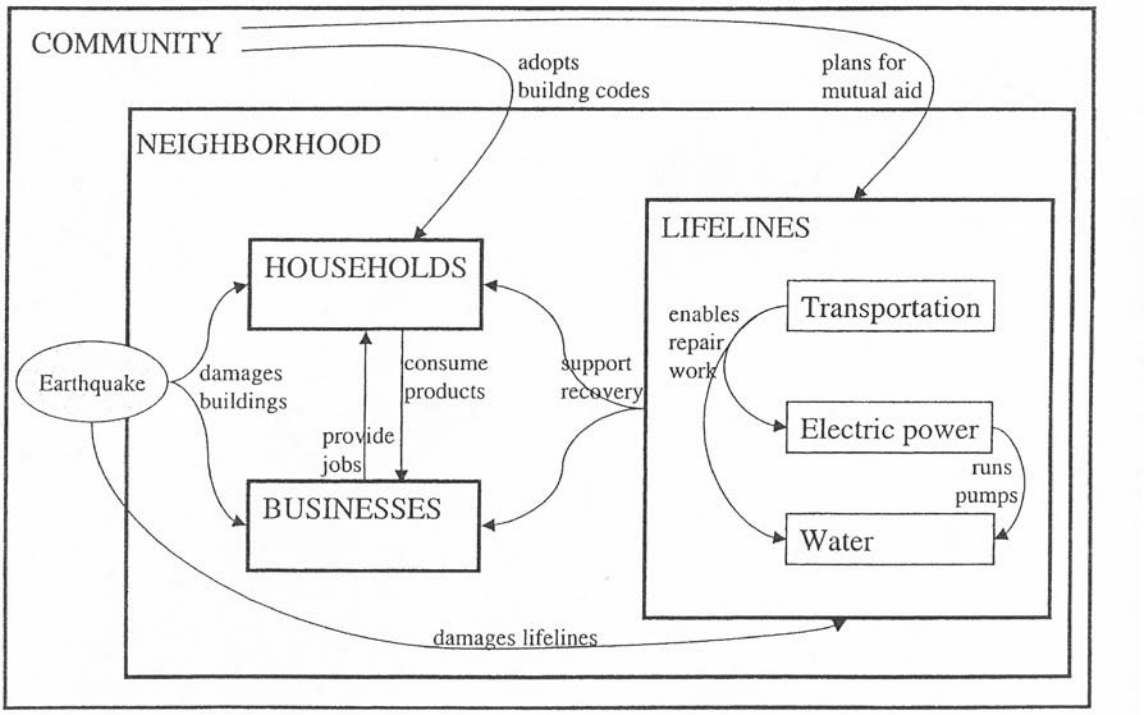

Figure 9. Conceptual Model Overview (Chang 2004)

According to the authors:

> The conceptual model . . . is derived here more by induction than by deduction— it is, in other words, guided by empirical observations rather than distilled from rigorous theory. It is especially interested in acknowledging how differences between business types and between household types help to determine recovery prospects. Thus, while the recovery simulation is intended to *measure* recovery at the community and neighborhood levels, it *models* recovery at the scale of the individual business and household. Moreover, the simulation models the influence of agents' environments on their recovery processes. (Chang 2004)

The model was developed using Object Modeling Technique (OMT), a software engineering methodology. The chapter also describes a prototype simulation of the recovery of the city of Kobe following the devastating 1995 earthquake.

Probably the best-known mathematical model related to disasters in the U.S. is the HAZUS (HAZards U.S.) model developed by FEMA and FEMA contractors. The FEMA website describes the current version of HAZUS, known as HAZUS Multi-Hazard, as follows:

> HAZUS-MH is a powerful risk assessment methodology for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH, current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after, a disaster occurs.
>
> Potential loss estimates analyzed in HAZUS-MH include:

- Physical damage to residential and commercial buildings, schools, critical facilities, and infrastructure;
- Economic loss**,** including lost jobs, business interruptions, repair and reconstruction costs; and
- Social impacts, including estimates of shelter requirements, displaced households, and population exposed to scenario floods, earthquakes and hurricanes. (FEMA 2009b)

The outputs of the current HAZUS-MH models are identified in Figure 10.

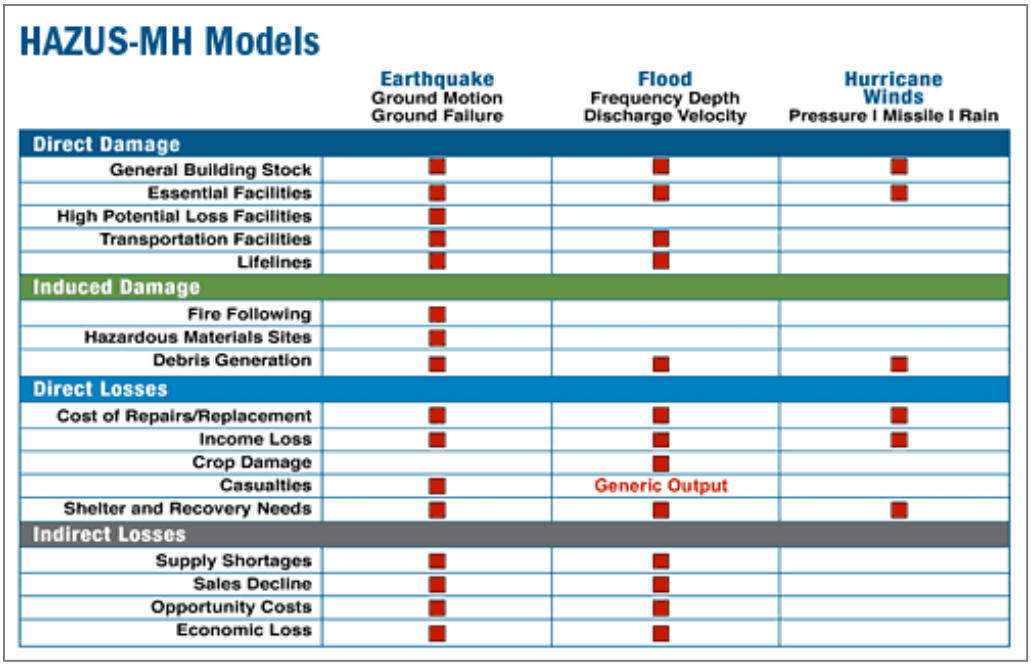

Figure 10. HAZUS Outputs (FEMA 2009b) Link

BUSINESS RECOVERY

The Internet is replete with dire statements about the ability of businesses to survive disasters, mostly in the form of one-liners, such as "X % of all businesses impacted by disasters are out of business within Y months." However, the original sources, supporting data, and descriptions of the underling research are elusive. Most of these statements seem designed to promote the importance of contingency planning and to get the attention of prospective customers. The following examples were found on the Internet in mid-2009. No source information was located for any of these examples:

- About 60 percent of businesses that experience a major disaster such as a fire close within two years.
- 30% of all businesses that have a major fire go out of business within a year. 70% fail within five years.
- An estimated 25 percent of businesses do not reopen following a major disaster.
- Over 40 percent of all companies that experience a disaster never reopen and more than 25 percent of those that do reopen close within two years.
- 60% of companies that lose their data will shut down within 6 months of the disaster.
- 80 percent of companies without well-conceived data protection and recovery strategies go out of business within two years of a major disaster.
- Within two years after Hurricane Andrew struck in 1992, 80 percent of the affected companies that lacked a business continuity plan failed.
- Companies that aren't able to resume operations within ten days (of a disaster hit) are not likely to survive.

The use of such "attention getters" is not limited to the Internet. Legislation introduced in Congress in 2006 and again in 2007, known as the "Gulf Coast Back to Business Act" (S. 537, H.R. 1243, 110th Congress), included the following statement:

> Congress finds that--
> (1) 43 percent of businesses that close following a natural disaster never reopen;
> (2) an additional 29 percent of businesses close down permanently within 2 years of a natural disaster (Library of Congress 2009)

The research for this paper found no source for the above Congressional "finding."

Regardless of the credibility of such statements, the *importance* of business recovery seems to be widely acknowledged—importance for the owners of the business, the employees of the business, the suppliers, the customers, the economy, governmental agencies depending on tax revenues, and the community at large. Research, however, is relatively limited. According to Kathleen Tierney:

> As units of analysis in disaster research, businesses have only recently begun to be studied. Far more research has been conducted on public sector organizations such as local emergency management agencies, public safety agencies, and other governmental organizations. Researchers studying the economic impacts of disasters have tended to focus on units of

> analysis that are larger than individual firms and enterprises, such as community and regional economies. Until fairly recently, very little was known regarding such topics as business vulnerability, loss-reduction measures adopted by businesses, disaster impacts on businesses, and business recovery. Systematic research was lacking despite the singular importance of businesses for society. (Tierney 2007, 275)

Several sources provide summaries of the research that has been accomplished and links to more detailed information. The quote just above is from "Businesses and Disasters: Vulnerability, Impact, and Recovery," a chapter in the *Handbook of Disaster Research.* In that chapter Tierney provides a comprehensive description of the research that has been conducted and a summary of the knowledge gained, under three major headings:

- Business Vulnerability to Extreme Events
- When Disaster Strikes: Impacts on Business
- Business Disaster Recovery and Longer-Term Impacts

She also offers suggestions about "future research needs." (Tierney 2007)

Another source that includes information about previous research is a paper entitled, *Vulnerability of Community Businesses to Environmental Disasters,* by Yang Zhang, Michael Lindell, and Carla Prater. (Zhang 2007)

For more of a focus on small businesses, see the "Disaster Recovery Resources" website (link) maintained by the Public Entity Risk Institute (PERI). A good starting point is the paper by Daniel Alesch and colleagues, *Organizations at Risk: What Happens When Small Businesses and Not-for-Profits Encounter Natural Disasters.* (Alesch 2001)

So what do these sources and others say about the ability of businesses to "recover" from disasters? What about the gloomy numbers from the Internet cited at the beginning of this section? Borrowing from Tierney:

> Do Businesses Recover? The answer to this question depends in part on how the question is asked: how recovery is conceptualized, how the concept is operationalized, what types of businesses are selected for study, and how studies are conducted. (Tierney 2007, 285)

Alesch points out that the term "recovery" can be misleading because it suggests a return to *normal.* Circumstances are often drastically and permanently different following a major disaster. "It would be far better to talk about survival and viability within a new context:"

> For us, "recovery" can be said to occur when any of several conditions are met. First, we believe that an organization has survived and become viable when the firm . . . has been conducting business for several months or years after the event and is generally at least as profitable as it was prior to the event. This is the simplest case and the one that most closely approximates the way people generally think about recovery.
>
> Second, recovery can also be said to have occurred when a business . . . remains in business for a significant time following the event and is profitable within a new economic environment,

> even though profitability may not be as great as before the event and the community may be generally in decline . . .
>
> Third, recovery can also be said to occur if the entrepreneur preserved his or her financial assets or recovered his or her equity . . . following the event and has moved onto a new business that is both profitable and viable. Not all businesses are meant to go on forever . . . Indeed, moving on to a new business is often the most prudent use of one's recovered resources following a natural hazard event.
>
> Finally, we say that survival has occurred when the entrepreneur is back in business, even though he or she is operating below pre-event profitability, provided there are good prospects of reaching or exceeding previous levels of business. (Alesch 2001)

Alesch also found that the measurement of business "failure" is imprecise:

> We came to understand that a small business or not-for-profit organization can be considered to have failed as a direct consequence of a natural hazard event under any of several conditions. First, failure occurs when there is a formal declaration of bankruptcy and the business closes. Second . . . when it is placed in receivership for purposes of liquidation of its remaining assets. Third, we class the organization as having failed when there is informal bankruptcy; that is, when the owner closes the door and walks away forever . . . Finally, we define organizational failure as having occurred when the entrepreneur continues doing business, but at a significantly lower level than before the event – a level that systematically and regularly fails to meet fixed plus variable costs and that has little prospect of continued viability. We call that "dead business walking." (Alesch 2001)

Research also indicates that not all businesses are affected in the same way. Figure 11 depicts four scenarios, and many others are possible. These four cases are described by Lindell based on the work by Zhang et al:

> The first case is defined by businesses in the impact area that have minimal hazard vulnerability. Such businesses—professional services are an example—experience only small decreases in sales after disaster impact and return quickly to their predisaster levels (panel a).
>
> The second case consists of businesses that also are in the impact area, but have moderate vulnerability. Such businesses—large manufacturers, for example—experience a larger initial drop in their sales levels and their recovery takes a longer time (panel b). Tourism oriented businesses may also suffer initial losses and take some time to recover to their prior level of profitability . . .
>
> By contrast, the third case consists of businesses that experience initial sales losses because they are inside (thus experiencing direct losses) or near (thus experiencing indirect losses) the impact area. However, they later experience an increase in demand . . . (panel c). Recovery-related businesses in the building construction, materials, and hospitality industries exemplify a pattern in which an initial loss . . . is rapidly restored and followed by increased sales.
>
> The final case describes recovery related businesses that are just outside the impact area. Not only do they avoid any initial losses, but they also can take advantage of expanded demand in the disaster stricken community and reap gains in the aftermath of the disaster (panel d). (Lindell 2006; Zhang 2004)

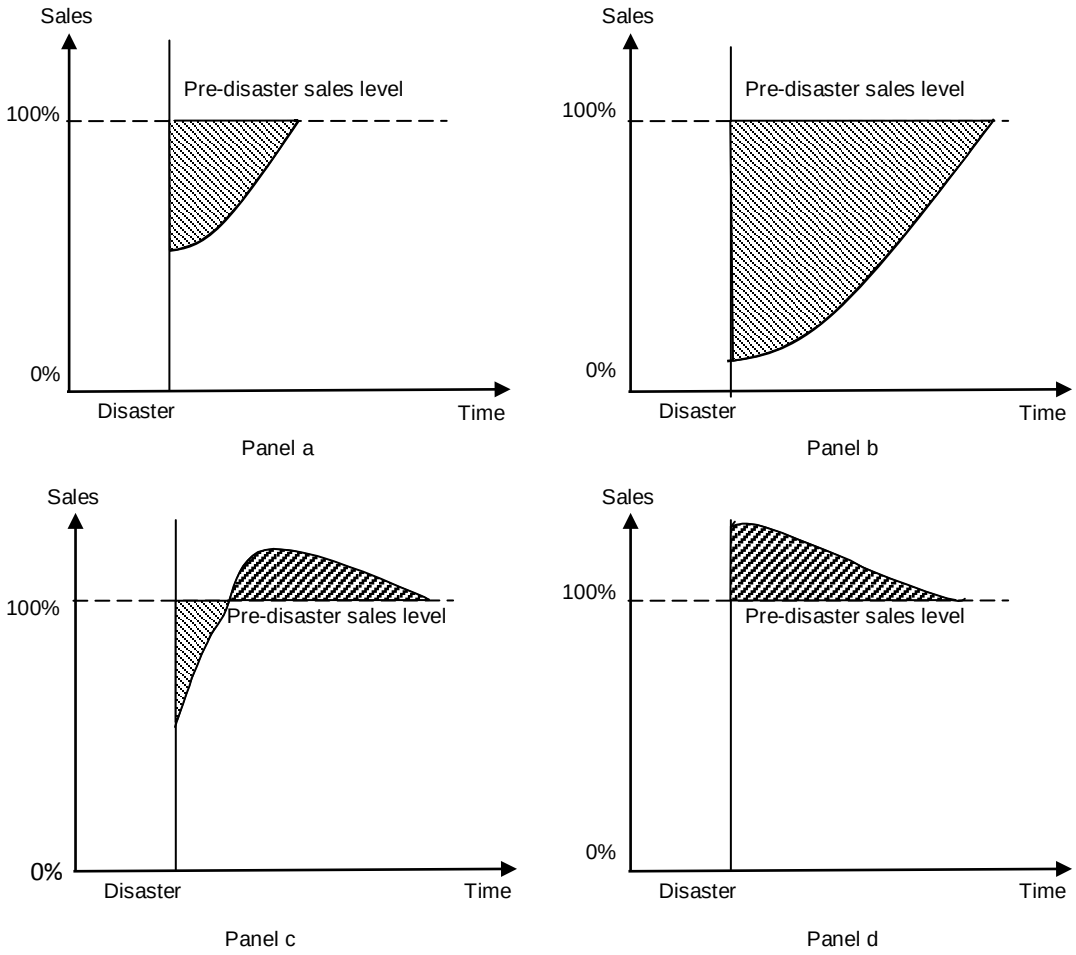

Figure 11. Patterns of Business Sales Changes after Environmental Disasters
(Lindell 2006, based on Zhang 2004)

Another source addresses business vulnerability and recovery as shown in Figure 12. This is from a paper that examined vulnerability based on the impact of the 2001 Nisqually earthquake on two "hard-hit" business districts in Seattle. The study "investigated the extent of losses, patterns of disparities, and underlying loss factors." Data was collected through 107 interviews with business owners and managers in 62 buildings. Figure 12 illustrates the "conceptual framework" to explain how business vulnerability dimensions contribute to disaster loss. According to the authors:

> We bring together insights from the theoretical literature on social vulnerability and the empirical literature on business losses to investigate how this vulnerability helped create differential business impacts . . . (Chang 2002)

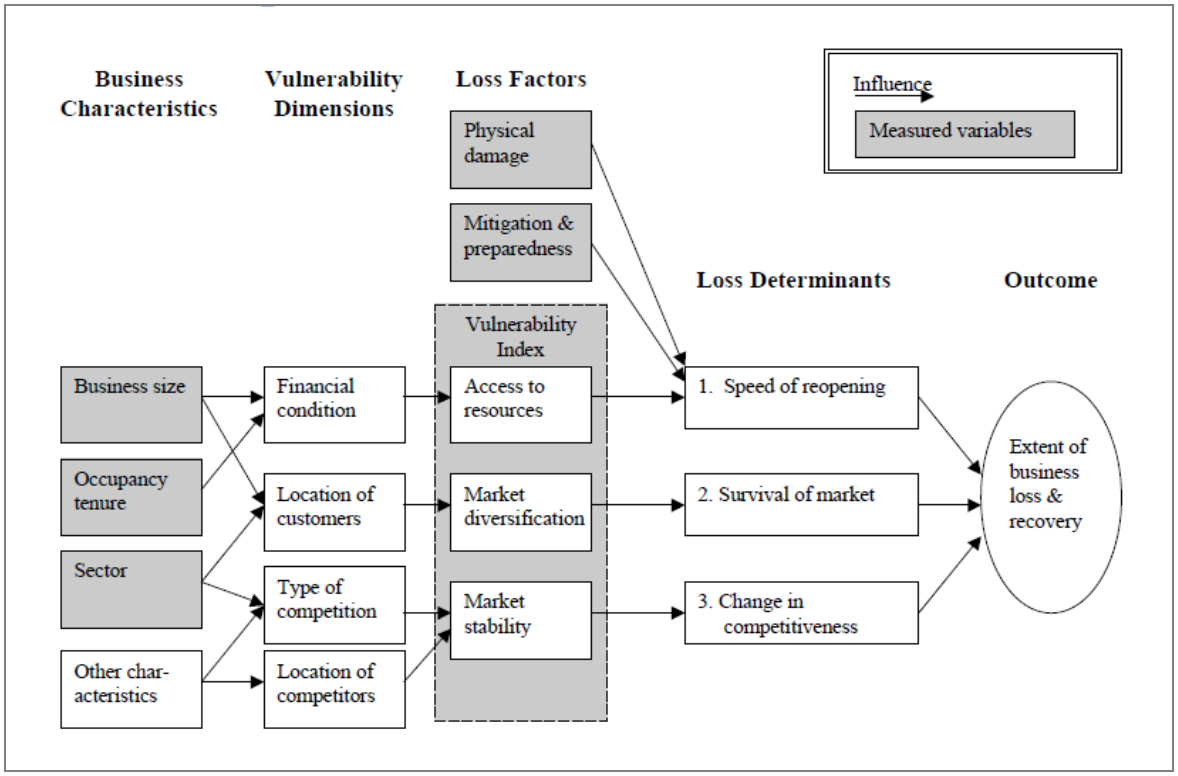

Figure 12. Conceptual Framework of Business Vulnerability and Loss in Disasters (Chang 2002)

The authors explain the framework by beginning on the right hand side of Figure 12. The three "Loss Determinants"—speed of reopening, survival of the market, and change in competiveness—were based on review of the literature on business loss. The diagram shows the measured variables and how each was assumed to influence the loss determinants, from left to right.

For vulnerability, the authors developed a "proxy variable" that "indirectly reflects such considerations as access to resources and market diversification." The variable, labeled "vulnerability Index," is explained this way:

> The proxy variable is based upon measurable business characteristics such as size, sector, and building occupancy tenure that affect business vulnerability. This approach focuses on variables for which data are readily available from statistical publications, thereby facilitating the development of predictive models that can be applied to anticipate future disaster impacts. Alternatively, more direct measures such as a self-reported index of the business's financial marginality could be used. Predictive loss models based on such measures would, however, be hampered by the scarcity and uncertain reliability of such data. (Chang 2002)

The study led to the three main conclusions:

> First, the ''hidden'' economic costs of disasters, particularly business losses, are at least as important as the documented costs.

> Business losses can be explained largely by vulnerability factors, rather than by either physical damage or preparedness behavior. While vulnerability is a complex concept, we developed a proxy measure with high explanatory power.
>
> Neighborhood effects are important in determining business loss and recovery. Businesses should not be viewed atomistically . . . there are important spatial feedback effects that can reinforce the effects of disaster vulnerability, particularly to businesses in the retail sector. (Chang 2002)

Although the Nisqually study examined businesses in just two districts following a single event, the data provides some insight on how businesses pay for repair and recovery. During the interviews each business was asked ‘‘How will you pay for earthquake related damage?’’ and ‘‘How will you pay for losses associated with business interruption?’’ Table 3 summarizes the results, based on the primary source cited by each business. For both questions, the vast majority of the responses were either “business reserves or self-insured” or “out-of-pocket.” The combination of “insurance” and “SBA loan” accounted for only 15 percent of responses.

Table 3. Sources of Repair and Recovery Financing in Two Business Districts in Seattle

Primary source of finance	For repairing damage (N=67) (%)	For business interruption loss (N=63) (%)
Insurance	6	5
SBA loan	9	10
Commercial loan	3	5
Business reserves or self-insured	51	55
Out-of-pocket	28	22
Unsure	3	5
Total*	100	100

*Columns may not add to 100% due to rounding.

Source: Chang and Falit-Baiamonte, *Disaster Vulnerability of Businesses in the 2001 Nisqually Earthquake*

Another way of examining and understanding the impacts of disasters on individual businesses is shown in Figure 13. This model identifies seven “critical cords” for a business, including a “functional transportation system.” The idea is that a business is in jeopardy if any one of the critical cords is severely damaged. (Green 2008)

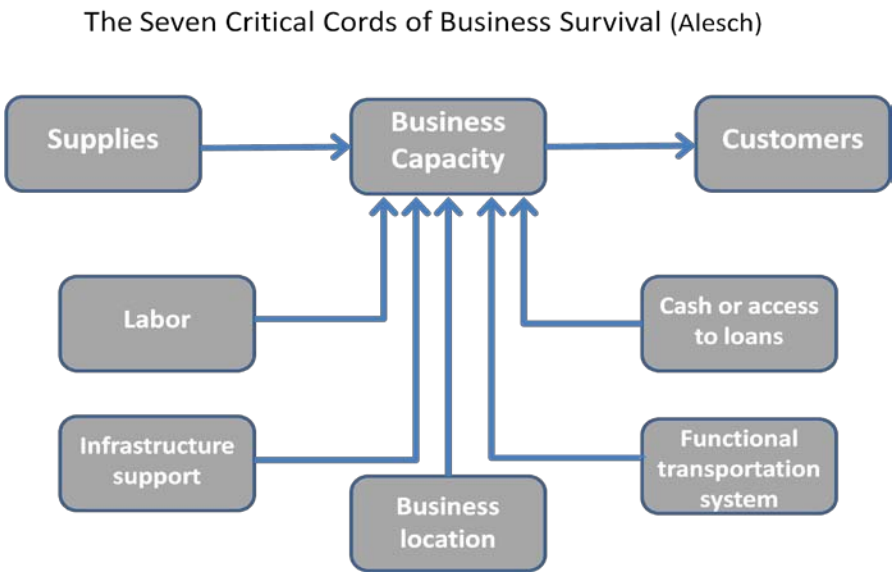

Figure 13. The Seven Cords of Business Survival
Twin Cities Business Sector Flood Impacts Survey Centralia Business and Professional Committee, May 14, 2008, Dr. Rebekah Green, Institute for Global and Community Resilience, Western Washington University

This graphic is an adaptation of work by David Alesch who used the seven cords in conjunction with the graphic show previously in this paper as Figure 1 (page 3).[2] Following a disastrous event, any one of the seven critical cords shown below could be damaged by one or more of the following (as illustrated on page 50):

- Immediate Consequences
- Immediately Following Consequences
- Systemic Consequences
- Ripple Consequences
- Ripple Reverberation Consequences (Alesch 2007)

All of the examples described above contribute to an increasing understanding of how individual businesses are impacted by disasters. However, the research to date provides very limited insight on the effectiveness of alternative actions, strategic or tactical by businesses or public agencies, to facilitate businesses recovery.

[2] In a conference presentation, "Business Survival and Recovery from Extreme Events," at the *Understanding Earthquakes: From Research to Resilience* Conference, April 22-26, 2008, Seattle, WA, Alesch used the same "seven chord" diagram, but for the lower block on the right-hand side (labeled above as "Functional Transportation System), Alesch used "Transformation/Transaction Facilities." Link

IS "RECOVERY" NEGLECTED?

One of the suppositions that led to this research was that "recovery" has received less attention and a lower priority, in research and in practice, than the other phases of emergency management, especially from a transportation perspective. The practical evidence and the opinions of other researchers, as outlined below, indicates that yes, recovery has been neglected relative to the other phases. However, there is also some evidence to the contrary. The next several pages examine the indications for both "yes" and "no."

Yes, Neglected

References to "recovery" are mostly parenthetical in the volumes of documents published by federal and state agencies since 9/11. When it is mentioned, "recovery" is often within the phrase "response and recovery" as if describing a single process with one objective or perhaps a seamless process with two barely separable objectives. The emphasis has been on protection, prevention, preparedness, mitigation, and, especially after the Katrina debacle, on response. Recovery in New Orleans and along the Gulf Coast is being studied by researchers and public officials, but the lessons are still being learned.

The following is from a chapter entitled "Sustainable Disaster Recovery: Operationalizing an Existing Agenda," by Gavin Smith and Dennis Wenger, in the *Handbook of Disaster Research*:

> Disaster recovery represents the least understood aspect of emergency management, from the standpoint of both the research community and practitioners (Berke, Kartez, & Wenger, 1993; Rubin, 1991). When compared to the other widely recognized phases of emergency management, that is, preparedness, response, and mitigation, scholars have yet to address fundamental questions, while practitioners have failed to establish an integrated policy framework or utilize readily available tools to improve disaster recovery outcomes (Berke 1993; May 1986; Mileti, 1999). (Smith 2007, 234)

Smith and Wenger provide this assessment of federal and state planning for recovery:

> The evaluation of state and federal recovery planning remains virtually nonexistent and represents a fertile area of needed research (Waugh 1996). Nor has the role of federal and state agencies in local recovery practice been adequately described. Anecdotal evidence suggests that states are more likely to develop recovery plans than local governments. Yet their quality, including the degree to which they provide the tools necessary to coordinate state recovery efforts, assist local governments to develop sound plans, or embrace the concepts of sustainable recovery remain uncertain. A nationwide analysis of local and state recovery plans is needed to more accurately assess their effectiveness. (Smith 2007, 242)

A recent article in the *Journal of Homeland Security and Emergency Management* summarizes a "content assessment" of the journal's articles and book reviews over the previous two years (2007 and 2008). A total of 40 research articles were published over that period, and not a single article addressed "Recovery." (As shown in Table 4, the authors used another alternative to "phase"—instead of phase, they used "hazards management area." They also used "prevention/mitigation" as a single category.) (Kushma 2009)

Table 4. Articles Classified by Hazards Management Area

	Prevention/ Mitigation	Preparedness	Response	Recovery	N/A	Total
2007	3	5	3	0	4	15
2008	2	8	5	0	10	25
Total	5	13	8	0	14	40

Source: Jane A. Kushma and Claire B. Rubin, "Focal Points in Homeland Security/Emergency Management Research and Practice," J*ournal of Homeland Security and Emergency Management*, Volume 6, Issue 1 2009.

Claire Rubin, a well-know researcher and author, recently offered a "personal retrospective of research on long-term recovery (LTR) based on my own work on this subject over the past 30 years." The following quotes are from a paper entitled *Long Term Recovery from Disasters – The Neglected Component of Emergency Management,* based on Rubin's presentation at the FEMA-sponsored 2009 All-Hazards Higher Education Conference:

> I have concluded that the research and knowledge base in the realm of long-term recovery is seriously inadequate to the needs we face today. In my opinion, LTR [long-term recovery] was, and still is, the neglected element of emergency management . . .
>
> The amount and quality of research is not adequate for our present needs; I think there are very serious deficiencies in basic and applied research on the topic, and that means a weak foundation exists for current and future recovery planning and implementation . . .
>
> Recovery as a practice issue is virtually uniformed by the research that does exist . . . The national response framework we have presently does little to enable local officials to address the challenges associated with the local and intergovernmental politics of disaster recovery.
>
> Not only is the knowledge base inadequate for what we need today, it surely is not adequate for what we are likely to face in the near future. Given the prospect of global warming and sea level rise as drivers, we can expect many major disasters and major population relocations looming ahead . . . (Rubin 2009)

The previous section on "business recovery" cites an observation by Kathleen Tierney that "as units of analysis in disaster research, businesses have only recently begun to be studied." In their 2007 paper, *Vulnerability of Community Businesses to Environmental Disasters*, Zhang et al reinforce that opinion:

> Despite a recognition that businesses play an important socioeconomic role in community functioning by providing products/services, employment opportunities, and taxes (Cochrane 1992), disaster research has tended to focus on families, households, and government agencies (Burby 1998; Tierney, Lindell and Perry, 2001). More research on business impacts is needed so communities can better prepare for, respond to, mitigate against, and recover from environmental disasters. (Zhnag 2007)

From a transportation perspective, many aspects of "emergency management" and "homeland security," other than recovery, have received the attention of governmental agencies and transportation researchers. Significant initiatives have been undertaken to improve security of the transportation infrastructure and security for passengers and cargo. New templates have been developed and best practices identified for emergency evacuations. State DOTs have upgraded their capabilities to assess

damage to infrastructure and to expedite emergency procurement processes when needed. Transportation and public works agencies have become more active participants in emergency drills and exercises. Public agencies are letting their stakeholders know about improvements in mitigation, preparedness, and response, but searches of publications and websites did not identify a single initiative among public agencies focused exclusively on recovery.

In the research arena, the Transportation Research Board (TRB) of the National Academies acted promptly after 9/11 to address the threats of terrorism against the nation's transportation system and the system users. According to the TRB:

> Since September 11, 2001, 100 security-, emergency management-, and infrastructure protection-related projects have been authorized in the Cooperative Research Programs: 82 of these projects have been completed; 10 projects are in progress; and 8 projects have contracts pending or are currently in development. (TRB 2009)

Approximately $13 million had been spent or committed on these projects as of September 2009.

However, only two of the one hundred Cooperative Research Program projects are directly related to the "recovery" phase of emergency management. The first, *Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies* was completed in 2005. Work is expected to begin in late 2009 on the second, *Pre-Planned Recovery and Accepted Practices for Replacement of Transportation Infrastructure.* Information about each of the 100 projects is available from a special TRB website.

An additional reason to conclude that recovery has been neglected is highlighted by this excerpt from a letter to the FEMA Administrator dated August 28, 2009, from the Senate Committee on Homeland Security and Governmental Affairs:

> The Post-Katrina Act required that FEMA, in coordination with other relevant federal agencies, complete a National Disaster Recovery Strategy. This strategy is now more than two years overdue and FEMA has not yet provided an estimate of when it will complete the strategy. What is your projected completion date for the recovery strategy? Please provide a FEMA staffing plan for completion of the recovery strategy. (Lieberman 2009)

We now have a *National Response Framework*, a *National Incident Management System*, and *National Preparedness Guidelines*, but no comparable framework, system, or guidelines for recovery. Looking at FEMA's organizational chart it is not clear which unit, if any, is responsible for recovery-related issues.

No, not neglected

Some evidence can be cited to argue that "recovery" has *not* been neglected, at least from some perspectives. Writing in 1997, Neal opined that, even though "early disaster research ignores recovery-time efforts . . . the past twenty years of disaster research sees an increased focus on recovery issues." (Neal 1997, 244; Barton 1970) No similar conclusions were found elsewhere in the research literature; but, obviously, researchers have not totally ignored recovery since numerous sources are cited in the

preceding descriptions of complexity, stakeholders, short-term versus long-term perspectives, conceptual models, and business recovery.

In addition, new research projects are underway. The NCHRP project mentioned above (*Pre-Planned Recovery and Accepted Practices for Replacement of Transportation Infrastructure*) is one example. Two new projects are described on the website for the Disaster Research Center (DRC) at the University of Delaware, one entitled *Methods for Measuring, Monitoring and Evaluating Post-Disaster Recovery* and the other *Resiliency of Transportation Corridors During Disasters*. (Descriptions can be viewed at Link1 and Link2.)

Numerous efforts are underway to document and assess the Katrina recovery efforts in New Orleans and along the Gulf Coast, but research for this paper did not identify any overarching description of underway research or any cataloguing of results.

The extensive research and public policy attention given to on mitigation, sustainability, disaster resistance, and disaster resilience all add to the understanding of recovery, or at least to the understanding of how to reduce the challenges of recovery. Reducing the challenges of recovery is at the core of mitigation, sustainability, resistance, and resilience.

Practitioners could argue that recovery, at least "short-term" recovery, is a central part of their work and receives no less attention or lower priority than other responsibilities. In fact, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, passed in 1988, authorized federal financial assistance specifically for recovery, and the Stafford Act has been amended several times to add additional categories and levels of assistance. FEMA and state EMAs administer those funds.

Based on the previous examination of the differences between short- and long- term recovery, another way to answer the question of "neglect" is that the parts of recovery for which the EMAs are responsible have definitely not been neglected. For the other parts of recovery (e.g., longer term), the answer is less certain, and only anecdotal information is available.

Practitioners could also point to *Emergency Support Function (ESF) #14* as recognition of the importance of Long-Term Recovery. The following is an excerpt from the Emergency Support Function #14 – Long-Term Community Recovery Annex:

> **Purpose:** ESF #14 – Long-Term Community Recovery provides a mechanism for coordinating Federal support . . . to enable community recovery from the long-term consequences of extraordinary disasters. ESF #14 accomplishes this by identifying and facilitating availability and use of sources of recovery funding, and providing technical assistance . . . for community recovery and recovery planning support.
>
> **Scope:** ESF #14 may be activated for incidents that require a coordinated Federal response to address significant long-term impacts (e.g., impacts on housing, government operations, agriculture, businesses, employment, community infrastructure, the environment, human health, and social services) to foster sustainable recovery. ESF #14 support will vary depending on the magnitude and type of incident.

> **Policies:** ESF #14 recognizes the primacy of affected State, tribal, and local governments and the private sector in defining and addressing risk reduction and long-term community recovery priorities, and in leading the community recovery planning process . . . (FEMA 2008)

According to FEMA, the federal ESF #14 team, Long-Term Community Recovery "responded with assistance in 10 of 75 federally declared disasters in 2008, deploying teams of long-term recovery specialists to 26 communities across 11 states to assist in charting an efficient and streamlined path to recovery." (FEMA, 2008b) All of the sate-level emergency plans reviewed as part of this research also included a long-term recovery ESF. FEMA has a website for "ESF #14 Planning Resources." Link

Although FEMA has not developed a "national recovery framework" as required by the Post-Katrina Recovery Act, the requirement is still there, and at least some members of Congress are still pressing. Others are also supportive. A copy of a briefing, "Developing a National Disaster Recovery Framework," to the Congressional Hazards Caucus is available on the Caucus's website. (Johnson, 2009) Further, the January, 2009, issues of *Natural Hazards Observer,* was entitled "Toward a National Disaster Recovery Act of 2009." No such act emerged, but some specific ideas were placed on the table. Link

The Obama Administration has established a Long Term Disaster Recovery Working Group, co-chaired by the Secretaries of the Departments of Homeland Security (DHS) and the Department of Housing and Urban Development with representatives from approximately 20 federal departments and agencies. "Stakeholder Forums" were held in four cities, including Memphis, in November 2009. Link

Finally, from a transportation perspective, the U.S. Department of Transportation circulated a draft report entitled *Recovering from Transportation Disasters: The National Transportation Recovery Strategy (NTRS)* in May 2009, and a final version was published in November 2009. The introduction to the final NTRS report includes this statement:

> The *NTRS* is designed to help transportation industry stakeholders and local, tribal, and State government officials prepare for and manage the transportation recovery process following a major disaster. *The overall goal of this Strategy is to promote a recovery process for transportation networks – and subsequently of communities in general – that results in a greater level of resilience.* (USDOT 2009)

The report is further described as an initial step in a national effort:

> *NTRS* begins a comprehensive national effort to promote community resiliency through effective transportation recovery planning and implementation. You are encouraged to use the *NTRS* as a resource to start planning for your role in the transportation and overall recovery process of your community following a disaster.
>
> The U.S. Department of Transportation (DOT) and its Federal partners are firmly committed to enhancing the usefulness of this initial Strategy through the future development of additional tools and resources for industry stakeholders and local, tribal, and State authorities facing the difficult task of recovering a transportation network. DOT is leading a joint effort with the U.S. Department of Homeland Security (DHS) to produce the package of products that will enhance the *NTRS*. (USDOT 2009)

CLOSING

The following advice from Daniel Alesch helps summarize much of the current thinking and public policy toward disaster recovery:

> The best advice for recovery is not to need it. (Alesch 2008)

A companion background paper, "The 'Phases' of Emergency Management," describes the popular emphasis on mitigation and related concepts to reduce the challenges of recovery—through prevention, protection, reduced vulnerability, increased sustainability, and improved resilience. Likewise, the private sector is giving attention to business continuity, risk management, and related concepts. All of these initiatives are aimed at not needing "recovery," or at least reducing the extent of damage when disaster occurs and/or increasing the inherent capabilities for recovery.

Nonetheless, disasters will occur and recovery will be required. Whether or not "recovery" has been the most neglected phase of emergency management in the past, transportation researchers and practitioners now have important opportunities to influence "recovery" research and policy development. The information presented in this paper is intended to provide insight on the complexities of recovery, the differences between short-term and long-term recovery (and the associated responsibilities), the factors that influence business recovery, and the conceptual models developed through previous research.

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