

How do Communities Recover from Disaster? A Review of Current Knowledge and an Agenda for Future Research

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Of all the phases of emergency management, recovery has been the least researched (Berke et al, 1993; Rubin et al, 1985). Although the number of individual post-disaster case studies has increased in recent years, comparative studies of recovery are few. Perspectives of recovery researchers vary, seeing it alternately as a social (community or family scale), economic, management, design, planning, or finance problem. The following review summarizes some of the key studies relevant to a community planning approach to post-disaster recovery.

Recovery as a Predictable Process

Reconstruction Following Disaster, by Haas et al (1977) was the first study to take a comprehensive view of the recovery process. They examined two recent (1972 Rapid City flood, 1972 Managua, Nicaragua earthquake) and two older (1964 Alaska earthquake, 1906 San Francisco earthquake) disasters in order to identify common policy issues and extract common lessons on the forces that affect reshaping of a city following disaster.

Although they were probably overconfident in declaring that “the reconstruction process is ordered, knowable, and predictable” (p. 261), their study contained a great deal of insight that has been confirmed by subsequent disasters. First, they observe that the city is almost always rebuilt on the same site, and it usually looks familiar to its residents. It is usually a bit safer than before the disaster, though not as improved as it could have been. Second, factors that increase the speed of reconstruction include: availability of large external resources, innovative national leadership, the existence of prior plans, community consensus, and wide dissemination of information. Third, ongoing urban trends accelerate after the disaster. They especially note that urban decentralization—which has been a general international trend for the past century—increases after disasters. Fourth, recovery is not an egalitarian process. Those who can pay for the best locations rebuild the soonest and in the prime places; others will follow. Those with greater access to resources before the disaster continue to have greater access. Fifth, the opportunity to do comprehensive re-planning is rarely fulfilled, because it costs too much in time and uncertainty. As they observe, “There is already a plan for reconstruction, indelibly stamped in the perception of each resident—the plan of the predisaster city. The new studies, plans and designs compete with the old” (p. 268). This observation is echoed by a contemporaneous study, describing how the city of Xenia, Ohio resisted the opportunity for change after a devastating tornado in 1974 (Francaviglia, 1978).

Haas et al recommend that post-disaster planners make decisions as soon as possible so as to reduce uncertainty among private decision makers. These decisions must be based on the best available information, and are easiest to accomplish if plans and policies are in place before the disaster and if the city routinely maintains land use inventories. To allow some time to make these decisions, they suggest a moratorium, but it must have a fixed deadline. They also suggest phased planning, with immediate needs addressed first. An important aspect of their model was identification of four overlapping phases of recovery, distinguishable over time: (1) *emergency period* of search and rescue and emergency housing (days or a few weeks); (2) *restoration period* of repairing infrastructure and returning to relatively normal activities (a few months); (3) *replacement period* of rebuilding capital stock to predisaster levels (up to two years); and (4) *commemorative, betterment, and developmental reconstruction* involving large projects (up to ten years).

Recovery as a Management Problem

Another important comparative study of post-disaster recovery was *Community Recovery from a Major Natural Disaster*, by Rubin et al (1985). This study looked at 14 disasters of several different types from throughout the U.S. In contrast to the Haas study, none of these were catastrophic disasters, they were all from the U.S., and the research covered only the first 12 to 24 months following each event.

The significant contribution of *Community Recovery* was that it carefully examined governmental organization and processes for community-level recovery. In initiating this study, the authors recognized that previous studies had focused on family and individual recovery, and significant questions remain regarding decision-making at the community level. Following a disaster, everyone turns immediately to the government for financial assistance and other forms of intervention, yet few studies have looked at recovery from the point of view of local government management. The success of a recovery process is affected by resources, allocation of resources, and the preparedness and skill of public officials. Rubin et al present two important sets of findings, methodological and substantive.

Recovery poses methodological problems for researchers, because it is a complex process with ill-defined endpoint and no agreed upon measure of success (see also Quarantelli, 1999). Indeed, Rubin et al observe that recovery is more complicated than Haas's sequential model suggests: "our research showed that issues frequently crop up in simultaneous or illogical sequences" (p. 6).

How can one compare one community's recovery process to another's? Rubin et al say that it is not possible to measure the length of the process, nor to identify the endpoint of recovery. All communities eventually recover. The distinction is that some recover better than others. Therefore, what is most worth evaluating is the *process* of recovering and how to improve both its *speed* and *quality*. To do this, the most appropriate way to study community recovery is by means of qualitative case study analysis. In their words, "After several meetings of the project team, it was decided that the qualitative data

collected during field visits could not be analyzed by quantitative methods of analysis, and that we should stop procrustean attempts to do so” (p. 13).

Based on their 14-community study, Rubin et al present a variety of observations, conclusions, and propositions regarding the recovery process. They identify three key ways that local officials can affect community recovery: (1) leadership, (2) ability to act, and (3) knowledge of emergency management and available resources. Of these, they emphasize leadership as the most important. This stems from the observation that recovery process is unique for each community and therefore requires “site-specific, adaptive planning strategies” (p. 28). Therefore, what the community needs is the organizational and leadership ability to solve its problems. Some of the important leadership characteristics include: flexible, creative styles of problem solving; a vision of the community; and strong links to other public and private decision makers. An effective leader turns adversity into opportunity, seeing the disaster as “an opportunity to implement plans that previously may have only been ‘pipe dreams’” (p. 30). One way a leader does this is by developing community organizations after the disaster, to help to define and advance community values. Even better, communities with effective leadership generally have plans in place before the disaster, reflecting the consensus of community networks.

After a disaster, Rubin et al propose that successful communities must decide quickly on their objectives and on the organizational and decision framework. They must also decide quickly whether outside assistance is needed, such as planning consultants or additional building department staff. Community betterment is an important goal, but it too must be decided quickly.

Resources are also important. Successful recovery depends on external financial and labor resources. Conversely, over-dependence on such resources can lead to a loss of local control. Effective administrative and development management mechanisms (e.g., land use controls, building permits, information systems, mutual aid agreements) also are important resources that can facilitate recovery. Finally, pre-disaster preparedness planning—including identification of all available federal and state assistance programs—will make the process go much more smoothly.

Another study looking at recovery as a local government management process was Johnson’s (1999) retrospective on the recovery of Watsonville and Oakland, California from the 1989 Loma Prieta earthquake. This study was important because it provided a long-term view of the recovery process, for both small and large cities, and from the perspective of thoughtful key participants looking back over the decade since the disaster. Johnson’s findings echo those of Rubin et al regarding the importance of leadership capacity, vision, and commitment. Post-disaster recovery is not a rational process that can proceed from a checklist. Neither Watsonville nor Oakland developed a comprehensive recovery plan. Instead, planning evolved from weekly staff meetings, prior plans and practices, and key policy decisions made along the way. Successful recovery requires community leaders to be proactive, organize meetings, have a positive attitude, and get things accomplished. This happened in both Oakland and Watsonville.

In addition, both cities benefited from public-private bodies that emerged after the earthquake and helped to provide community forums and develop consensus. Additional successful management strategies included use of information systems, flexible and creative finance packaging, outside technical assistance, and coordination with multiple levels of other organizations (federal, state, and community groups).

It is significant that, in retrospect, Johnson's managers describe the process in terms of four phases: *immediate response* to endangered people and property; *restoration* of utilities and short-term housing; *short-term or interim recovery* to restore pre-disaster levels of functioning to households and businesses; and *long-term recovery or permanent reconstruction* to repair, rehabilitate, and redevelop. Even if these do not occur sequentially as Haas et al proposed, these clearly are important conceptual phases in post-disaster recovery.

In both cases, leaders appreciated the opportunity the earthquake provided for community improvement, and they were able to include this as part of their recovery goals. The window of opportunity for doing so existed in the first few months following the earthquake. Both cities depended initially on rehabilitation of public facilities to attract private investment. Conversely, both reported difficulty in quickly accessing federal funds in the beginning, because of complex program requirements and reimbursement processes. Managers in both cities also lamented the lack of time to create a vision for recovery and systematically define priorities.

Recovery can also be seen as an example of a planning implementation challenge. During the past twenty years a body of literature has grown regarding implementation of plans and policies. This research reflects the realization that government programs rarely work in practice as envisioned (e.g., Bardach, 1977; Pressman and Wildavsky, 1973). More recent studies have revealed the complexities of local planning implementation (Burby et al, 1988; Dalton, 1989; Forrester, 1989; Hoch, 1995; May and Bolton, 1986). All of these studies underscore the importance of considering local implementation when designing larger policies. This perspective is missing from the recovery and reconstruction literature, but it is important because recovery is another example of a situation in which widely accepted goals—rapid replacement of what was lost, at a higher quality if possible—are difficult to accomplish at the local level.

Citizen Participation in Recovery Decisions

One of the most important issues to emerge since the Haas study—both in recovery research and in planning practice in general—is the critical importance of citizen participation in decision making. Although most American planners now consider it routine to involve community members in plan preparation (Gil and Lucchesi, 1979; Hollander et al, 1988), such processes necessarily make planning more complicated, and the number of actors in the process increases the possibility of unexpected outcomes (Bardach, 1977; Pressman and Wildavsky, 1973). Still, Rubin et al (1985), Johnson (1999), and many others speak of the importance of community organizations in the recovery process. Oliver-Smith (1991), for example, in a study of post-disaster

relocations, found that resettlement can only succeed when residents take active roles in the planning and construction. Without participation in planning their new community, residents refuse to be relocated. And without participation in design and construction, the new settlements fail because they do not reflect the needs of the residents. In a very different environment, Topping (1998), in his account of the recovery after the 1991 fire in Oakland, California, noted that an important innovation for reducing some of the tension between government and property owners was a community development center that provided for better two-way communication during the reconstruction period.

Berke et al (1993), in a review of the limited literature to date on community-level recovery, observe that successful recovery occurs when citizens and institutions are able to adapt programs from higher levels of government to local needs and capacities. Thus, active local involvement is critical to success. They conclude that local recovery can succeed best when national programs are flexible, “with a capacity for embracing error, learning with people, and building new knowledge and institutional capacity with action” (p. 97). In a review of studies of economic development projects in general, they document the increasing trend over the previous two decades toward participatory planning and implementation for these types of projects. This trend extends also to post-disaster development assistance projects. Comerio (1998) observes that self-help housing is now the current model for rebuilding after disasters in developing nations.

Participation offers several advantages, the most important of which may be sustainability: by involving citizens, recovery can build community capacity to sustain success in the long run. External aid can help, but its purpose should be “to build and support local organizations to be more effective in undertaking self-directed sustainable development initiatives” (Berke et al, 1993, p. 93).

Recovery as a Process of Physical Change

Although cities tend to rebuild themselves much as they were before the disaster, there is no avoiding the fact that disasters result in physical changes to the urban environment. Catastrophic disasters can obliterate entire cities or districts, and cities change after disasters, often for the better.

Arnold (1993) studied reconstruction after earthquakes in Tokyo, Mexico City, Armenia, Tangshan (China), and Santa Cruz (California) to find common lessons regarding physical construction and urban design following these disasters. On the one hand, he shows that significant change is difficult to achieve, because the political and administrative environments resist it, and because the historic evolution of the city reflects the deep-seated desires of its inhabitants. On the other hand, Arnold sees earthquakes as the equivalents of the first step of urban redevelopment: clearance of blighted areas. Earthquakes, he says, weed out the old and poorly-maintained buildings in the city—precisely those places in need of redevelopment. As a result, he concludes that, “Over a long period of time earthquakes in general have probably been beneficial to the city as a whole” (p. 28). Arnold’s advice for reconstruction is to accept the basic

character of the city, but then see how best and efficiently to enhance it in specific locations.

In the normal course of urban development, physical planning improvements work slowly, as design standards are gradually implemented over many years. A disaster provides the opportunity to implement these changes more quickly. Arnold documents considerable physical improvements in several cities following earthquakes. And, as his examples show, these physical changes also bring about social and economic improvements. In Mexico City, the need to rebuild several medical facilities provided the opportunity to upgrade not only the buildings but the entire medical system. The earthquake also resulted in improved housing that enhanced the lives of 50,000 families. Arnold describes the planning and reconstruction efforts following the 1923 earthquake in Tokyo. Planning emphasized streets, land readjustment, and parks. Although the basic city form remained, it was much improved, and the post-1923 modernization of central Tokyo has supported Tokyo's growth to the present day (Sorensen, 2002). Tangshan was totally destroyed, so it had a range of planning options. It was rebuilt in the same location, but at lower densities and with new satellite cities. The new Tangshan now has open space, planned traffic, and planned neighborhoods.

Although emphasizing physical design, Arnold also focuses on the question of reconstruction timing. For Spitak, Armenia, he describes how individuals began to rebuild before planning was completed. Thus, planning, to succeed at all, must be done immediately. In Santa Cruz, the city took advantage of the earthquake to reevaluate its downtown, and Arnold marvels at how quickly a community-wide planning process was accomplished to enable this.

If physical change is to be accomplished, it requires an appropriate process to plan and manage it. Tyler et al (1992) show how redevelopment has been used following various disasters in the U.S. "to revitalize downtowns, reduce vulnerability to future damage, replace damaged and inadequate infrastructure, replace affordable housing and preserve historic buildings" (p. 41). When a community decides to take advantage of a disaster to change part of the city, an effective way to do this is to use existing urban redevelopment processes. Tyler et al show that redevelopment is common after disasters in general, and earthquakes in particular. In their 11 case studies—from earthquake-damaged Anchorage, Alaska in 1964 to flood-damaged Kinston, North Carolina in 1996—they show how redevelopment provides a means for communities to make changes as they rebuild. Tyler et al echo Arnold's observations in stating that cities "want to emerge from disasters essentially the same as before, but less vulnerable, more economically robust and more attractive than before the disaster" (p. 35). Redevelopment does not change the entire fabric of cities, but it is a way to completely redesign and rebuild specific heavily damaged urban districts.

To some degree, recovery always involves change. The community will never be exactly what it was before. It will look different, residents will migrate, and the economy will change. All communities change and evolve over time, but a disaster accelerates this process.

Recovery as Concern of Urban Planners

The planning literature on disasters in general and earthquakes in particular has generally focused more on mitigation than on recovery (e.g., Jaffe et al, 1981; Erley and Kockelman, 1981; Bolton et al, 1986; Berke and Beatley, 1992; Olshansky, 2001). Less work has addressed post-disaster reconstruction processes or the mitigation opportunities following disaster, but planners' interest in recovery has been increasing in recent years.

The first significant study on post-earthquake land use planning was *Land Use Planning After Earthquakes* (William Spangle and Associates et al, 1980). This study was concerned with how to further post-disaster mitigation. One conclusion was that improved structural design is normally sufficient for reducing future seismic risk, but areas of highly concentrated damages and with significant seismic risk may need land use changes. Second, they found that local governments with well-established planning functions tend to be the most effective at managing reconstruction. Third, they found—for U.S. disasters—that land use changes are only made when the federal government bears the costs. Finally, the authors identified operational aspects of post-earthquake hazard mitigation planning, and they recommended a post-event hazard evaluation and mitigation process in many ways similar to subsequent federal regulations to implement Section 409 of the 1989 Stafford Act (see Godschalk et al, 1999).

Selkegg and Preuss (1984) also examined policy issues related to post-disaster hazard mitigation during reconstruction after the 1964 Alaska earthquake. In particular, this study noted the difficulties of attempting to impose professionally preferred mitigation solutions on policymakers who have competing concerns. Preuss' more recent assessment of Anchorage looks at the long-term impacts of the hazard mitigation actions on subsequent growth and development (Preuss, 1995).

Los Angeles in 1994 was rare in that it had what was the nation's only pre-earthquake recovery and reconstruction planning process at the time. The Los Angeles plan stemmed from a series of projects carried out by the city and state over the preceding decade (Recovery and Reconstruction Advisory Committee, 1984; Spangle Associates, 1987; SCEPP, 1991; Office of Emergency Services, 1993; Spangle Associates, 1994). The city's Emergency Operations Board approved a draft Recovery and Reconstruction Plan (City of Los Angeles, 1994) on January 22—just five days after the Northridge earthquake—and the City Council approved it in September 1994. The Northridge earthquake provided a well-timed opportunity to assess the effectiveness of this recovery plan. need to cite to Spangle study of this.

Practical Lessons for Planners

A significant contribution to the literature of post-disaster recovery was a 1998 publication by the American Planning Association, *Planning for Post-Disaster Recovery and Reconstruction* (Schwab, 1998). Funded by FEMA, and published as part of the Planning Advisory Service subscriber series, this report has been widely distributed

among American professional planners. It provides advice to planners, presents several case studies from a planning perspective, and includes a model ordinance that can help communities prepare ahead of time for post-disaster planning.

An important message of *Planning for Post-Disaster Recovery and Reconstruction* is that cities should have a recovery plan in place ahead of time, and it should be a part of their normal comprehensive plan, as well as being linked to their mitigation plan and emergency operations plan. Schwab makes several arguments for the value of planning. First, a plan can reduce the chances of making short-term decisions following a disaster that may limit future options. A plan can identify options and define priorities ahead of time, ensuring that the first decisions following the disaster represent the community's long-term wishes. Second, in the absence of a plan, it is more likely that public officials would respond to the pressures of the moment by making promises that compromise opportunities for achieving a safer community. Third, the planning process itself is valuable. Planners play an important role in building consensus around a vision before a disaster, and then in making key rebuilding decisions after the disaster. Schwab describes planners as "both visionaries and salesmen prior to the disaster and, afterwards, watchdogs patiently waiting for their moment of opportunity to guide the community toward the implementation of its vision of itself" (p. 25). Fourth, a plan helps to better position a community toward accessing post-disaster funding. Additional resources become available following disasters, such as for hazard mitigation or for infrastructure improvement. Schwab writes that these resources don't appear by accident; rather, "Local governments manage to secure such resources in large part because they have planned to do so" (p. 62). Having a plan means that local officials have considered a large range of options and decided how to use post-disaster funding so as to best further all the planning goals of the community. Plans also help communities to save critical time by making their funding requests early in the process.

Schwab also provides important advice regarding speed of rebuilding. Although it is vitally important to include mitigation in the recovery process, it should not be at the expense of restoring normal activities as quickly as possible. As he points out, "public support for mitigation can dissolve easily if achieving it entails serious delays in restoring normal civic and economic activity" (p. 18). And he says that moratoria should be used judiciously, depending on the hazard characteristics, need for further studies, and areal extent of damage.

Case studies in *Planning for Post-Disaster Recovery and Reconstruction* include accounts of recovery following the 1991 Oakland Hills, California fire (Topping, 1998), 1995 Hurricane Opal in Florida (Smith and Deyle, 1998), and the 1989 Loma Prieta earthquake in Santa Cruz and Watsonville, California (Eadie, 1998), and provide numerous insights on the realities of recovery. Topping (1998a) describes the intense pressures in Oakland to allow individuals to rebuild as quickly as possible after the fire, making it very difficult for government officials to implement improvements such as wider streets and fire-resistant building materials and designs. The window of opportunity was brief—eight to twelve months—and even this opportunity was severely limited by what the community was willing to do. In the end, Oakland made some

improvements in parking, roof requirements, and water supply, but the city was unable to accomplish the needed safety improvement of wider roads.

Smith and Deyle (1998) describe a process in which planning played only a minor role. The Florida communities affected by Hurricane Opal viewed the recovery process as a short-term extension of the response process. Speed was a priority, whereas betterment was not. They expected to rebuild what was there before as quickly and inexpensively as possible. They resisted mitigation other than structural improvements, resisted land use changes or time-consuming infrastructure relocation, and had no interest in redevelopment. This is because they were not accustomed to doing redevelopment or mitigation planning, and the post-disaster period was not the time to start.

Smith and Deyle suggest addressing post-disaster reconstruction within a community's comprehensive plan, to serve the dual purpose of bringing hazards into planning and bringing planners into the post-disaster process. They emphasize a distinction between planning for *short-term* and *long-term recovery*, with the former term approximately corresponding to Haas et al's second and third phases and the latter term to Haas' fourth phase of betterment and redevelopment. They propose that conceptually separating these phases can help to reduce community mistrust of long-term planning as being intrusive and make it easier for planners to participate in the important activities of short-term recovery. They further emphasize that the community must reconcile the short-term demands for community restoration and the long-term needs of redevelopment, without leaving them as competing alternatives. This can only be done by means of a recovery plan, grounded in the content of the comprehensive plan. They advocate a recovery plan with general policies and specific criteria for post-disaster decisions.

Eadie emphasizes the political and financial aspects of the recovery process, in his account of Santa Cruz and Watsonville, California, following the 1989 Loma Prieta earthquake. Eadie writes that economic objectives are paramount in post-earthquake recovery, particularly when the disaster is largely uninsured. Thus, pre-event planning should emphasize understanding of post-event economics. "Although the substance of recovery is primarily economic," however, Eadie observes that "politics drives the process" (p. 282). Plans must be sensitive to local politics, but they also need to be flexible enough to recognize that politics may change. The best way to accomplish this is to build citizen involvement into the process. In a positive sense, recovery forces the community to resolve difficult community problems it had long avoided.

Eadie also presents a long list of pragmatic observations, from his experience working in these communities. For example, he warns planners that it is difficult for staff to balance both long-term recovery planning and expedited permit processing. But planners are highly valued, because their skills "incorporate the ability to bring people together in stressful settings to sort out complex situations and create plans to address critical needs" (p. 285). Both cities required a variety of economic strategies, based on their individual priorities and on available funding. Eadie observes that it is critical to keep businesses alive in the short-term, and conversely that cities need to be patient with the time it takes to permanently rebuild retail areas if external funding is limited. Recovery also includes a

financial paradox: money is most readily available during the first six months, but it is most needed later on, once needs become more clear. Thus, cities and granting agencies need to be willing to renegotiate terms later on.

The APA guide includes a model recovery ordinance, drafted by Topping (1998b). Besides providing a helpful framework for local governments, the ordinance identifies several key ideas in planning for recovery. For example:

- It is important to have a coordinating body, including representatives of all relevant agencies and organizations. This organization needs to be separate from emergency management so that it can better emphasize the long-term construction and economic recovery issues the community will face.
- Pre-disaster planning should distinguish between long-term and short-term decisions, and understand which short-term actions have long-term consequences. The plan should provide for phased planning following the disaster, by beginning immediately with a strategic program to identify high priority actions, and then following with more detailed plans.
- Consultation with citizens is essential.
- An effective recovery plan should include temporary regulations, to allow for efficient actions with respect to such issues as moratoria, permit expediting, temporary uses, demolition, and housing.
- Moratoria can help allow for informed decisions while still ensuring some degree of speed. To ensure acceptance of a moratorium, however, it is important to lay the groundwork in pre-disaster planning.
- Cities need to be prepared to allow temporary uses and rebuilding of nonconforming uses, as long as they fit prescribed criteria. For example, a pragmatic approach is to allow rebuilding of nonconforming uses within the previous size envelope, if they comply with strict life safety requirements.
- A recovery plan should recognize the degree of vulnerability in the community's housing, estimate housing needs following a disaster, and try to plan accordingly.
- The recovery plan should identify high priority mitigation actions that can be accomplished in the wake of the disaster.

Housing, Finance, and Economics

Although Eadie (1998) reminds us that it's all about money, the issue of post-disaster finance is generally overlooked in the literature. An exception is Comerio's (1998) *Disaster Hits Home: New Policy for Urban Housing Recovery*. On its surface, Comerio's study is about post-disaster housing issues, but her primary conclusions emphasize housing finance. She writes that the most important factor contributing to a community's capacity to rebuild is the system of finance for housing repairs (p. 24). Comerio's is one of the few comparative studies of recovery—covering Hurricane Hugo, Hurricane Andrew, the Loma Prieta earthquake, the Northridge earthquake, 1993 Mississippi River floods, the 1985 Mexico City earthquake, and the Kobe earthquake—although it specifically focuses on urban housing issues. One of Comerio's main points is that policy makers need to think of post-disaster housing in terms of the effects on the

local population, rather than focusing solely on total numbers of housing units or economic losses. Some markets, for example, may be better prepared to absorb displaced families (this seems to be especially true of rural areas), and other markets may have inadequate supplies of affordable housing. In the case of some developing nations, jobs may be more important than housing, which families can readily build themselves. Second, she shows how renters and lower-income homeowners have been neglected by policies in the past, and she asserts that these are precisely the groups that should be the targets of public programs. Too often in the U.S. middle-class homeowners have gotten too much assistance too quickly, at the expense of those who are less powerful and influential. Renters are often neglected, and they are at the mercy of the investment decisions of landlords. Third, she warns that future urban disasters (particularly earthquakes) in the U.S. will have much less insurance coverage, making housing finance a significant challenge. She also stresses that the finance system must ensure that rebuilding or repairs occur within two years, because empty buildings have physical consequences, and delays have serious economic consequences.

Friesema et al (1979) also take an economic perspective, but their focus is on economic impacts rather than finance. The purpose of their research was to determine the long-term economic effects of disasters on communities. They studied four communities, with disasters occurring from 1955 to 1967. They used several indicators over time in order to measure the long-term effects of the disaster. Their goal was to sort through the conflicting hypotheses of economic effects: (1) a natural disaster leads to long-term economic growth because it stimulates recapitalization from outside financial resources; or (2) a disaster has long-term negative effects because of the damage it causes to the community's resources.

Friesema et al make the same observation as Rubin et al that the recovery process is very difficult to measure by means of quantitative variables. Identifying and gathering appropriate time series data was a challenge to them, and trends, if any, turned out to be more subtle than they expected. Much of their book ended up being a discussion of how to develop better methodologies for future studies. It is notable that we are unaware of any other such long-term economic studies since this 1979 publication; even short-term economic effects have posed challenges to researchers (e.g., Ellson et al, 1984; Development Technologies, 1992; National Research Council, 1992; FEMA, 1999).

Despite the methodological difficulties, Friesema et al are able to draw some conclusions from the four communities they studied. They conclude that there were no long-term economic effects for the community as a whole, either positive or negative. This is because the effects are quickly spread through the entire economy, which is so well integrated that one cannot isolate a single region. This explains why they could measure no large-scale permanent economic effects at the community level. But the researchers are quick to caution that this is not to say that disasters have no economic effects. Disasters can cause severe personal impacts to victims, and they can create winners and losers in their aftermath. And long-term costs do occur, but these are to larger society. Friesema et al also found some short-term social effects, such as changes in unemployment or marriage rates, lasting several months after the disasters. One

limitation to their conclusions is that none of the disasters they studied were catastrophic for large urban areas; the worst of them involved destruction of 800 homes.

Recovery can involve large economic redistributions. Some individuals gain, others lose, and there is a net loss to society as a whole. Financing arrangements can affect who wins and who loses, depending on the source and terms of the funds. Often the losers disappear and move away, as Comerio (1998) notes following Hurricane Andrew.

Individual, Household, and Small Business Recovery

A larger body of literature covers the areas of individual and household recovery following disasters, in part because these micro-scale effects are easier to measure. Although our current review is most interested in community-level issues, understanding of household effects is critical to understanding the context and significance of community-level decisions.

The Haas et al (1977) study, for example, includes a detailed review of effects on families in Managua and Rapid City. Some of these efforts directly relate to issues of timing and location of urban reconstruction. In Managua, they found that families had to struggle to keep their jobs and find places to live. The economy slowed down, jobs became scarce, and the costs of housing and building supplies became highly inflated. Because of the damage to the city center and the rapid decentralization of the new city, long commutes created large costs and considerable stress to families. In particular, families were filled with uncertainty about their financial future and about how the city would develop (Where will the stores be? What will new neighborhoods be like? Where are the most convenient places to live?). Dishonest contractors also made rebuilding more difficult. In contrast, in Rapid City work places were not damaged, and considerable federal aid was available. The result was that many renters were able to buy homes after the flood, and 74% of owners reported that their new homes were better than their pre-flood ones. Almost all reported that their new homes were safer from disasters than before.

Quarantelli (1999) summarizes some of the household-level research to date. An important finding is that, for most victims, the major helping sources are relatives. Families and informal organizations play a greater role than usually supposed by government agencies. Research also confirms that those who are well off financially and/or better connected to community networks are more likely to recover quickly to predisaster levels. Living in temporary housing can be stressful, particularly if far away from residents' predisaster neighborhood and social networks. Victims usually can cope with an initial move into temporary housing, "but show sharply decreasing adaptability to cope with additional moves" (p. 9). It is also important to appreciate that losses are not always quantifiable or comparable in monetary terms between households. For some families, the lost past can never be adequately recovered.

Only a few studies have looked at the impacts of disasters on small businesses. One of the most detailed studies was the University of Delaware Disaster Research Center's

survey of over 2,000 businesses following the 1993 flood in Des Moines, Iowa, and the 1994 Northridge earthquake (see Tierney, 1995). In both cases, a significant amount of business disruption came from lifeline interruption rather than direct damage. Other indirect factors, such as loss of customers, also contributed. Most business owners used primarily personal savings to offset their losses. Few permanently lost their business, but it is possible that such businesses were underrepresented among respondents.

Common Research Findings

Recovery studies are few, and systematic comparative studies are fewer. The studies that exist look at recovery through a variety of lenses: process, urban form, economics and finance, and social and family impacts. Some are descriptive, whereas others are prescriptive. Still, considerable consensus exists in the literature regarding a variety of recovery issues. Based on the above review, I propose several consensus observations:

Process

- Recovery is a process, with no clear endpoint. The balance between “normal” and “recovery” activities will gradually change over time, and eventually recovery blends with business as usual.
- The goals of a recovery process depend on the particular case. In general, speed and quality are the measures of a successful recovery process. At a minimum, the goal of recovery is to return to the previous level of economic function and replace the quantity of lost housing units. Beyond that, the recovery process depends on local social and economic context, as well as local and national politics.
- Bureaucracies lack the flexibility to be able to quickly respond to the uncertainties of the recovery process. As a result, new community-based organizations emerge. Such organizations are, in fact, crucial to a successful recovery process.
- Government agencies can facilitate recovery to the extent that they can support—financially and technically—local organizations and not tie their hands with excessive requirements. Establishment of a separate recovery organization is often helpful, to link the efforts of all involved government and nonprofit groups. In addition, it is important to realize that much of recovery occurs through family and informal networks.
- Citizen participation is essential, to help determine recovery goals, provide communication during the recovery process, and ensure community support.
- Local leadership is critical to successful recovery. An effective leader can provide vision, work with community organizations, communicate with other government agencies, and take decisive actions.

Urban Systems

- Negative trends that existed before the disaster will usually worsen during the recovery period. These include declining economies, social problems, and out-migration.
- Cities usually rebuild in the same place, and with the same general urban form, in all but the most catastrophic of disasters. This is because economic and social

networks are more resilient than buildings. The economic functions of the city will usually continue after the disaster, and residents will usually try to locate their homes so as to maintain their pre-disaster social networks. Economic activity usually recommences very shortly after the disaster, often using temporary buildings or tents. Similarly, displaced residents prefer that temporary homes be near their former residential location.

Physical Change

- Cities see physical improvements after disasters. Changes are never as much as planners would like, but some level of incremental improvement always occurs. Although widespread land use change and relocations are rare—because of timing and logistical challenges as well as citizen resistance—focused redevelopment efforts are common and have been quite successful. For severely damaged areas, redevelopment allows communities to make desired changes during reconstruction. It is particularly effective for upgrading older commercial areas. Redevelopment is almost always involved after earthquakes, because these tend to damage areas of concentration of old or substandard structures.
- Citizens resist relocation of residential areas, and relocations without citizen support and participation are likely to fail.

Equity

- The higher the socioeconomic level, the more likely households and businesses are to recover to predisaster levels. Similarly, those who are better integrated into economic and social networks will recover faster. Conversely, those with the fewest resources get less attention from aid organizations, and get it later in time.

Money and Other Outside Resources

- Money comes from many sources: local and national governments, insurers, foundations, investors, victims' savings, and international aid organizations. The amount of funds and mix of sources after any particular event is not easy to predict. Setting priorities for use of limited funds is a challenge, and the process is not usually a rational one.
- Financial resources often are in the form of loans, which eventually need to be repaid. This can create problems many years after the disaster.
- Outside resources—in the form of money, supplies, technical assistance, and employees—are vital. But local decision making is also important; excessive dependence on external resources can slow the recovery or impair the long-term sustainability of the rebuilt community.
- The national political context often is a crucial factor in delivery of resources. For example, in numerous cases the ruling political party allocates aid based on the importance of the affected region in upcoming elections. In addition, if mayors or local representatives are well connected to the national party in power, they can influence both the speed and quantity of financial assistance.

Planning Strategies

- Speed is important in rebuilding. It is important in order to keep businesses alive, rebuild infrastructure, and provide temporary and permanent housing for disaster victims. Even if official agencies do not act quickly, many victims will begin to rebuild on their own—in a manner and location that they determine, even if uncoordinated with services. Although there is little research on this topic, some writers have suggested that the basic restoration of previous functions should be completed within two years.
- Taking the time to plan the post-disaster reconstruction is also important. A city that took a century or more to develop might be rebuilt in just a few years; it is important to make this new, permanent city the best it can be. Planning can maximize the opportunities for coordination of land uses and infrastructure, ensure safety, promote design that will improve the quality of residents' lives, account for the concerns of all citizens, and seek cost-effective solutions. But if it takes too long, it will be ineffective. Although there is no research regarding the best length of an initial reconstruction moratorium, some writers have suggested that approximately one to two months would be appropriate and reasonable.
- The window of opportunity for accomplishing post-disaster improvements is short, lasting at most for several months following the disaster.
- Previously existing plans can help to improve both the speed and quality of post-disaster planning. "Existing plans" means much more than simply land use maps. It means that the community has an active planning process, including well-established community organizations, lines of communication, a variety of planning documents and tools, and some degree of community consensus. To the degree that these plans address issues of post-disaster recovery and hazard mitigation, the recovery process will be improved.
- Information is a valuable resource, because it provides the basis for strategic planning decisions. Information systems that include inventories of parcels, structures, and hazards can greatly facilitate the recovery process.

Research Needs

Although considerable consensus exists on general principles, many qualities of recovery are still poorly understood. As noted above, countless variables affect the success of post-disaster recovery, and their individual effects are very difficult to assess. Recovery processes are complex and unique to location, time, and context. Furthermore, the number of variables far exceeds the number of disaster recovery cases.

That said, I suggest two interrelated pairs of key variables that are particularly deserving of further study.

The first pair of variables consist of disaster size and the nation's economic level. Regarding size, as noted by Comerio (1998), Quarantelli (1999), and others, there is a big difference between a disaster and a catastrophe. A catastrophe can create a housing crisis. If it causes a significant number of deaths, as in the obliteration of Yungay, Peru in 1970 (Oliver-Smith and Goldman, 1988), social and business networks may vanish. Often, a catastrophic disaster affects a widespread area, which means that, in addition to

the immediate effects, mutual aid from neighboring communities would also be lacking. Conversely, catastrophes offer opportunities for large scale redevelopment, as Arnold (1993) describes in Tangshan, Spitak, and parts of Tokyo. Much of the best comparative research on post-disaster recovery has studied disasters rather than catastrophes (e.g., Rubin et al 1985), which means that some of our consensus conclusions may or may not hold for larger events. A closely related variable is that of urban versus rural disasters. A nation's economic level has a considerable effect on the recovery process. On the one hand, nations with less resources obviously are at a disadvantage in recovering from disasters. On the other hand, when developing nations are struck by disaster, foreign financial assistance can go a long way towards helping recovery. And in recent years there has been an increasing body of research on post-disaster recovery in such situations. This research shows the importance of assisting businesses while improving local capacity for housing construction and local economic development. But there is little research on the implications of a catastrophic disaster in a developed nation. Rebuilding developed nations presents financial challenges. They must finance the cost of recovery themselves, and the costs can be considerable, as can be the expectations of their citizens. This is a particular problem for earthquakes, which have much less insurance coverage than floods or hurricanes. Thus, a catastrophic earthquake could have significant and widespread economic effects. For future disasters, it would be helpful to have a better understanding of these financial issues, both at the individual and community scales. It would also be of interest to learn more about planning processes in catastrophic disasters in developed nations.

The second pair of variables relate to conflicting demands on timing, for reconstruction and for planning. The central issue to post-disaster recovery is the tension between speed and deliberation: between rebuilding as quickly as possible and considering how to improve on what existed before the disaster. As put by Eadie (1998), "Recovery involves the conflict between the community's desire to recover quickly and the need to move deliberately, pursue new opportunities, and make well-considered long-term decisions" (p. 282). Despite warnings from Haas et al (1977) to avoid slowing down to plan, the historic record is full of examples of post-disaster plans that led to significant improvements. Rubin et al (1985) observed that speed and quality are the metrics of successful recovery; the problem is that speed and quality often conflict. This is a fundamental conflict, because both are vitally important.

Another way of thinking about this tension is that it involves conflicting plans. The first plan is that of the pre-existing city. This is the plan in everyone's minds, and the pieces are probably still in place: people, skills, human and economic networks, and all the lines on the maps. We know that this plan can work, but only if it is put back quickly while all the pieces are still close at hand. The second plan is the plan for the future. It might be a previous plan or a new recovery plan. It is the conflict between these two plans that must be resolved, and in a short time, so as not to lose the functional capabilities of the first plan and mitigation and improvement possibilities of the future plan.

Current research only provides limited anecdotal guidance regarding appropriate responses to this tension. As noted by Rubin et al (1985, p.42), the ability to make this

tradeoff strategically and purposefully is rare. Furthermore, decisions on timing of reconstruction and planning are made at many levels: national, state/prefecture, city, community, investor, business, and household. On what basis do we know which one to emphasize, and in which situations? It would be helpful to have additional evidence on the costs of delay (In what ways does it cost? How long of a delay is too long?). It would also be useful to have more evidence on the value of moratoria of various lengths. And it is critical to understand more about the decision processes of all the various parties related to this tradeoff.

Finally, in general more research is needed on recovery decision processes following large disasters. We need more information regarding recovery decisions: Who makes them? When? What parties participate in the decision? Which decisions are most critical? Each large disaster is a potential data point, and it will take many more disasters to begin to systematically address these issues.

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