

Chapter 3

Policies for Guiding Planning for Post- Disaster Recovery and Reconstruction

Every plan has a purpose. Under the U.S. Constitution, land-use planning has been used to advance legitimate state purposes concerning public health, welfare, and safety. Beneath these broad categories are a number of more specific policy objectives that justify a wide range of plans, plan elements, and accompanying regulations. Chapter 6 of this report deals with the legal issues surrounding land-use planning concerning natural hazards. The focus of this chapter is on establishing the policy objectives that underlie the exercise of developing plans for post-disaster recovery and reconstruction.

Simply put, the driving factors behind such plans are public safety and economic recovery, the latter obviously being a specific aspect of the public welfare. Allowing unwise and inadequately protected development in locations known to involve serious dangers from natural hazards amounts to a failure of planning to serve one of its most vital public functions. If planners take great care in many communities to separate residential housing from noxious industrial fumes or vibrations, or to establish minimum distances of churches and schools from sexually oriented businesses, does it make less sense to keep homes and schools out of the path of floods and landslides? Even more to the point, if a post-disaster situation affords the opportunity to remedy some past land-use planning mistakes in this regard, does it make sense for the community to forego such opportunities simply because it failed to plan for them?

By the same token, if planners involved in economic development take great care to try to attract an effective mix of industrial and commercial uses that will enhance the local economy and make best use of its labor pool and other resources, is it wise to put all that at risk by failing to consider how the local economy can be protected from the impact of natural disasters? Both the business community and working residents have a major stake in plans that help to ensure a quick and efficient recovery from whatever economic devastation may occur in a natural disaster. A plan for post-disaster recovery and reconstruction that is well crafted to assist business recovery, ideally with the aid of a local redevelopment agency that has given serious thought to such contingencies, clearly is a major means of advancing the public welfare.

Nonetheless, only half the states, in their planning enabling statutes, mention natural hazards at all as a concern that should or may be addressed in comprehensive plans. Of those, only 11 mandate some sort of planning for natural hazards, either in the form of a distinct natural hazards element (sometimes referred to as a safety element, as in California and Nevada) or in the form of hazards-related content in another element (as in Maryland, where certain natural hazards must be addressed in a sensitive areas element). Of those 11, only Florida includes a requirement for a local plan for post-storm recovery, and the mandate applies only in coastal counties.

This information (see Figure 3-1) was gathered while preparing the model state planning legislation for APA's Growing SmartSM *Legislative Guidebook*.

Figure 3-1. State Enabling Statutes with Natural Hazards Content

State	Local Plan Mandated	State Land Use Policy Basis	Strength of State Role	Internal Consistency Required	Hazard Statute Citation	Jurisdictions Covered	Hazards Element Mandatory?	Discrete Hazards Element	Geographic Coverage	Which Hazards Specified	Post-Disaster Recovery Element	State Technical Assistance
1	2	3	4	5	6	7	8	9	10	11	12	13
AZ	P(CT, T); M(C)	N	1	N	11-806.B.	C, CT	CT>50,000	Y	All	C (F), CT (H, G)	N	DOC-DMG; OES
CA	M(C, CT)	N	2	Y	65302(g); 65302(e)(7)	C, CT	Y	Y	All	G, T, S, F, W	N	
CO	P(C, CT)	N	1	N	30-28-106; 31-23-206 163.3177 (6)(g) and (7)(h) and (l); 163.3178	C, CT	N	N	All	F	N	
FL	M(C, CT)	Y	3	Y		C, CT	Y	Y	Coastal River corridors	C, W, F	Y	DCA
GA	M(C, MN)	Y	3	Y	12-2-8	C, MN	N	N		F*	N	
ID	M(C, CT)	N	2	N	67-6508(g)	All	Y	Y	All	G, S, F	N	
IN	P(C, CT)	N	1	N	36-7-4-503	All	N	N/Flood control & irrigation	All	F	N	
IA	O(CT)	N	1	N	281.4	?	N	N	All	F	N	
KY	M(C>300K); M(CT>300K); P(C)	N	2	Y	100.187 (5)	Same as column 3	N	Y	All	F	N	
LA	P(P, MN)	N	1	N	R.S. 33:107	P, MN	N	N	All	W, H	N	
ME	P(CT, T)	Y	3	Y	30-A 4326.A(1)(d)	MN	Y	N/Growth areas implementation strategy	All	F	N	
MD	P(C, MN)	Y	3	Y	3.05(a)(1)(viii)	C, MN	Y	N/Sensitive areas	All	F, S	N	DNR
MI	P(CT, V, TP, C)	N	1	N	125.36	All	N	N	All	F	N	
MT	P(CT, T, C)	N	1	N	76-1-601(2)(h)	C, T, CT	N	N	All	F	N	
NV	M(C, CT)	N	2	N	278.160.1(k) and (l)	All	Y	Y	Seismic-all; safety plan-C>400,000	G, F, W, S	N	CRC, EMC
NC	O(C, CT)	N	1	N	113A-110 ff.	C	Y	Y	Coastal	F, C	N	LCDC
OR	M(C, CT)	N	1	Y	197.175	C, CT	Y	Y	All	F, T, E?	N	

Figure 3-1. State Enabling Statutes with Natural Hazards Content (continued)

State	Local Plan Mandated	State Land Use Policy Basis	Strength of State Role	Internal Consistency Required	Hazard Statute Citation	Jurisdictions Covered	Hazards Element Mandatory?	Discrete Hazards Element	Geographic Coverage	Which Hazards Specified	Post-Disaster Recovery Element	State Technical Assistance
PA	P(C, CT, T, TP, B)	N	2	N	10301(2)	All	Y	N/Land use	All	F, H	N	CRC
RI	M(CT, T)	Y	3	Y	45-22-2-6(E)	CT, T	Y	N/Natural and coastal resources	All	F	N	CRC
SC	P(C, CT, T)	N	2	N	6-7-510	C, CT, T	N	N	Coastal	F, H (under Beachfront Management Act)	Y (under Beachfront Management Act)	
UT	O(C, T, CT)	N	2	N	10-9-302(2)(c)	C, CT, T	N	N/Environment	All	F, F, S	N	
VT	P(T, CT, V, G)	Y	3	N	4382(a)(2)	All	N	N/Land use	All	F	N	
VA	P(C, T)	N	1	N	15.1-446.1.1	C, T	N	N/Land use	All	F	N	
WA	M(C, CT therein)	Y	3	Y	36.70.330 (1)	C, CT	N	N/Land use	Puget Sound watershed	F	N	
WV	P(C, CT, T, V)	N	2	N	8-24-17(a)(9)	All	N	Y	All	F	N	

Key to Figure 3-1

1. Only those states with statutes that mention natural hazards are listed. There are 25 such states.
2. This overview, which is based on more than one statute, indicates whether municipalities must have a natural hazards or similar element. (See column 7 for a list of specific jurisdictions covered by the state's natural hazards legislation.) The letters M, O, and P are used to indicate whether planning is Mandatory, Optional, or mandated if a Precondition is met (e.g., if a planning commission is created). The other symbols in this column are keyed to type of jurisdiction: B (borough); C (county); CT (city); G (gore); M (municipality); P (parish); T (town); TP (township); and V (village).
3. Indicates whether there is a state land-use policy regarding natural hazards.
4. The state role is classified as 1 = weak; 2 = significant; and 3 = substantial.
5. Indicates whether internal consistency between plans is required.
6. This column provides a citation to the provisions that reference natural hazards. In some cases, these references occur in more than one place (e.g., in enabling legislation covering municipalities and counties). In others, the provisions may be in a part of the state code governing natural resources or coastal zone management.
7. Natural hazards provisions or hazard mitigation planning provisions specifically apply to these types of jurisdictions. See note 2 for the key to jurisdiction types. More elaboration is provided in columns 10 and 11 about geographic coverage and which hazards are specifically covered.
8. Indicates whether a hazards element is mandatory in local planning and which jurisdictions are covered, along with population requirement, if any. See column 9 to see whether the mandate is for a discrete plan element focused on natural hazards or a mandate to include natural hazards in a related element (e.g., environment or land use). See also columns 10 and 11 for the specifics of the mandate.
9. Y indicates that a discrete natural hazards plan element is required. N indicates that the issue of natural hazards is covered in another element, which is named after the slash. For example, steep slopes and floodplains are mentioned in the mandatory sensitive areas element in the Maryland statutes.
10. A few states apply the natural hazards element mandate only to areas of the state; those areas are specified here.
11. Indicates which types of hazards are mentioned in the state legislation. The key is as follows: C (coastal storm); E (earthquake); F (floodplain); G (geologic hazards generally); H (all hazards generally); S (slope-related hazards, including hillside erosion, avalanches, and landslides); T (tsunami); V (volcano); and W (wildfire).
12. Only one state in this column has a post-disaster recovery element; we include this column to draw attention to this device as a distinct element from the natural hazards element. Such an element would not just identify hazards; it would identify how a community plans to rebuild so as to become less vulnerable to future disasters.
13. This column provides a shorthand for the agencies that provide assistance in the preparation of a natural hazards element. In California, these agencies are the Department of Conservation, Division of Mining and Geology (DOC-DMG) and the Office of Emergency Services (OES). In Florida, it is the Department of Community Affairs (DCA). In Maryland, it is the Department of Natural Resources (DNR). In North Carolina, it is the Coastal Resources Commission (CRC) and Environmental Management Commission (EMC). In Oregon, it is the Land Conservation and Development Commission (LCDC). And in Rhode Island, it is the Coastal Resources Center (CRC).

Model Post-Disaster Plan Language for a Natural Hazards Element

(Chapter 7, Section 7-210,
of the *Growing SmartSM*
Legislative Guidebook)

- (5) The natural hazards element shall consist of:
- ...
- (f) a plan for managing post-disaster recovery and reconstruction. Such a plan shall provide descriptions that include, but are not limited to, lines of authority, interagency and intergovernmental coordination measures, processes for expedited review, permitting, and inspection of repair and reconstruction of buildings and structures damaged by natural disasters. Reconstruction policies in this plan shall be congruent with mitigation policies in this element and in other elements of the local comprehensive plan as well as the legal, procedural, administrative, and operational components of post-disaster recovery and reconstruction.

For the complete text of the Natural Hazards Element, see Appendix E.

Chapter 7 of that guidebook includes legislation and commentary concerning local comprehensive plan elements. Specifically, the work involved drafting statutory language concerning the preparation of a natural hazards element in local comprehensive plans. This language included specific provisions concerning the preparation of a plan for post-disaster recovery and reconstruction.

Two factors should be noted about the general absence of planning enabling statutory provisions concerning natural hazards. First, most states have planning enabling legislation that remains based to varying degrees on the original model statutes promulgated by the U.S. Department of Commerce under Secretary Herbert Hoover in the late 1920s. At that time, research of any type about the pattern of natural disasters and the potential to ameliorate their impact through planning was virtually nonexistent. Consequently, statutes drafted in that era with only modest subsequent revision reflect that lack of awareness of the role that planning could play. Only as legislatures have taken note of the more recent research in this area, or have been prodded to some degree by federal programs, such as NFIP, has this changed in states that have not yet engaged in a wholesale redrafting of planning enabling legislation. However, in states like Florida, Oregon, and Maryland, where planning laws have been completely rewritten, specific provisions concerning natural hazards tend to be included. Even still, only Florida includes planning for post-disaster recovery as part of that process.

Second, while state mandates certainly push communities in the direction of planning for post-disaster recovery and reconstruction, that is not the only way in which such planning happens. Several communities outside the states with mandates have simply taken the initiative of doing such planning on their own and for their own benefit. Los Angeles, concerned about a range of hazards that most significantly includes earthquakes and wildfires, adopted such a plan in early 1994. Arnold, Missouri, highlighted in a case study in Chapter 8, is an example of a city that effectively used its floodplain management plan for this purpose. Part of Chapter 4 will discuss the means by which officials and interested citizens in these and other communities built public support behind the need to develop such a plan.

However the community arrives at the decision to develop its plan, four simple constant factors pervade the process: goals, strategy, priorities, and criteria. These factors apply equally well to hazard mitigation plans intended to be employed before the disaster strikes. First, having decided on the goals for the plan—say, reducing vulnerability to coastal storms by preserving the integrity of barrier islands and ecologically sensitive tidal wetlands—the community must then develop a strategy for achieving that goal. The choice of appropriate strategies will depend on technical data concerning the feasibility of specific strategies for coping with local hazards, political preferences for specific approaches to the problem, and cost implications. Creative planners employ the concept of multiobjective management, in which hazard mitigation objectives are made to coincide with the policy objectives of other stakeholders in the community. Such stakeholders may include parks and recreation advocates who see benefits in preserving a greenbelt and trail system along the riverbank, tourism promoters who may see great value in preserving undisturbed views of the mountainsides just outside the city, or even developers of multifamily housing who can gain a density bonus through a transfer of development rights from hazardous areas. Multiobjective strategies can help to expand the resource base available to accomplish mitigation objectives and thus widen the community's vision of what can be accomplished.

Implementing strategies requires the elaboration of priorities, and the establishment of priorities must be based on clear criteria. Criteria in a plan

are the hands-on means for planners to make day-to-day decisions about what actions are more important than others. How does one rank preferences for action in acquiring flood-prone land, for instance? Given an inevitably limited pot of staff time, money, and other resources, decision makers may choose to rank possible acquisitions based on rated criteria, such as elevation, erosion potential, and the contiguity of the parcels being acquired, among other likely considerations. The choices of criteria will vary depending on local circumstances, values, and politics.

One final point in introducing the next section of this chapter deserves repetition throughout the entire discussion of planning for post-disaster recovery and reconstruction. It deals with timing. Hazard mitigation that occurs after a disaster is still hazard mitigation in preparation for another disaster further in the future. Natural disasters are cyclical occurrences. Communities must incorporate that expectation into their planning and their environmental consciousness. Only the interval between disasters will vary with circumstance.

Regardless of the specific natural hazards that must be identified and addressed, planning for post-disaster recovery shares some common elements. Disasters and their aftermaths tend to follow essentially the same sequence of events, with adjustments varying with the scope of the event. Much of this sequence will occur with or without planning, and much of the early research in this area examined communities that lacked plans for post-disaster recovery simply because very few—if any—communities had such plans. What we have gained from disaster recovery research is the knowledge of how to focus the efforts behind such plans to achieve meaningful, lasting results toward sustainability. Achieving sustainability, which, in a disaster-related context, means the ability to survive future natural disasters with minimum loss of life and property, is the overarching goal of planning for post-disaster reconstruction. Policy objectives are the measurable landmarks a community sets out for itself in seeking to achieve that goal. This section is about the process of defining those objectives.

LONG-TERM GOALS AND SHORT-TERM PITFALLS

The immediate post-disaster period is obviously one with immense potential for confusion, or at least for many of those involved to take actions that serve opposite or divergent purposes. Decisions must be made quickly, with little time for reconsideration before new problems urgently demand resolution. Thus, an essential purpose of the plan for post-disaster recovery and reconstruction is to provide some vision that serves as a beacon for decision makers and some framework within which decisions will be taken. However, it is the role of civic leadership to help maintain that focus when it really matters. The policy objective in this respect is to avoid situations in which short-term decisions adversely affect the community's potential for achieving long-term post-disaster goals.

Unexpected contingencies can always arise in the aftermath of a disaster, no matter how good the pre-disaster planning, in large part because no plan developed in the pre-disaster period can anticipate the precise nature of the next disaster. But the plan can provide decision makers with some general guidance as to the policy objectives their decisions must aim to achieve. This serves to minimize unintended consequences and to keep the maximum number of players working toward the same ultimate goals. Communities that develop plans for post-disaster recovery and reconstruction can highlight what they regard as their most essential objectives in what is sometimes called a vision statement in other types of plans. It is, essentially, the place where the community articulates its overall desires with regard to the focus of the plan in question. Because so much is at stake in planning for

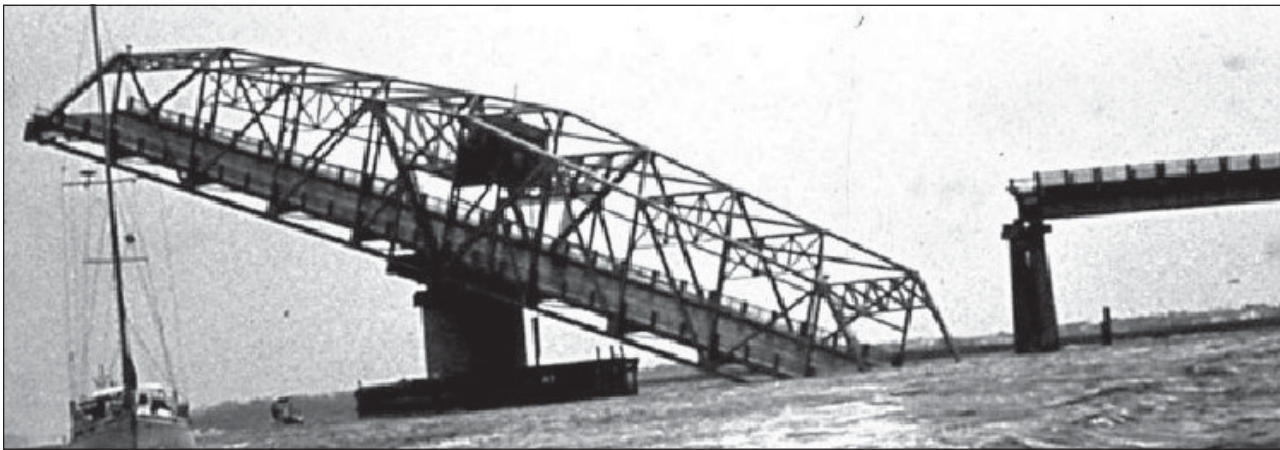
Creative planners employ the concept of multiobjective management, in which hazard mitigation objectives are made to coincide with the policy objectives of other stakeholders in the community.

An essential purpose of the plan for post-disaster recovery and reconstruction is to provide some vision that serves as a beacon for decision makers and some framework within which decisions will be taken.

post-disaster recovery and reconstruction, the vision statement should be clear but broad in its view of the positive consequences for the community if the plan is properly implemented. It should provide an overall framework within which more specific policy objectives, discussed below, can fit.

Short-Term Recovery Issues that Affect Long-Term Reconstruction Goals

The vision statement can help provide overall motivation and inspiration for a community to achieve its objectives during post-disaster recovery and reconstruction. But attention to detail also counts for a great deal. Real success in long-term reconstruction stems from both effective plan guidance concerning the big picture and an acute awareness by planners and other local officials involved in post-disaster recovery of the short-term obstacles that often thwart the achievement of those larger goals. Here, we shall explore what those are.



National Weather Service

Winds from Hurricane Hugo in 1989 were powerful enough to blow down the Ben Sawyer Bridge, which connects Sullivan's Island and Isle of Palms to the South Carolina mainland. That left island residents with only boat access to their homes and businesses.

One of the earliest messages to arise from modern disaster recovery research was that public decisions taken in the heat of the emergency period immediately following a disaster often compromise significant opportunities to rebuild a safer community for the future. The pressure exerted by residents and property owners to have their disaster-stricken community rebuilt to its pre-disaster form and condition as quickly as possible remains a powerful factor in local, state, and federal emergency management to this day.

There are ways to restrain such pressures and maintain mitigation and other post-disaster goals as high priorities during the process of long-term reconstruction even as the ashes, the rubble, and the water are receding or being cleared away. The secret lies in identifying in advance those decisions that will need to be made after a disaster that are most likely to have long-term repercussions for hazard mitigation. The case studies in the later chapters of this report are replete with examples of these decisions, but listing a few here will serve to illustrate the point:

- the location of temporary housing, which often becomes more permanent than was originally intended
- the siting of temporary business locations, which begin with the aim of allowing local businesses to continue to operate, but may become de facto long-term relocations
- the selection of sites for dumping disaster debris
- road closures and reopenings
- bridge closures and reopenings

- restoration of critical infrastructure that might otherwise have been suitable for relocation
- permitting the reoccupation of homes that have suffered substantial damage

Some tools for this process are already built into the emergency management system. For instance, emergency managers will already have a list of priorities for restoration of vital public facilities following a natural disaster. The local planning department, working with the emergency manager and other city departments responsible for infrastructure development and maintenance, can then review that list to determine areas of potential concern. Various types of damage assessments performed during the early recovery period provide opportunities to assess the effectiveness of previous mitigation efforts. The planning staff can establish a procedure for participating in the assessments themselves or for reviewing these damage assessments to glean any meaningful land-use lessons they may offer. Making effective use of those lessons often requires a planning department to buy time, which can be done through an ordinance establishing the authority for declaring a temporary building permit moratorium during an emergency. The ordinance should provide for necessary exemptions for building activities that are vital to public health and safety during the recovery period, which may include restoring essential public services or constructing an emergency shelter for those rendered homeless by the disaster, and should specify the duration of its effectiveness. More details on this particular planning tool appear in Chapter 5.

Making effective use of those lessons often requires a planning department to buy time, which can be done through an ordinance establishing the authority for declaring a temporary building permit moratorium during an emergency.

The central element of good decision making in the short-term recovery period following a disaster is the community's designation of a recovery management team that is empowered to monitor the process and implement the community's post-disaster recovery policies. (This is a management team that is distinct in both function and form from the plan development task force that will be discussed at the beginning of Chapter 4.) Relatively few communities have done this to date, but the idea is making headway. Lee County, Florida, and the town of Nags Head, North Carolina, both can claim actual experience in implementing such a policy, and Los Angeles had just barely adopted such a scheme when the Northridge earthquake hit the city in 1994. Although some doubt has been expressed concerning the planning department's effectiveness in the Los Angeles scenario, its limitations following that disaster appear to be attributable to circumstances that include a mayor and city council concerned primarily about business recovery and a pervasive perception within city government that the earthquake did not warrant planning intervention. Nonetheless, prior training may well have internalized many of the mechanisms prescribed in the plan for line agencies performing recovery operations (Spangle Associates and Robert Olson Associates 1997).

The big question for any community establishing such a team is its composition. Figure 3-2 shows the structures used by some of the communities mentioned above. These are larger jurisdictions that have primarily chosen to use department heads representing major agencies that must act quickly during the post-disaster period or have major stakes in the outcome. Representatives of major private-sector agencies, such as the local business community (e.g., Chamber of Commerce) or social service agencies (e.g., United Way) are essential additions to such a task force. Involving private citizens, whether as individuals or as representatives of civic organizations such as block clubs or neighborhood organizations, is critical in enhancing the quality and breadth of input into decision making during this crucial period.

Figure 3-2. Recovery and Reconstruction Task Force Composition

The table below offers a comparison of the organizational composition established by three different Florida counties for task forces empowered to guide recovery and reconstruction following a disaster. In addition, the lead agencies are listed for Los Angeles as designated by its recovery and reconstruction plan, although they do not serve on a task force like those in the three Florida counties. The information is drawn from the *Post-Disaster Redevelopment Guide for Pinellas County*; Lee County Ordinance No. 95-14, adopted August 2, 1995; the *Palm Beach County Post-Disaster Redevelopment Plan*; and the Los Angeles Recovery and Reconstruction Plan.

One interesting point is that Lee County, in a 1990 ordinance, gave its recovery task force a role in pre-disaster mitigation planning, an idea that is worth copying elsewhere. However, it revised this initial structure with the 1995 ordinance, which established a two-tier arrangement in which a new Post-Disaster Recovery Task Force (RTF) is mobilized after a disaster while containing, as ex-officio members, the members of a separate Disaster Advisory Council (DAC), which officially replaced the former recovery task force. Thus, in the Lee County column below, positions are followed in parentheses by designations of either RTF, DAC, or both. The Lee County ordinance also specifies four positions, with specific listed duties, to be filled by recommendations from the task force. These are disaster recovery coordinator, economic recovery coordinator, hazard mitigation coordinator, and tourism recovery coordinator. Also, "other representatives" may be added by the county administrator in Pinellas County. The Palm Beach County plan seems to leave room for other representatives but does not make clear who would designate them.

Finally, because jurisdictions often use different titles to describe similar functions, the generic term is used in the Member column, but any unique label that a specific county applies to that function is used in that county's box in place of the "x" that otherwise designates that the director of that agency is part of the task force. Where someone else is officially designated to represent the agency, that is also noted in the box.

MEMBER	PINELLAS	LEE	PALM BEACH	LOS ANGELES
County Administrator/Mayor	X	RTF/DAC	X	Mayor
Legislative Liaison				Chief Legislative Analyst
Emergency Management				Emergency Operations Board
Clerk's Office				X
Public Safety	Civil Emergency Services	RTF/DAC	X	Police/Fire
Planning & Zoning	X	Local planning agency member (DAC)	Planning, Zoning and Building	City Planning
Public Works	X	RTF/DAC	County Engineer	X
Transportation		Transportation Director and Transit Director (both DAC)	Surface Transportation	X
Building	X		*see Planning and Zoning above	Building & Safety
Environment	Environmental Management		Environmental Resources Management	Environmental Affairs
Legal	X	DAC		X
Fire Chief		Representative of County Fire Chiefs Association (DAC)	X	
General Services	X	Administrative Services Director (DAC)		X

(continued)

Figure 3-2. Recovery and Reconstruction (continued)

MEMBER	PINELLAS	LEE	PALM BEACH	LOS ANGELES
Utilities	X	DAC		Telecommunications/ Water and Power
Risk Management	X			
Social Services	X	Human Services (DAC)	X	
Management and Budget	X	Budget Services Director (DAC)	Financial Management and Budget	City Administrative Officer/Personnel/ Treasury
Public Information	Public Services and Information	DAC		Information Services
Animal Control	X			X
Redevelopment				Community Redevelopment Agency
Housing				X
Community Development	X	Community Services (DAC)	Community Services	X
Finance		DAC		
Tourism		Visitor & Convention Bureau (DAC)	Tourist Development Council	
Port Authority		DAC		
Equal Opportunity		DAC		
Health		Health Director and County Medical Examiner (DAC)		
Historic Preservation		H.P. Board member (DAC)		
Waste Management		Solid Waste Director (DAC)		
Parks & Recreation		DAC		X
Economic Development		DAC		
Facilities Planning, Design and Construction			X	
Cultural Affairs				X
Local Government Liaisons		Cities of Cape Coral, Fort Myers, Sanibel	Liaison to Municipal Governments	
Other Public Sector Liaisons		County Sheriff, County School District, SW Florida RPC	County Sheriff, County Solid Waste Authority, County School Board, South Florida Water Management District, Florida Department of Environmental Regulation, Department of Transportation	
Private Sector		Business community representatives	Private utilities	

While the examples above and in Figure 3-2 involve communities that established the makeup of a recovery task force in a plan developed during the pre-disaster period, other communities have established recovery task forces in the aftermath of natural disasters. Two examples materialized in the spring of 1997 with the tornadoes that struck parts of Arkansas. Arkadelphia, a community of about 10,000, within days of the March 1 event, established an open-ended recovery task force, inviting all residents, officials, and business owners to participate, forming several committees in the process. Later, a 15-member disaster recovery plan committee was appointed to work directly with Woodward-Clyde Associates, the contractor directed by FEMA to mobilize resources to develop and implement a recovery plan. Chaired by a foundation official, the committee included the mayor and city manager and various local citizens (Woodward-Clyde Associates 1997a). On the other hand, College Station posed a special problem because it is not a jurisdiction in its own right but a community that straddles the city of Little Rock and parts of unincorporated Pulaski County. There, constructing an eight-member disaster recovery plan committee, including officials of the community development corporation and credit union, a local civic group, and the Watershed Human Development Agency, required the cooperation of the city, the county, and the community itself (Woodward-Clyde Associates 1997b). A major theme that has emerged from such efforts is the need to include in some way all those who must be heard to ensure the plan's successful implementation.

Smaller communities may wish to pursue other approaches using simpler structures. Brower, Beatley, and Blatt (1987) also list three alternatives that emphasize greater involvement by elected officials. One is to create a group representing broadly based community interests, among which would be some agency heads who meet that criterion. This has the advantage of bringing a number of perspectives into play and ensuring a healthy variety of expertise. A second alternative would be to empower the local planning board or commission, which would ensure a familiarity with land-use planning but might often require some special training of citizen commissioners on disaster recovery issues. A final possibility is simply to devise a board wholly composed of local elected officials. This last option has a serious drawback in that the task force members might prove to be sorely overburdened in the aftermath of a serious disaster. In the end, however, each community must think through the issues connected with its own decision-making practices and circumstances and produce its own optimum solution. The model recovery ordinance that appears in Chapter 5 provides some options and language for communities seeking to craft a mechanism for guiding the post-disaster recovery process.

Nonconforming Uses

Planners everywhere become accustomed to problems involving nonconforming uses. These arise when zoning for a particular area is changed in a way that does not encompass some land uses already present in the affected zoning district. The standard procedure is to allow the continuation of the nonconforming use, but not to allow its expansion, its conversion to another nonconforming use, or its restoration in the event of its discontinuance or destruction. Thus, in the aftermath of a fire or flood that substantially damaged a nonconforming structure, the owner would not be allowed to rebuild that use at that location. The goal is to respect the vested rights of the owner of the nonconforming use while gradually or eventually eliminating such uses.

Under normal circumstances, issues involving the restoration or discontinuation of nonconforming uses arise one at a time, as a result of

events such as fires, conveyance of the property to new owners, or the dissolution or relocation of existing businesses. As such, they pose mostly a routine burden for local zoning officials. Major disasters, however, can create hundreds, even thousands, of nonconforming uses virtually overnight, each of which adds to the workload of an already stressed planning department, as well as posing serious questions for the integrity of the entire redevelopment process. In such circumstances, it is both politically and practically unlikely that the community will want to take an uncompromising stand against allowing the repair and reconstruction of all nonconforming uses. Disasters may pose an opportunity to eliminate nonconforming uses, even to reshape existing patterns of development along lines deemed more desirable, but they also generate enormous pressures from property owners to allow the reestablishment of the existing development pattern, complete with nonconforming buildings and uses. Such pressures result in part from the difficulty of finding enough suitable locations in the proper zoning districts for the relocation of those uses not permitted to be rebuilt. Under such circumstances, the community may need to face the question of where and how to compromise and for what reasons.

The solution, or at least an amelioration of the problem, may lie in establishing criteria for allowing the reestablishment of nonconforming uses under disaster-related circumstances. Section 7.9 of the model ordinance in Chapter 5 attempts to prescribe such conditions.

ECONOMIC RECOVERY

Economic recovery is quite likely the most serious issue facing most communities in the post-disaster period, and almost certainly the central issue in every major disaster. The extent of the disruption of normal economic activity varies with the type of disaster, the size and economic makeup of the community, and other factors, but the disruption invariably adds to the property losses already suffered by shrinking incomes, profits, and productivity.

The Tampa Bay Regional Planning Council (1994) introduced its *Model Community Post-Disaster Economic Redevelopment Plan* by recounting the staggering economic losses suffered in Dade County, Florida, following Hurricane Andrew:

- 8,000 businesses and more than 100,000 jobs seriously affected
- disruption of a \$500 million-per-year tourist industry for several years
- \$1 billion in damage to agriculture with permanent income loss of \$250 million
- daily lost output in storm-affected areas of \$22 million

The potential duration of some business disruptions is considerable. In December 1997, the island of Kauai in Hawaii finally witnessed the reopening of the Sheraton Kauai resort on Poipu Beach, closed after the September 11, 1992, destruction of Hurricane Iniki. Despite that reopening, three of the island's five major hotels remained closed at that point (Cannon 1997). The disruptions can entail substantial costs, such as the \$200 million in business disruptions suffered by Des Moines following the 1993 floods. Small businesses, in particular, are vulnerable, with some 30 percent not surviving when stricken by a natural disaster (Armstrong 1998). Other disaster-ravaged communities have their own statistics, all indicating that economic recovery needs to be at the top of the planning agenda for long-term recovery and reconstruction.

Major disasters can create hundreds, even thousands, of nonconforming uses virtually overnight, each of which adds to the workload of an already stressed planning department, as well as posing serious questions for the integrity of the entire redevelopment process.

Small businesses, in particular, are vulnerable, with some 30 percent not surviving when stricken by a natural disaster.

Establishing the Means to Facilitate Recovery

The first step in facilitating any type of recovery is anticipation of the consequences of a disaster as a means of identifying the strategies and resources needed to make it happen. While hazard identification per se is the topic of Chapter 7, the object here is to highlight the kinds of impact assessment needed in the pre-disaster period to allow planners to develop effective contingency plans to facilitate post-disaster economic recovery. In this respect, the Tampa Bay plan cited above offers a good model and a reasonably detailed example of a substantial compilation of that type of information, albeit on a regional basis. The report details estimated damages for various types of structures from hurricanes of varying strength, initial job losses, population displacement, and similar projections. Individual communities can certainly make their own detailed assessments. These projections can be delineated within a couple of major categories and several subcategories.

Inventory of potential structural damage. This is essentially what the Tampa Bay study does by positing potential hurricane paths and wind velocities in relation to the vulnerability of housing stock, industrial property, and commercial buildings. Also vital in this category of direct losses to structures is the estimated potential damage to public and private infrastructure.

Overall economic impact. These projections will estimate all possible indirect losses, such as the loss of economic activity suffered in Des Moines, Iowa, following the temporary closure of the water treatment plant. During the same Midwest floods, Iowa and other states suffered major disruption of railroad traffic, much of which had to be rerouted due to flooded tracks. Transportation-related economic losses can take other forms, such as the loss of major highway corridors, the collapse of the Oakland Bay Bridge during the Loma Prieta Earthquake, or the closing of local airports. As noted above, the loss of tourism, even in the short term, poses a major economic threat to many disaster-affected communities, particularly in the Sun Belt. All of these problems entail direct or indirect consequences that include job losses and the closure of previously viable businesses. Moreover, in communities with severely damaged residential neighborhoods, employee dislocation can result in the inability of much of the work force to continue its normal work patterns, at least temporarily complicating economic activity for businesses that might otherwise be unaffected.

In fact, that last issue is so potent in its impacts that the Tampa Bay model plan lists as its first goal, "Restore and enhance residential communities." Not only is this a matter of restoring normal life for the local work force in order to minimize productivity losses, but it is also a matter, as the plan notes, of reestablishing the residential market base for local retailers. Goal 2 in the plan is the restoration and enhancement of employment opportunities; Goal 3 the provision of public and nonprofit infrastructure and support services.

A related issue that good comprehensive planning should address in this regard is the differential impact of disasters on different communities or sectors within communities. Some low-income communities may, for instance, suffer disproportionate damage due to the relative age of housing stock and the limited financial capacity of many residents to undertake (or, in the case of tenants, even influence) effective mitigation measures or post-disaster repairs. Recovery thus becomes relatively more difficult and prolonged than might be the case in a more affluent neighborhood, and neighborhood businesses may also suffer accordingly.

Another important point that should be addressed by planners in facilitating economic recovery as a prime policy objective is the fact that disasters

Some low-income communities may suffer disproportionate damage due to the relative age of housing stock and the limited financial capacity of many residents to undertake (or, in the case of tenants, even influence) effective mitigation measures or post-disaster repairs.

produce an inevitable roller-coaster impact on subsequent economic activity. Economic activity takes a rough ride in which there is, first, a rapid downhill cycle in the immediate post-disaster period, during which the consequences detailed above are sustained. As recovery progresses, the local economy experiences an accelerated rate of growth, nurtured in large part by infusions of outside aid and the need for rapid restoration of local buildings and structures. During this period, the shape of local economic



Maridee Greenbacks

activity will also shift dramatically, emphasizing construction and services. As this physical restoration of the community comes to a close, economic activity flattens out to a more normal pace, and the structure of the local economy begins to regain its pre-disaster balance. The objective of the plan for post-disaster recovery and reconstruction is to take advantage of this process to build a community that is both economically stronger than it might otherwise have been and less vulnerable to future disruptions from natural disasters.

Downtown Grand Forks, North Dakota, was completely awash in water during the 1997 winter floods. The business district suffered severe economic setbacks and required substantial aid.

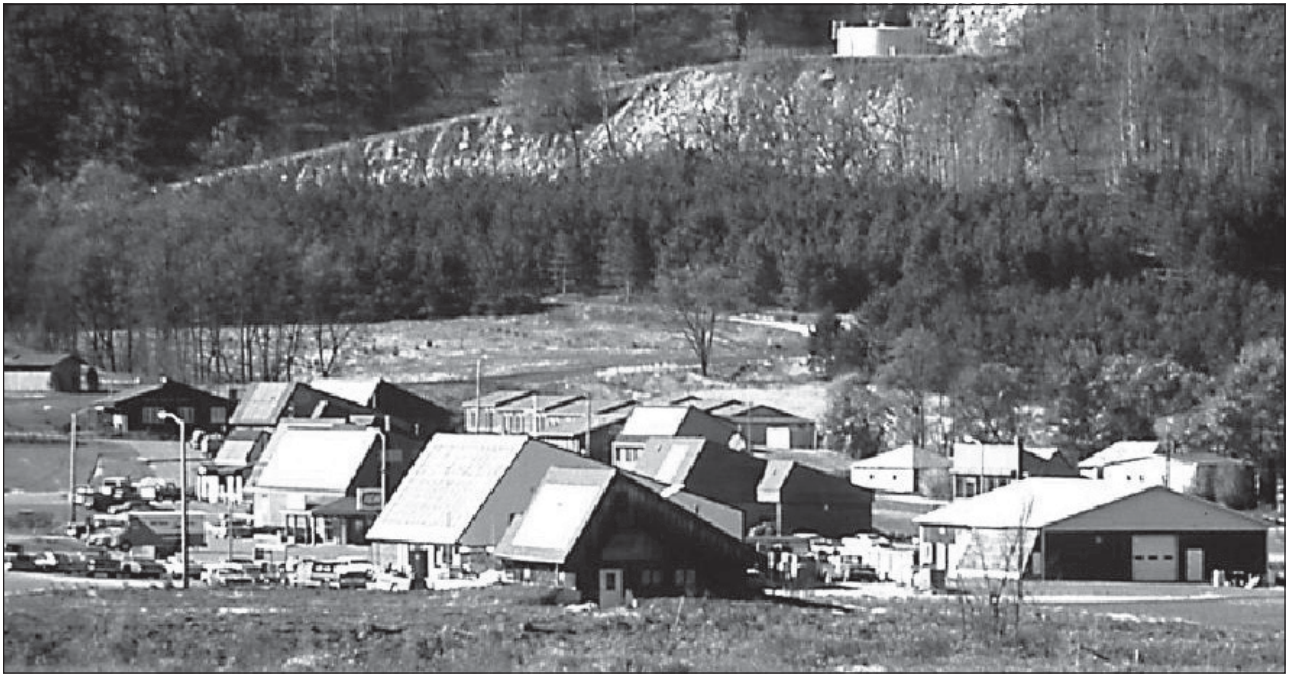
Building a Disaster-Resistant (Sustainable) Economy

The plan for post-disaster recovery and reconstruction should have, as part of its policy objectives concerning economic recovery, not just the objective of restoring normal economic activity but that of making it more resistant to such disruptions should nature strike again. In essence, this means seizing the opportunity, where it is deemed appropriate, to move the community's most vital businesses out of harm's way. In other cases, such as waterfront or water-related activities that must remain along the coast or shoreline or in a floodplain, the objective may instead be to make them less vulnerable to damage through floodproofing, elevation, or other structural mitigation approaches.

The most dramatic examples of building a disaster-resistant economy have come from small towns that have either completely relocated or at least moved their central business district from the path of disaster. Soldiers Grove, Wisconsin, set a notable example by relocating its entire downtown away from the Kickapoo River floodplain in the early 1980s, thus forever eliminating what had been a repetitive problem (Becker 1994a). With

assistance from the U.S. Department of Energy, Pattonsburg, Missouri, relocated to higher ground and likewise buffered its future business activity from flooding after the 1993 Midwest floods, as did Valmeyer, Illinois (Becker 1994b; Skinner and Becker 1995).

These small towns provide particularly clear examples of using post-disaster opportunities to build a more disaster-resistant economic base mostly because wholesale relocation on a small scale makes the results more obvious than is the case with measures taken to protect business districts in small parts of much larger communities. The same principles apply, none-



Bill Becker

Valmeyer, Illinois, a town along the Mississippi River that relocated to higher ground after the 1993 floods, has incorporated solar heating into many of its new buildings, including the community center.

theless, to the need to make industrial and commercial areas of larger communities more disaster resistant as a means of reducing the economic impact of future disasters. Most communities will face situations involving at most only partial relocations. Determining exactly which measures are appropriate and effective in accomplishing this mission is an essential function of the local planning process, much as the specific measures for mitigating all other structural and building damage must be chosen in light of the local hazard context. On a small scale, these measures include the relocation of vulnerable businesses from floodplains or the seismic retrofitting of older commercial and industrial facilities. On a larger scale, however, they may involve contingency plans for wholesale planned redevelopment of devastated central business districts, such as occurred in Fillmore, California, following the Northridge Earthquake (McSweeney 1997).

The Soldiers Grove and Pattonsburg examples, however, highlight more than just the issue of relocation of vulnerable businesses from the path of known natural hazards. Both communities have also seized the opportunity to make their local businesses and residential sector more environmentally and economically sound by institutionalizing energy efficiency in the rebuilding process. For instance, the Soldiers Grove building code requires that all new structures receive at least half their energy from renewable sources. Valmeyer's new civic buildings employ solar heating principles. These communities are, in effect, insulating themselves not only from future natural disasters but from economic shocks as well, by reducing energy

costs and thus retaining in the local economy the additional dollars saved, presumably generating new jobs as money recirculates locally instead of leaving the community. Of course, many of these measures can be taken at times other than following a disaster. However, few events besides disasters result in the need to rebuild so much of the community so quickly and hence pose the same opportunity to reshape the local economy so dramatically. The significant benefits of integrating principles of sustainable development into the process of post-disaster redevelopment have resulted in a modest but growing collaborative effort among federal agencies, such as DOE, FEMA, and HUD, and various state, local, and private-sector entities to facilitate this integration. (A particularly good source of examples can be found by clicking "Operation Fresh Start" within DOE's sustainable development Web site at <http://www.sustainable.doe.gov>.)

One final pair of points can be made here. The process of planning for post-disaster recovery and reconstruction affords the opportunity to think about building a disaster-resistant economy not only in a structural and locational sense, but in terms of the kinds of businesses that are more likely to recover quickly from disasters. For instance, a town totally dependent on tourism will probably face a more dire predicament following a disaster than one with a more diversified economy, some of which consists of industries more capable of withstanding the impact of a local disaster. The second point, closely related and intuitively obvious, is that making the local business sector more resistant to disasters in these and other ways discussed above provides fiscal insurance to the local government by making the local tax base itself more disaster resistant. When it comes to disasters, what is good for the local business sector is also good for the municipal budget.

MITIGATION

Local government engages in hazard mitigation whenever it undertakes activities that are designed either to prevent future disasters (by keeping development out of harm's way) or to minimize or reduce their deleterious effects on property and infrastructure. Many activities that local government may not be able to mandate for private property owners may nonetheless be worth encouraging through means like public education campaigns and financial or other incentives. Also, while the damage from natural disasters is typically structural, the solutions need not be. Much of the most effective mitigation consists of nonstructural measures directing land use away from hazardous areas or even seeking simply to influence human behavior. The all-time classic example of the latter type of nonstructural mitigation is the U.S. Forest Service's Smoky the Bear advertising campaign, designed to reduce the risk of wildfires. For decades, most of the public was completely unaware of any positive role for fire in the natural environment. The fact that many wildfire experts now consider that campaign, in retrospect, almost too effective in shaping these exclusively negative public perceptions of wildfires serves to underscore the very power of the technique.

While little empirical research to date has been done relating plan quality to actual results in reducing damages from natural disasters, French et al. (1996) found in a study of the Northridge earthquake that a regression analysis of variables influencing damage showed the influence of public awareness policies in local plans to be a significant factor, along with the age of the buildings (correlated, obviously, to the building codes and land-use measures then in effect) and programmatic policies (affecting existing development). More research along these lines may serve to strengthen the hand of land-use planners urging greater emphasis in these areas.

The precise details of local hazard mitigation policies should grow out of the data amassed through hazard identification and risk assessment at the

The process of planning for post-disaster recovery and reconstruction affords the opportunity to think about building a disaster-resistant economy not only in a structural and locational sense, but in terms of the kinds of businesses that are more likely to recover quickly from disasters.

The Benefits of Implementing Hazard Mitigation

Pinellas County, Florida, in its redevelopment guide, provides an excellent summary list of the local benefits of implementing hazard mitigation.

- Saving lives and reducing injuries
- Preventing or reducing property damage
- Reducing economic losses
- Minimizing social dislocation and stress
- Minimizing agricultural losses
- Maintaining critical facilities in functional order
- Protecting infrastructure from damage
- Protecting mental health
- Limiting legal liability of government and public officials
- Providing positive political consequences for government action

outset of the planning process, coupled with the development of community consensus concerning the means for mitigating those hazards and the extent of the effort directed toward that goal. McElyea, Brower, and Godschalk (1982) list six generic questions as key issues in a hazard mitigation planning process. The Florida Department of Community Affairs, in a model plan developed by the Tampa Bay Regional Planning Council and the Hillsborough County Planning and Development Management Department (1995), also uses those and details others for specific hazards, such as high winds, flooding, wave action, and severe erosion. Other Florida jurisdictions like Pinellas County (1994) have used them as well. More recently, the Florida DCA (1997) developed statewide guidance in two documents addressing mitigation planning. Jurisdictions outside Florida, of course, will need to develop their own hazard-specific issues for other hazard categories more relevant to local circumstances. A few model and actual hazard mitigation plans and guides from around the country that planners can tap for examples relevant to their own communities are listed in the sidebar. Many of these necessarily deal also with long-term reconstruction and redevelopment issues because the two goals so often are pursued concurrently. Six basic questions can be asked about the policies and regulations in effect. Do the policies and regulations:

1. recognize the existence of different hazard areas that are subject to different forces?;
2. cover all types of structures (single-family, multifamily, commercial, etc.)?;
3. apply to public facilities as well as private?;
4. encourage higher-density uses to locate outside the most hazardous areas?;
5. result in nonconforming uses and structures being brought into conformity after they are damaged?; and
6. relate the level of development in the community to the capacity of existing evacuation routes and the time it would take to evacuate those areas?

Having listed these questions, it is worth noting that, as with many issues in the field of planning, there will always be exceptions concerning their validity in certain circumstances. For instance, higher densities in some areas, such as earthquake zones with liquefaction potential, may actually better support the cost of structural mitigation measures. Also, as was discussed above, it is not always possible or desirable to seek the complete elimination of nonconforming uses.

Florida is one of a mere handful of states with a specific mandate requiring communities to include particular kinds of natural hazards mitigation elements in their comprehensive plans. In view of research by Burby and Dalton (1993) finding stronger plan quality where state mandates with sanctions drive a process of development and implementation of hazard mitigation elements, it may be unfortunate that so few states have gone this route as yet.

As discussed elsewhere in this report, NFIP also provides some guidance on mitigation specific to flood hazards, and the Coastal Zone Management Act and Coastal Barrier Resources Act provide some reinforcement in coastal areas. The 1994 National Flood Insurance Reform Act (Public Law 103-325) created the Flood Mitigation Assistance (FMA) program to assist local governments with funding for mitigation planning and projects.

Under its Hazard Mitigation Grant Program and Public Assistance program, FEMA has also sought to facilitate local cost-benefit analysis by developing a worksheet to determine funding levels. Local planning agencies can adopt or adapt it to their own needs.

The main impetus for most state and local mitigation planning, however, is contained in Section 409 of the Stafford Act (Public Law 93-288, as amended), which requires state and local governments to develop a hazard mitigation plan as a condition of receiving federal disaster aid. The state or local government must agree to evaluate natural hazards in the areas where the loans or grants are used and to take appropriate action to mitigate them. The rules for implementing these requirements are in the Code of Federal Regulations (44 CFR, Part 206, Subpart M), but a FEMA (1990) handbook, *Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments*, can serve as an effective guide to the process of planning and plan review (see sidebar on page 60). More recently, however, FEMA has been reshaping its relationship with state emergency management and mitigation agencies through clarifying its own expectations of state and local mitigation efforts, which emphasize the implementation of ongoing mitigation planning programs.

Structural approaches to hazard mitigation can include the building of seawalls and revetments, levees, seismic retrofitting, landslide barriers, and other measures designed to make the built environment more resistant to the onslaught of natural forces. There is a temptation for decision makers to rely on such approaches and to avoid the more difficult options of restricting development in hazardous areas, but such a one-sided attack on the problem suffers from two major deficiencies: first, that catastrophic damage can

Model and Actual Plans and Guides for Local Hazard Mitigation

For full citation information, see Appendix A. Also note that each state has a state-level mitigation plan that all local planners in that state can request from their state emergency management office.

- California Department of Forestry and Fire Protection, *California's I-Zone: Urban/Wildland Fire Prevention & Mitigation*
- California Seismic Safety Commission, *California at Risk: Steps to Earthquake Safety for Local Governments*
- Federal Emergency Management Agency, *Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments*
- Florida Department of Community Affairs, *The Local Mitigation Strategy: A Guidebook for Florida Cities and Counties; Workbook in Local Mitigation Strategy Development; Model Local Government Disaster Mitigation and Redevelopment Plan and Model Local Redevelopment Regulations*
- Hilton Head Island, South Carolina, *Post-Disaster Recovery and Mitigation Plan*
- Long Island Regional Planning Board, *Hurricane Damage Mitigation Plan for the South Shore—Nassau and Suffolk Counties, N.Y.*
- Massachusetts Department of Environmental Management, *Flood Hazard Mitigation Planning: A Community Guide*
- Nags Head, North Carolina, *Hurricane and Storm Mitigation and Reconstruction Plan*
- Pinellas County, Florida, *Post-Disaster Redevelopment Guide for Pinellas County*
- South Florida Regional Planning Council, *Post-Disaster Redevelopment Planning: Model Plan for Three Florida Scenarios*
- Tampa Bay Regional Planning Council, *Tampa Bay Region Hurricane Recovery Planning Project, Volume I—Phases I and II Regional Recovery Planning Guide*

Primary Steps for Hazard Mitigation Planning

Implementing regulations for Stafford Act mitigation planning list four primary components of a state hazard mitigation plan that are also outlined in Section 409 of the Stafford Act:

- An evaluation of the natural hazards in the designated area
- A description and analysis of the state and local hazard management policies, programs, and capabilities to mitigate the hazards in the area
- Hazard mitigation goals and objectives and proposed strategies, programs, and actions to reduce or avoid long-term vulnerability to hazards
- A method of implementing, monitoring, evaluating, and updating the mitigation plan. Such evaluation is to occur at least on an annual basis to ensure that implementation occurs as planned, and to ensure that the plan remains current.

Source: 44 CFR Part 206, Subpart M

exceed the design capabilities of cost-effective engineering solutions (Petak and Atkisson 1982), causing additional damage; second, that the avoidance of more difficult land-use decisions produces a false sense of security that allows more development in hazardous areas than might otherwise have occurred (Burby and French et al. 1985). Nonstructural approaches may include stricter building codes and improved enforcement, the acquisition of vulnerable properties, zoning and subdivision regulations aimed at minimizing or prohibiting undesirable land uses, setbacks, floodplain regulations, and relocation programs.

Implementation of the chosen strategies must then depend on the priorities established in the mitigation plan. Where do limited funds get spent first? Regulatory solutions (e.g., zoning) are obviously less costly than alternatives that involve direct public expenditures, but, with the exception of nonconforming uses substantially damaged by a disaster, do not affect existing development. Retrofitting costs money, but a community can become more adept at identifying funding sources to assist in these objectives and in developing incentives for property owners so that they are more palatable politically. Because most mitigation money is available after a declared disaster, communities must also build into their mitigation plans targets of opportunity, in effect shifting their priorities to fit the resources available at any given time. That is so commonly the circumstance that planners would be well advised to assume that such opportunism is a necessary element of a good mitigation plan. Part of the essence of good post-disaster planning is preparation to seize the moment. The best way to marshal the resources to do so is to have a ready set of priorities.

Finally, planners should develop criteria for implementing those priorities. Risk assessment is a critical factor in establishing those criteria because considerations related to protection of population (including density) and critical facilities will inevitably drive these priorities. Criteria are the workhorses of day-to-day plan implementation. At some point, for example, planners and other local officials must decide, with limited resources, which flooded house is bought and/or relocated from a willing seller, and which one must wait. These criteria may include a variety of very detailed factors, such as repetitive loss history, elevation within the floodplain, the condition of the property, the percentage of the surrounding subdivision or neighborhood that either has been relocated or remains intact, and the cost of the transaction. Many communities have developed scoring systems for rating the relative priority of various properties for acquisition or other mitigation strategies. In an area vulnerable to high-wind damage, for instance, which utilities should be undergrounded first, and how soon? Which local roads and bridges should be elevated or seismically retrofitted, and how soon? Which culverts most need to be expanded to facilitate the flow of flood waters? The answers to these questions are as varied as the communities themselves and involve as many possibilities as the items listed in Chapter 5.

From this discussion, it should be apparent that hazard mitigation is an implicit function of all other objectives of the plan for post-disaster recovery and reconstruction. Nonetheless, mitigation needs to be highlighted in its own right in the plan in order to achieve the visibility and priority it deserves. As a policy objective, mitigation should be seen as posing two distinct sets of opportunities that deserve distinct treatment—those pursued during the pre-disaster period and programmed into local government activities and budgets on an ongoing basis, and those created as an immediate result of a natural disaster and which must be acted upon in a timely manner during the recovery and long-term reconstruction periods. There are two essential reasons why these sets of opportunities are different. First,

the post-disaster period, especially if the local government has planned effectively for this eventuality, is one in which additional outside resources become available that would not otherwise exist. Second, the damage caused by the disaster and the consequent need to rebuild produce an atmosphere of heightened urgency in decisions concerning when, where, and how to rebuild. In other words, there is no substitute for a good plan in these circumstances.

Pre-disaster Mitigation

Despite the emphasis placed in this report on preparing to seize opportunities for hazard mitigation that arise in the aftermath of a disaster, nothing could make less sense in the context of post-disaster planning than to wait for such opportunities before doing anything. Hazard mitigation works best as a policy objective of local planning when it is so completely integrated into the comprehensive plan that it becomes a normal assumption behind all daily planning activities. There is far more political and institutional momentum in the post-disaster period behind a policy objective that is already in place and being actively pursued than in one that is suddenly activated from scratch, no matter how well the community planned for its contingency.

Any doubts on that point ought to be resolved by the case study of Arnold, Missouri, which appears in Chapter 8. That city's existing plans, part of its 1991 floodplain management plan, called for the establishment of a greenway along the Mississippi and Meramec rivers through a program of gradual buyouts of floodplain properties. When the 1993 floods arrived unexpectedly soon and with unexpected intensity, the city's pre-existing commitment to this objective made it easier to accelerate the whole process. This maxim need not be limited to land acquisitions; the same principle applies to other mitigation measures like elevation, floodproofing, seismic retrofitting, and various wildfire mitigation techniques.

An excellent example of an ongoing commitment to a major hazard mitigation challenge is the Los Angeles program for seismic retrofitting of a large stock of unreinforced masonry buildings (URMs), based on the earthquake hazard reduction ordinance the city passed in 1981. When it began, Los Angeles required almost 8,000 URM owners over several years either to improve their buildings, vacate them, or face demolition. Despite the massive damage of the 1994 Northridge earthquake, matters could have been much worse. By 1996, one-third of the URMs were vacated or demolished, and 95 percent of those remaining were in compliance (FEMA 1997c).

Stricter building and zoning codes for future development, whether stemming from a planning process related to natural hazards and post-disaster recovery or not, also play a role in achieving the policy objective of pre-disaster hazard mitigation. The severe housing damage following Hurricane Andrew that stemmed from admittedly uneven compliance with the Southern Florida Building Code served, if anything, to highlight the value of the code where it had been observed. It is sometimes easy to lose perspective on just how much we have learned about effective hazard mitigation techniques regardless of the specific disasters involved. No American city, for example, is even remotely likely today to suffer the same type of massive housing and infrastructure damage that occurred in San Francisco in the 1907 earthquake. The reason is simply that so much has been done to secure newer buildings and structures over time even though the city and region have grown significantly since then.

The objective of a pre-disaster mitigation program is to identify vulnerable buildings and infrastructure and to program the needed improvements into governmental budget priorities, as well as to persuade private property

Hazard mitigation works best as a policy objective of local planning when it is so completely integrated into the comprehensive plan that it becomes a normal assumption behind all daily planning activities.



Marya Morris

This home in Lewes, Delaware, was elevated to raise it above the base flood level in a coastal high hazard area.

owners to undertake such commitments themselves to the extent possible. To return to the Arnold, Missouri, example, it is far easier to convince outside funding sources to assist with such efforts if it is clear that the local government, and ideally its business sector and citizens as well, already are taking the issue seriously.

Seizing Post-Disaster Opportunities

It should be obvious by now that pre-disaster and post-disaster mitigation should be two parts of a seamless whole in a sound plan for post-disaster recovery and reconstruction. The only difference, although it is often a major difference, is one of scale, of accelerating the pace with which existing mitigation plans are implemented, as a result of the influx of outside assistance. What is important about planning for post-disaster hazard mitigation is that the additional resources that facilitate local hazard mitigation in the aftermath of a disaster do not materialize by accident. Local governments manage to secure such resources in large part because they have planned to do so.

That does not mean that they know when those plans will be put into effect. Arnold took advantage of the post-disaster elements of its 1991 floodplain management plan far earlier than anyone had expected, and on a grander scale than it had expected. Los Angeles was forced to activate its plan for post-disaster recovery and reconstruction during the Northridge earthquake almost as fast as it had adopted it. Disaster could strike even in the midst of the planning process. One never knows, but initiating the process now usually ensures more success than waiting.

Planners and city officials also find themselves in a position to accelerate mitigation in the post-disaster period because a disaster captures people's attention for such matters like nothing else. This attention span can be very short, however, unless local officials are able to focus it quickly and point to existing plans to address the problem because there is little time in the recovery period for developing plans from scratch. Many property owners are facing the need to rebuild or to repair damaged buildings, and while this

circumstance generally leads to pressure to allow them to rebuild the same structures in the same places, this need not always be the outcome—certainly not where the local government is prepared with some alternatives and has identified in advance some resources with which to implement them. Specific details of the issue of using disaster assistance effectively is addressed later in this chapter.

One noticeable result, for example, of the 1993 Midwest floods was a growing public willingness to consider such alternatives, leading to the complete relocation of towns like Valmeyer, Illinois, and Pattonsburg, Missouri, and significant alterations to local development patterns in many others. The targets of opportunity are not just those physical structures that are most vulnerable to natural hazards, but the public attitudes toward those opportunities and the prospect of mobilizing public opinion behind the idea of implementing a new vision. Ideally, that new vision will have been considered in the process of developing a plan for post-disaster recovery and reconstruction, but even where that is not the case, it may still be possible to act quickly. Neither Valmeyer nor Pattonsburg had such a plan prior to the 1993 floods, but, with outside assistance, their civic leaders, particularly their mayors, were able to rally local public opinion. Their job may have been made easier by the small scale of their communities. In larger communities, the pre-disaster preparation of a plan for post-disaster recovery may be more essential to success.

The targets of opportunity are not just those physical structures that are most vulnerable to natural hazards, but the public attitudes toward those opportunities and the prospect of mobilizing public opinion behind the idea of implementing a new vision.

Because only very small communities will likely ever undertake wholesale relocation, planners need to focus on those less drastic but nonetheless significant opportunities that are more likely to present themselves. These opportunities may include rezoning hazard-prone areas to lower densities, designating areas where acquisition of property would be most effective and establishing priorities to guide those purchases, designating target areas for various kinds of retrofitting, and revisiting subdivision controls for hazard-prone areas (Morris 1997). In the aftermath of disaster, planners may also discover unique opportunities to reassess the effectiveness, extent, and policy basis of existing hazard mitigation programs.

The National Flood Insurance Program (NFIP)

By far the most significant and far-reaching federal legislation affecting local land-use planning is NFIP. It remains the one program deliberately designed to have some direct federal policy-making impact on local land-use planning related to disasters. It thus merits some special discussion related to local hazard mitigation policy objectives because of its unavoidable influence on local decisions concerning those objectives.

Put simply, NFIP has steadily become more specific in encouraging the type of local planning and land-use regulation that will yield results. That is not always readily apparent because so much of the program has relied from the beginning on incentives rather than direct mandates, although there are more than a few of the latter once a community is in the program. Participation in the program is voluntary; otherwise, its effectiveness relies on the willingness and desire of property owners to buy the insurance, whose availability depends on the compliance of their local government with the terms of the program. Those terms include the adoption and enforcement of a floodplain management ordinance, which necessarily imposes requirements for construction and post-disaster reconstruction within the regulatory floodplain.

Beyond the actual requirements of NFIP, FEMA encourages communities to undertake floodplain management programs that consider a number of factors that, it is hoped, will provide for a more comprehensive approach than the simple adoption of mandatory regulations. These are delineated in

the Code of Federal Regulations (44 CFR, Section 60.22(c)). (The language of that section appears in this report in Chapter 7.) Planners may perceive in these considerations a relationship to floodplain management regulations that is similar to that between a comprehensive plan and a zoning ordinance. Many states not only require a comprehensive plan as a step preliminary to the adoption of zoning, but also require consistency between the two documents. In some cases, rezoning can be overturned legally on the basis of inconsistency. In any event, a community that wants to address flood hazards seriously, rather than merely to comply with NFIP regulations, would do well to examine the list of floodplain management elements suggested in NFIP regulations as a starting point for an effective, well-planned floodplain management program. Planners in states that already require some type of natural hazards element in local comprehensive plans may already be accustomed to perceiving the issue in these terms. Planners should also encourage their communities not to limit their focus to the 100-year floodplain as if some magical force prohibited larger floods. In fact, according to FEMA, nearly 35 percent of flood insurance claims go to victims outside the 100-year floodplain (TBRPC/Hillsborough County 1995).

Planners should also encourage their communities not to limit their focus to the 100-year floodplain as if some magical force prohibited larger floods. In fact, according to FEMA, nearly 35 percent of flood insurance claims go to victims outside the 100-year floodplain.

It is unlikely that NFIP will move away from its philosophy of essentially relying on voluntary participation, but it is likely that the strength of both its incentives and disincentives will grow with each new reform. This conclusion is apparent from the evolution of the program. At its inception in 1968, with the passage of the National Flood Insurance Act (NFIA), the intent was to make federally subsidized insurance available to owners of homes and businesses subjected to flood hazards. To ensure some effort by local governments to restrict losses, insurance was available only in those communities that adopted a floodplain management ordinance in compliance with program requirements. As of October 1998, 19,302 communities (out of nearly 22,000 identified as having flood hazards) were participating in NFIP.

Originally, however, little in the program served to differentiate the actual level of risk. Premiums were based on various flood hazard zones but did not reflect the level or quality of effort of individual communities in reducing flood hazards. The Community Rating System (CRS), also discussed in Chapter 5 of this report, was born out of a desire to incorporate in federal flood insurance rates some reflection of this quality of effort. The point of CRS is to offer incentives, in the form of premium reductions to policy holders, for communities to perform a series of point-garnering activities that are assumed to strengthen local floodplain management. As of October 1998, 894 communities with flood problems were participating in CRS, and they represent 66 percent of the NFIP policy base. With the exception of the Flood Mitigation Assistance Program described in the following paragraph, the CRS is the closest any federal hazards program has ever come to spelling out what the federal government would like to see in a comprehensive hazards management plan at the local level. Under the floodplain management planning category, communities can receive points for:

- organizing and preparing the plan;
- involving the public;
- coordinating with other agencies;
- assessing the hazard;
- assessing the problem;
- setting goals;
- reviewing possible activities;

- drafting an action plan;
- adopting the plan; and
- implementing, evaluating, and revising the plan.

By 1994, following the great Midwest floods of 1993, flood program reform was again in the air and resulted in the passage of the National Flood Insurance Reform Act, which amends the original 1968 act. CRS remains voluntary, providing incentives in the form of credits on policyholders' flood insurance premium rates for communities that undertake the recommended activities. The new law also replaced two previous programs that provided funds for buying and removing flooded or erosion-threatened structures with a new Flood Mitigation Assistance Program that is to provide grants to state and local governments for planning and executing activities to reduce flood risks before disaster strikes. Eligibility for the program requires the adoption of a flood-risk mitigation plan approved by FEMA, whose requirements are compatible with those of CRS and Section 409 of the Stafford Act. Finally, to increase program participation by property owners, the 1994 amendments:

- direct the federal agencies that regulate financial institutions to mandate that the institutions abide by rules which required that loans the institution made, increased, extended, renewed, or purchased from another lender were to include flood insurance if the property securing the loan was in a floodplain;
- require that federal lenders be given that same mandate;
- require lenders that escrow taxes, insurance premiums, and other fees to also escrow payments for flood insurance as a means of discouraging homeowners from dropping the insurance after the first year or after receiving flood damage payments (a common problem); and
- require lenders to notify FEMA of any change in the servicer of a loan covered by flood insurance, as when an original lender resells the loan to a secondary mortgage institution.

These measures represent the latest tightening of the federal screw within a voluntary, incentive-based context in order to ensure that federal disaster aid is seen less as an entitlement and more as a helping hand in a meaningful intergovernmental partnership to reduce hazard risks.

CONNECTING THE DOTS

Although a plan for post-disaster recovery and reconstruction can be conceived and prepared as a stand-alone document, it should ideally be part of a community's comprehensive plan and therefore be integrally linked with all other elements of the city's plans. Disasters have the potential to disrupt so many aspects of normal activity in a community that there are few aspects of a city's operations that will remain totally unaffected. The point of this section is to discuss how and why those linkages may occur. The policy objective is to ensure the integration of disaster-related planning into the considerations that drive other plans and plan elements.

Linkages with Other Comprehensive Plan Elements

Consider just two recent major disasters—Hurricane Andrew and the Northridge Earthquake—and their impact on a variety of normal civil government functions, all of which are typically the subject of some element of a local comprehensive plan.

Although a plan for post-disaster recovery and reconstruction can be conceived and prepared as a stand-alone document, it should ideally be part of a community's comprehensive plan and therefore be integrally linked with all other elements of the city's plans.

Particularly important are the linkages between a natural hazards and post-disaster element and the implementation element of a comprehensive plan. Pre-disaster mitigation plans need clear goals and a time frame to be achieved and in order to avoid gathering dust on a shelf. It is all too easy for mitigation objectives to remain unfunded for years.

- Telecommunications were disrupted where telephone lines were down.
- Transportation was disrupted by damaged bridges, fallen trees, and other obstacles.
- Utility service was unavailable where power lines were down.
- Education was interrupted at all levels not only because of the above problems but also because school buildings were damaged, roofs had collapsed, and schools were used as temporary shelters.
- Economic development agencies had suddenly inherited the huge job of helping businesses reestablish themselves in the face of a weakened economy, structural damage, loss of customer access, cleanup priorities, inability of employees to commute to work, and related nightmares.
- Thousands of residents needed emergency housing, and others faced the task of arranging for costly repairs.
- Environmental damage was substantial, particularly where fragile ecosystems were harmed or spills of hazardous waste occurred.

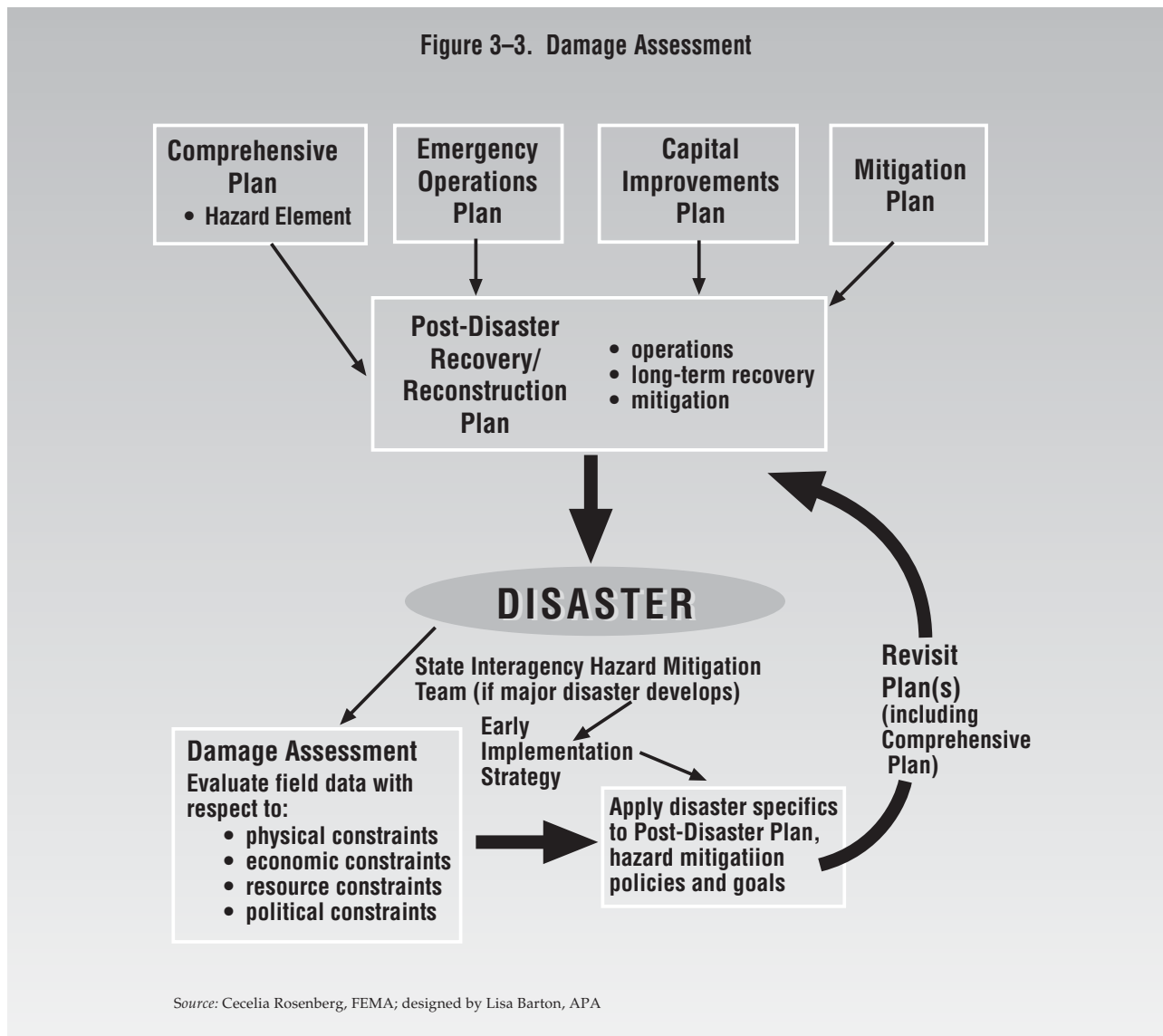
Clearly, the list of local comprehensive plan elements called into question can be even longer. Land-use elements, dealing with the community's plans for zoning changes and subdivision regulations, among other issues, are an obvious additional point of linkage for post-disaster considerations because many communities may find a need to revisit such regulations based on lessons learned from the disaster. (See Figure 3-3.) Public safety, capital improvements, and other elements may also be examined for their potential role in addressing mitigation and disaster planning.

Particularly important are the linkages between a natural hazards and post-disaster element and the implementation element of a comprehensive plan. Pre-disaster mitigation plans need clear goals and a time frame to be achieved and in order to avoid gathering dust on a shelf. It is all too easy for mitigation objectives to remain unfunded for years. Although post-disaster recovery and reconstruction plans may seem to be self-activating once disaster strikes, experience indicates that the unpredictable timing of disasters can allow them to be forgotten by the time the event occurs. It is essential that oversight and agency responsibilities be clearly assigned. The designation of a post-disaster recovery task force, as discussed above, is one obvious way to accomplish this purpose.

The principal point is simply that post-disaster issues must be considered as these other plan elements are prepared, and cross-references within them to the post-disaster element can then make the plan an effective instrument for taking cognizance of both the problems and opportunities for improvement that the disaster itself may engender. Des Moines, for instance, was forced in the aftermath of the 1993 floods to reconsider the vulnerability of its single water treatment plant in the downtown area and take steps to plan for some alternatives. Although no one anticipated the duration or extent of those floods, prior consideration of this issue might have given rise to other options much earlier.

Linkages with Other Plans

The comprehensive plan, while clearly the most important set of linkages and the ideal repository for the plan for post-disaster recovery and reconstruction itself (as an element), is not the only linkage that matters. The opportunities for integrating disaster planning awareness into local plans



and their implementation extends much further. Many special plans developed by local governments also deserve such attention.

Neighborhood plans, for instance, allow an ideal opportunity to sharpen the focus of post-disaster planning. Neighborhoods in hazard-prone areas, especially if they are developed with a high level of citizen participation, can serve well to raise citizen awareness of the need for preparedness and mitigation and of possibilities for more sustainable methods of rebuilding (such as improved energy efficiency in more disaster-resistant structures) in the aftermath of a disaster. Could better stormwater detention systems that resulted in the construction of swales or that took better advantage of natural runoff patterns ease a neighborhood flooding problem? Might fire-resistant landscaping requirements for a subdivision or homeowners association help avert disaster? What access patterns could be changed to benefit residents and improve public safety? Under what conditions should treasured but vulnerable historic buildings and homes be demolished? Linking the post-disaster element with the development of neighborhood plans presents an opportunity to nail down details of post-disaster reconstruction and mitigation that might otherwise escape notice in the larger scheme of things.

Linking the post-disaster element with the development of neighborhood plans presents an opportunity to nail down details of post-disaster reconstruction and mitigation that might otherwise escape notice in the larger scheme of things.

Resources that may not be available on a routine basis for certain improvements may become available from various disaster relief sources, particularly where careful planning has allowed the community to identify certain needs in advance, saving critical time in the aftermath of the disaster.

Finally, there is the most important link of all to a plan independent of the local comprehensive plan, in no small part because it brings together two groups of professionals who need to collaborate more than has traditionally been the case: planners and emergency managers. The latter develop their own emergency operations plans, which are in the vast majority of cases focused almost exclusively on immediate response and recovery functions following a disaster.

Area and corridor plans likewise present special opportunities to examine specific issues, the latter particularly in the area of transportation. Downtown or business district plans for areas with significant natural hazards can address the questions of how business activity will be restored in the aftermath of a disaster, what sort of economic redevelopment may be necessary, and which resources will be available to make it all happen. Narrowly focused infrastructure considerations, such as planning for the undergrounding of utility lines in a waterfront business district, can undergo detailed scrutiny in such plans.

One special area that absolutely needs linkage consideration is capital improvements programming. Because such programming involves the scheduling of public improvements over a multiyear period (typically five years), it presents a recurring opportunity to consider and include those improvements needed to make the community more disaster resistant. The list of potential improvements that fall into this category includes nearly every item of public expenditure mentioned in this report, from road resurfacing and the retrofitting of vital infrastructure for wind or seismic resistance, to the creation of emergency management shelters and the seismic retrofitting of schools and community buildings. As important as the improvements themselves is the provision for financing them, the subject of later chapters in this report.

Because of the unpredictability of disaster-related reconstruction costs, however, it is also important to recognize the wish-list aspect of capital improvements planning. Resources that may not be available on a routine basis for certain improvements may become available from various disaster relief sources, particularly where careful planning has allowed the community to identify certain needs in advance, saving critical time in the aftermath of the disaster. This is particularly true with regard to assistance under Section 406 of the Stafford Act (42 U.S.C., Section 5172), which deals with the federal cost share for the repair, restoration, or replacement of damaged facilities. The act permits some flexibility by allowing a local government to receive 90 percent of the federal cost share if it chooses not to repair or replace a damaged facility but to channel that money into mitigation for other facilities instead. Incorporating mitigation-related concerns into capital improvements planning thus eases the path to quickly identifying the community's unmet needs when it counts.

Finally, there is the most important link of all to a plan independent of the local comprehensive plan, in no small part because it brings together two groups of professionals who need to collaborate more than has traditionally been the case: planners and emergency managers. The latter develop their own emergency operations plans, which are in the vast majority of cases focused almost exclusively on immediate response and recovery functions following a disaster. These are, of course, extremely important, but the opportunity has generally been missed for discovering the synergies involved in linking long-term post-disaster recovery and reconstruction planning with emergency management concerns. The two professional communities have much to say to each other, for there is no clean division in time between the response period that begins with the onset of disaster and the initiation of long-term recovery and rebuilding functions.

To cite one example, planners and emergency managers at the same table might agree that a new subdivision of any type with no basements—whether because it consisted of manufactured housing or because, as is often the case along the Gulf Coast, the climate does not permit such construction—might be better off with a required storm shelter to prevent deaths and injuries from tornadoes, hurricanes, and other violent weather. In the absence of collaboration, however, such concerns may never be voiced

during the development process, and the concept of a later retrofit seldom acquires much urgency. In the end, a form of mitigation that might have been incorporated into the site plan at only modest additional expense never happens. After disaster strikes, the inevitable question is Why?

Similar examples of the value of cross-breeding emergency management and comprehensive planning can be found with regard to virtually every disaster scenario imaginable. Many of these have to do with public safety functions during the emergency period that nonetheless have some repercussions for the long-term rebuilding process, such as the reopening of blocked roads in flooded areas or emergency access to fire-prone hillside developments.

Moreover, the discussion between these two groups, particularly if augmented by environmental and sustainable development perspectives, could open up new opportunities and approaches for post-disaster redevelopment. For instance, to the extent that centralized power sources are vulnerable to certain kinds of disruption, creative efforts to introduce renewable power sources that can be generated on site might open the door to further explorations of new possibilities in local energy planning. In a severe northern ice storm, for example, buildings with their own solar power and heating sources can maintain operations where those dependent on downed power lines cannot. Might this not be a potential consideration relative to shelter sites? Once in place, might it not serve as a provocative example for the rest of the community? Collaborative thinking by planners and emergency managers concerning these eventualities can open the door to some exciting new ideas for rebuilding more disaster-resistant communities.

Linkage with Land-Use Regulations

State laws vary widely concerning the required degree of consistency, if any, between local land-use regulations, particularly zoning, and the comprehensive plan (Dennison 1996). Some state courts require strict consistency and view the comprehensive plan as the controlling document to which the local zoning ordinance must adhere. In others, zoning may occur with no comprehensive plan whatsoever, and sometimes in the view of state courts serves as the master plan itself. In the absence of any consistency in state rules regarding consistency, it is impossible here to discuss in depth the legal relationship of the plan or element for post-disaster recovery and reconstruction to land-use regulations.

As a practical matter, however, a community clearly advances its agenda for post-disaster recovery and reconstruction by using the development of such a plan to review the logic of its existing land-use regulations and to revise them in accordance with its own stated goals as a byproduct of that planning process. These are inevitably very hazard-specific. For instance, coastal erosion is a recurring concern in communities facing hurricane hazards. Nags Head, North Carolina, used its plan to address this problem by requiring future subdivisions to have ocean-to-road linear orientations, an approach of little relevance to most other types of hazards. On the other hand, vegetation, slope ratios, and soil stability would be relevant regulatory considerations in wildfire and landslide hazard areas.

APA recently published a PAS Report (Morris 1997) dealing with subdivision controls in flood-hazard areas. Various earlier PAS Reports have dealt with land-use regulatory and design issues concerning other types of hazard-prone areas, such as steep slopes and earthquake fault zones. Mostly, however, these deal with the design and zoning for new subdivisions and other developments rather than those affected by disaster and needing to undergo reconstruction. The reconstruction situation can be

Moreover, the discussion between planners and emergency managers, particularly if augmented by environmental and sustainable development perspectives, could open up new opportunities and approaches for post-disaster redevelopment.

State laws vary widely concerning the required degree of consistency, if any, between local land-use regulations, particularly zoning, and the comprehensive plan (Dennison 1996). Some state courts require strict consistency and view the comprehensive plan as the controlling document to which the local zoning ordinance must adhere.

considerably more daunting because of existing lot lines and, far more often than not, a crazy-quilt pattern of damaged and undamaged structures within the same area. For these areas, rezoning considerations, especially with regard to lot size and configuration, or floor-area ratios and impervious surface coverage, can be a treacherous enterprise, but it is certainly made easier by some forethought about potential alternatives in a plan devised prior to the emergency.

USING DISASTER ASSISTANCE EFFECTIVELY

The first step in effectively using disaster assistance, says consultant Clancy Philipsborn (1997), principal of the Mitigation Assistance Corporation of Boulder, Colorado, is to learn not to focus on the disaster alone. A community's narrow focus on simply gaining access to the limited pools of disaster assistance money available from FEMA leads to a cramped vision of the its options and keeps it from getting a handle on the bigger picture. In other words, planning for post-disaster recovery and reconstruction needs to be well integrated into the community's comprehensive plan and stitched into its larger vision of its own future. Not only does this open up much larger options for attracting outside resources to aid in post-disaster recovery and reconstruction, but it also helps the community itself to identify more creative solutions to a range of problems exposed by the damage wrought by a disaster. Furthermore, it provides an opportunity to identify a range of resources to assist in dealing with ongoing or pre-disaster mitigation issues. For instance, many small Midwest communities had long-running economic difficulties that may have been exacerbated, but certainly were not caused by, the 1993 floods. For those communities that latched onto a multiobjective approach, recognizing those larger problems and seizing opportunities to address them through the rebuilding process was the key to creative planning for economic renewal.

A community's narrow focus on simply gaining access to the limited pools of disaster assistance money available from FEMA leads to a cramped vision of the its options and keeps it from getting a handle on the bigger picture.

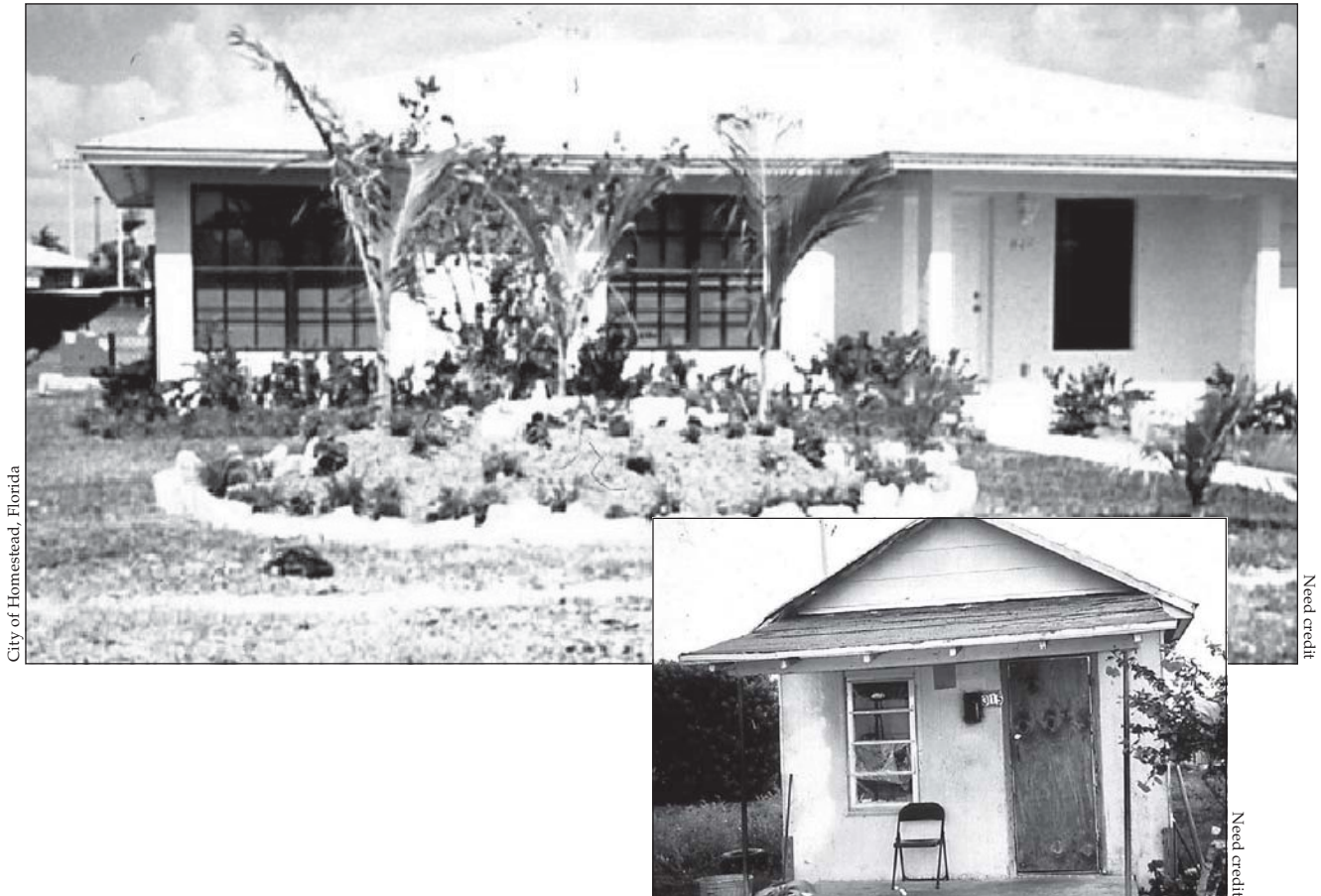
Among the examples that emerged from the Midwest floods is that of Valmeyer, Illinois. Although the total relocation of a town is an exceptionally rare outcome, Mayor Dennis Knobloch showed unexpected opportunistic zeal when, after initial skepticism, he sought the help of an outside design team organized by DOE to bring sustainable design principles to the relocation process. Knobloch acquired his enthusiasm while attending a conference on sustainable redevelopment underwritten by DOE, with support from the Johnson Foundation, at the Wingspread Conference Center in Racine, Wisconsin, in January 1994. The regional planning agency had already laid out the new town site, and time did not allow for reconsideration of its conventional suburban-style street layout. Valmeyer, however, still derived substantial benefits in other ways, particularly by incorporating superior energy efficiency into its new buildings, using incentives provided by the Illinois Department of Energy and Natural Resources.

Pattonburg, Missouri, because it did not yet have a new town site platted by the time it connected with DOE's design team, was able to use such help more extensively in pursuing a more neotraditional design and opening more questions to public discussion in its citizen participation process. Mayor David Warford latched onto the idea of sustainable redevelopment by attending a workshop in Valmeyer. Pattonburg was then able to marshal resources from the Division of Energy in the Missouri Department of Natural Resources, in addition to FEMA, DOE, and the Economic Development Administration (Skinner and Becker 1995).

A number of other communities, including Darlington, Wisconsin, and Arnold, Missouri, were able to act on their own dreams of connecting their river corridors to larger existing greenways and trails, using money from the special \$130 million supplemental appropriation for the buyout pro-

gram designated by Congress for use in the Midwest (Design Center for American Urban Landscape 1994).

Homestead, Florida, which was forced by Hurricane Andrew to undertake extensive rehabilitation of its downtown and nearby residential areas, constructed a package of improvements under a newly created community redevelopment agency called Homestead Economic and Rebuilding Organization (HERO). Its five-year plan reveals heavy reliance on a combination of state and federal resources including various grant programs of the



City of Homestead, Florida

Need credit

Need credit

federal Economic Development Administration and grants for road improvements from the Florida Department of Transportation, in addition to the use of Community Development Block Grants (CDBG) and Housing Opportunities Made Equal (HOME) funds from the U.S. Department of Housing and Urban Development for residential redevelopment (Enterprise/Homestead Planning/Action Team and City of Homestead 1993).

FEMA is simply not the only game in town when it comes to applying for disaster assistance. Many agencies and institutions that may have no direct connection to disaster management may be viable sources of funding for communities that can tie other development objectives to their plans for post-disaster recovery and reconstruction. (Appendix C provides a directory of federal programs providing various types of disaster assistance.) This allows a community to assemble a better array of funding to achieve its own longstanding objectives. Moreover, a more substantial local effort, including the extra effort that goes into identifying and pursuing such funds, will go a long way in impressing FEMA

Code enforcement and crime had been problems in this Homestead, Florida, neighborhood (below, right). After Hurricane Andrew flattened the area, the Homestead Economic Redevelopment Organization acquired and cleared the property and constructed 18 single-family houses (above), which were sold to first-time buyers.

officials with the level and quality of the local contribution to the post-disaster effort, potentially bumping the creative community up the priority list in the competition for disaster funds. The Nags Head, North Carolina, *Hurricane and Storm Mitigation and Reconstruction Plan* (1988) contains a provision for retaining an assistance facilitator-consultant who would be responsible for:

- determining the types of assistance available to the town and the type of assistance most needed;
- assisting in the coordination of federal disaster recovery effort;
- coordinating federal and state programs of assistance;
- informing the community of types of assistance programs available; and
- recommending to the recovery task force and board of commissioners programs that are available to the town and then to act as facilitator in securing those programs.

It is important to consider the community's contribution of staff time and energy in addition to any specific budgetary allocation it makes to match federal and state grants. Many communities, Philipsborn says, fail to account for this "soft match" of resources for disaster assistance. For some projects, that staff time may be quite substantial.

Boone: A Case Study

Boone, North Carolina, a town with recurrent flood problems, provides an example of a community with a particularly thoughtful and flexible plan for using disaster-related assistance to achieve several outcomes and to use a "soft match" to generate more resources. Part of the town's mitigation program entails a three-phase project within one neighborhood. Phase One of the project is the acquisition and relocation of 15 houses on 17 lots, all of which are located within the floodway and 12 feet below the base flood elevation. The town conducted appraisals and offered the building owners fair-market value. For those owners who wanted to retain their structures, relocation assistance was envisioned in lieu of purchase—but only if the cost of relocation was less expensive than outright purchase. To accomplish this effort, the town assembled a package of funding consisting of FEMA Hazard Mitigation Grant Program (HMGP) funds, state division of emergency management funding, HUD-state CDBG funds, and town resources.

In many communities, that might have been the whole story. Boone, however, is planning to eliminate the demolition and removal costs by bringing other priorities into play. It turned out to be more manageable for the town to plan to relocate the majority of acquired structures to a new low- and moderate-income housing development elsewhere within Boone (rather than allow the few interested owners to relocate the structures themselves). Owners who wanted to reoccupy their homes and meet the income eligibility requirements will be provided the highest priority to purchase within the development. In addition, several structures are being donated to Habitat for Humanity and to a women's domestic violence organization. The organizations taking possession of the structures will be responsible for their relocation, but the town has lined up additional low-interest funding that is available to help defray the costs should the organizations be interested. Finally, if a structure remains unmoved, it will be donated to the town fire department and burned for training purposes. Thus, a variety of housing and other community goals are being served by identifying stakeholders with an interest in the physical property.

Phase Two, which also was funded, involved the acquisition and relocation of 15 additional structures. The only difference is that these structures are in the floodplain, rather than the floodway. According to project manager Jim Byrne (1998), by December 1998, 24 of the total of 30 units acquired had been relocated and were to be rehabilitated to create low- and moderate-income housing. Philipsborn added that a "reuse plan has been developed for the area vacated by both Phase I and Phase II that incorporates open space, bicycle and pedestrian trails, and an open-air amphitheater."

Phase Three of this project is for the relocation of a 104-bed residential health care facility. Funding of this phase exceeds that of Phases One and Two together and required a different strategy. An HMGP application for Phase Three was submitted to the state in December 1997 and is pending approval when funds become available. The primary focus initially was to assist the health care facility to relocate its business to a flood-free location and to promote the reuse of the structure as a nonresidential daytime use. This would be considerably safer than the current use, which is a 24-hour residential care facility for individuals with disabilities. To date, the town has successfully supported the facility's application for an increase in the state-controlled number of beds. This provides the means for the business to operate profitably in a new location. Second, the town waived current policy by agreeing to extend water and sewer services to the proposed new site, which is beyond the town's current limits. Then, the town approved a request for rezoning of the existing building's site to improve the ability to attract a suitable nonresidential day use. According to Byrne, however, in the end, the nursing home operator was unable to make the move without selling the old building, so the application ultimately involved purchasing and demolishing the facility.

The options for preserving the newly created floodplain open space are equally diverse and the result of the emergence of other local priorities and interested parties. Of course, the final results will be contingent on many factors, not the least of which is 100 percent voluntary participation of the building owners to sell their properties and vacate the floodplain. Among the parties interested in the reuse of the floodplain property is the state department of transportation. They "owe" several acres of reconstructive wetlands to replace those destroyed elsewhere within the county during a construction project. This site meets their criteria, thus creating a situation where environmental regulatory priorities may enhance the funding sources for a hazard mitigation project. The state also has funding for a greenways program, and consideration is being given to using some of the land to fill a missing link of the town's existing trail system. Clearly, the greenway and wetlands project could be linked together. In addition, Appalachian State University is located in Boone, and it has an interest in obtaining more open space for use as recreation and/or parking. And, of course, both the town and the county are interested in using the space for similar purposes themselves.

A key element in the Boone story concerns the local match for federal disaster assistance, which can provide up to 75 percent of the cost of a project. Finding a variety of other funding sources can make the community's grant application look more attractive by reducing that federal match. In Boone's case, that federal percentage fell to just 63 percent, a very attractive proposition for agencies dispensing limited funds to competing local governments. Even more importantly, this is an attractive proposition for the state, which must prioritize and select projects to stretch the available money and provide matching funds.

The Essential Lesson

The essential lesson is that a community's ability to marshal disaster assistance and use it effectively does not depend solely on its ability to make a case for the need to rebuild the community. It depends instead on the community's ability to relate those reconstruction goals to larger plans it has developed for the community's overall future. Fitting disaster assistance aims into those larger aims allows officials to be more creative in thinking about the kinds of funds that may be appropriate to the situation. Those can include a variety of possibilities: rural economic development, housing, transportation, environmental protection, parks and recreation, urban redevelopment, and even health and sanitation.

Chapter 4

The Planning Process

Chapter 3 reviewed the underlying public purposes of planning for post-disaster recovery and reconstruction. This chapter will move beyond that discussion to examine the steps a community should follow in preparing such a plan, based in large part on the experiences of a number of communities that have already done such planning. (See the sidebar on the next page for an overview of these steps.)

In the United States, the centerpiece of planning efforts has long been the comprehensive plan. The individual elements included in local comprehensive plans have varied significantly in response to both community needs and state planning mandates, although certain staples, such as transportation, community facilities, and land use, are nearly universal. In addition, various kinds of jurisdictions have evolved specialized plans to address particular needs, such as inner-city redevelopment, the cleanup of environmentally contaminated areas, or the expansion of public parks and recreation facilities. The previous chapter covered the need for strategic linkages between the plan for post-disaster recovery and reconstruction and these other plans or plan elements. In some communities, post-disaster plans themselves have been devised as independent, or stand-alone, special plans. In either case, plans or comprehensive plan elements addressing the need for post-disaster recovery and reconstruction represent one more way for planners to help their communities cope with a defined problem and to shape a vision of how the community can improve its situation and take advantage of opportunities for positive change (Berke, Kartez, and Wenger 1994).

Importantly, this section will not consider those issues that are largely addressed by emergency managers in their own operational plans for disaster response. Rather, it will be limited to those that affect the long-term reconstruction of the community. The more operational emergency management issues may well find a place in an actual post-disaster plan, but that integration needs to be developed through local cooperation between planners and emergency management officials. Where the latter set of issues intersects both categories, the emphasis will be on their implications for long-term reconstruction.

FORMING A TASK FORCE

The plan for post-disaster recovery and reconstruction must tap a uniquely broad combination of resources and expertise in order to reflect the complex realities that must be addressed. An interdisciplinary reconstruction planning task force is the best way to guide the process of constructing the plan. This allows the interagency task force that must implement the plan to have a hand in guiding its creation. In relatively small communities, however, the staff may be able to develop the plan with less formalized public and

Steps in the Planning Process

Below is a simple chronological outline of the steps described in this chapter for initiating and completing the process of preparing a plan for post-disaster recovery and reconstruction:

1. **Make the decision to plan** for post-disaster recovery and reconstruction
2. **Form a task force** to develop the plan
3. **Put someone (some agency) in charge** of the process
4. **Document the hazards and risks** for your community
5. **Present your findings** to the community and get feedback
 - a. Develop clear, effective educational materials
 - b. Hold public forums to discuss the problem
6. **Build public consensus** around the need to develop and implement a plan
7. **Develop the plan**
 - a. Prepare plan elements as needed
 - b. Link the plan to other plans
 - c. Link the plan to land-use regulations
8. **Present the plan for adoption**
 - a. Hold public hearings
 - b. Get the legislative body and chief executive to adopt the plan
9. **Implement the plan**
 - a. Set pre-disaster elements in motion
 - b. When disaster strikes, be ready to act
10. **Review and amend plan as appropriate**
 - a. On periodic basis
 - b. When planning laws change
 - c. After disasters

interagency input, but citizen participation in the plan's development will remain essential for building public consensus. The sidebar on page 78 lists the composition of the post-disaster planning task force proposed in a Key West, Florida, ordinance that was awaiting city council action as this document was being completed, as well as an existing intergovernmental task force in Escambia County, Florida.

These task forces have taken different names and forms depending on the nature of the hazards being addressed. In many communities, for instance, a floodplain management plan task force would suffice. In Los Angeles, on the other hand, the multiplicity of natural hazards present necessitates a multihazard perspective that accounts for wildfires, mudslides, floods, and earthquakes. Regardless of the specific circumstances, the plan is more likely to succeed if a broad range of stakeholders has worked on its development. This is particularly true when hazard mitigation can serve some additional planning objectives in the bargain.

Organizing appropriate representation on the task force is as important in this case as with any other interdisciplinary planning effort. The sidebar on page 80 suggests a number of the key players from local government sectors whose representation is likely to be at least essential if not mandatory for success. Two considerations enter into the process: whose participation is essential in guaranteeing technical accuracy and thoroughness for the plan?, and whose participation and support will enhance its political acceptability? With regard to the first question, the input involves issues of both hazard mitigation and emergency management. Those involved in mitigation activities will bring to the process their professional knowledge of both the structural and land-use implications of attempting to minimize or eliminate dangers to life and property from natural hazards. These players include planners and zoning administrators, environmental specialists, and building inspectors. Emergency management perspectives will come from a combination of both emergency managers themselves and allied public safety forces, such as fire and police departments, who can help identify issues like the feasibility of evacuation and shelter plans. Beyond these players, various other local government personnel whose functions either aid or are affected by the post-disaster plan should be involved as is locally appropriate. Common candidates would be transportation and economic development personnel.

In soliciting public input and building public support for the plan, the topics of the next section of this chapter, it is wise to involve some nongovernmental representatives in the task force. Nonprofit service delivery agencies often have a major stake in the plan, considering the resources they often are called upon to deploy in the aftermath of a disaster. Neighborhood and civic organizations representing the most hazard-prone areas of the community may be better able to sell components of the plan affecting those areas to their members if they have been part of the process and learned along the way what stakes are involved in ensuring the plan's success. The chamber of commerce and other business organizations can play a major role not only in selling the plan to the local business community but in providing important perspectives on the challenges involved in facilitating economic recovery. Religious institutions often provide volunteers, shelter, and food in disaster situations and probably deserve a role in helping devise the means of reducing the severity of the crisis beforehand. Environmental organizations can lend support for the multiobjective benefits of sound floodplain management. All of these constituents of the community have played a role in some task force somewhere, but the right mixture for any one community will depend on its history, local politics, the nature and extent of its natural hazards, and the resources needed.

Launching the Post-Disaster Planning Process: Three Case Studies

What launches the process of planning for post-disaster recovery and reconstruction in a community? Much like death, which they sometimes bring in their wake, natural disasters are a subject people often don't want to discuss. It is human nature to try to deny the inevitable, even when we know better. Preparing for the consequences of natural disasters thus becomes a subject shunted into a corner where a handful of professionals, such as emergency managers and fire chiefs, can tend to such nasty business.

The reality, however, is that disasters are everyone's business, a fact that becomes abundantly clear when they strike. Like other less threatening aspects of city planning, they should therefore be the subject of considerable public scrutiny and of a planning process that involves a wide cross-section of the public. Soliciting public input in public hearings on the plan is one way to accomplish that, but it is just as important to construct a process that involves a variety of public and private-sector representatives from the outset in order to guarantee adequate consideration of all the relevant issues. The result will be a plan in which the vast majority of the community, whether or not people are comfortable with peering into the mouth of the beast, feel a sense of ownership of the decisions that resulted. It is vitally important that the plan enjoy wide enough support to ensure its implementation.

Case studies presented on pages 84, 87, and 88 describe how three jurisdictions of widely varying sizes handled the problem of initiating the planning process and of managing public involvement to produce positive results. All three have had their post-disaster plan in place for several years, allowing some perspective concerning their achievements. The case studies are based on both the documentary materials and the plans themselves, as well as telephone interviews with local planners.

Gaining an effective mix of representation can be a prelude to some creative cross-breeding of perspectives in the planning process over the long term. This is important because the disaster recovery plan, once created, will need to evolve over time and respond to new circumstances. In this respect, Lee County, Florida, offers a worthy example of a jurisdiction where, over nearly two decades, emergency management concerns have been steadily integrated into the development approval process. For instance, David Saniter (1998), the county's emergency programs manager, reported that effective intervention by his department helped induce a change in design for a planned hockey stadium to make it possible to use the facility for an emergency public shelter, should the need arise. Such advocacy within the planning process has raised local awareness of the problem, he says, to a level where developers and their attorneys now call him regularly to find out what sorts of shelter space are needed and to discuss what they can offer.

In a sense, Saniter is unusual in that he brought three years of planning experience to his emergency management job when he arrived 17 years ago. But it is not necessary to have people who combine both types of professional experience. Planners can play a significant role in introducing land-use planning concerns to the thinking of local emergency managers, just as Saniter has introduced emergency management concerns into land-use planning. This type of awareness and cooperation in planning for post-disaster recovery does not come easily. The first step on the long road to such a cultural change in resident and developer perspectives on planning for post-disaster reconstruction is to ensure that, at a minimum, planners and emergency managers are exchanging their concerns on the plan development task force, preferably with other vital players involved from the start as well.

The first step on the long road to such a cultural change in resident and developer perspectives on planning for post-disaster reconstruction is to ensure that, at a minimum, planners and emergency managers are exchanging their concerns on the plan development task force, preferably with other vital players involved from the start as well.

Task Force Composition in Escambia County and Key West, Florida

As is stressed elsewhere in this chapter, no one formula for constructing a post-disaster planning task force is ideal for all communities and jurisdictions. The suggestions offered in this report are all generic in nature, subject to adaptation to local politics and circumstances. That said, examples never hurt.

The first example below is a description of the composition of the Intergovernmental Recovery Task Force prescribed in the *Post-Disaster Redevelopment Plan* of Escambia County, Florida (1995). It should be considered in light of the fact that Escambia County has just one major city: Pensacola. The remainder of the county is unincorporated. The plan envisions a simple structure in which the task force is “created to provide opportunities for cooperation between local governments during pre-disaster planning and post-disaster mitigation analysis and redevelopment.” In other words, it serves double duty as a plan development task force and in managing post-disaster redevelopment, although the latter duties must wait upon activation by the board of county commissioners asking the governor to declare the county a disaster area. The designated chairperson is the county administrator.

The following text is from the plan:

COMPOSITION OF RECOVERY TASK FORCE

The Recovery Task Force will be composed of the individuals (or their designees) that reflect a broad-based representation of community interests and shall be appointed annually by the Board of County Commissioners. The Recovery Task Force shall consist of, but not be limited to, the following individuals:

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. County Administrator 2. County Special Projects Director 3. County Attorney 4. County Emergency Preparedness Director 5. County Solid Waste Director 6. County Neighborhood Services Director 7. County Public Works Director 8. County Medical Director 9. County Utilities Authority Director 10. County Neighborhood Improvement Chief 11. County Budget and Finance Chief 12. County Building Safety Chief 13. County Growth Management Director 14. County Planning and Zoning Chief 15. Santa Rosa Island Authority General Manager | <p>Ex officios:</p> <ol style="list-style-type: none"> 1. Representatives of the business community (appointed by the Chamber of Commerce) 2. City of Pensacola Liaison 3. City of Gulf Breeze Liaison 4. Santa Rosa County Liaison 5. County Sheriff Liaison 6. County School District Liaison 7. Northwest Florida Regional Planning Commission Liaison 8. Santa Rosa Island Authority Liaison 9. Other representatives as appointed by the Board of County Commissioners or the Recovery Task Force (i.e., Home Builders Association, League of Women Voters, etc.) |
|--|--|

The county followed the major provisions of the plan in the aftermath of Hurricane Georges, which hit the Gulf Coast on September 28, 1998. These provisions include dealing with operational issues like debris cleanup, damage assessment, and reconstruction policy. At this writing, the activation of the local interagency task force had not occurred.

(continued)

Escambia County and Key West, Florida (continued)

Key West, unlike Escambia County, is a single municipal jurisdiction in Monroe County, an archipelago jutting into the Caribbean that comprises the southernmost part of the state. In August 1997, the consulting firm of Solin and Associates drafted a post-disaster recovery and redevelopment ordinance that will be revised prior to sending it to the city council for adoption. It provided for a redevelopment task force that would meet within 90 days of adoption to “establish a regular schedule of meetings to determine a management framework for resolving issues confronted in times of disaster.” Its proposed duties are typical of those discussed elsewhere in this chapter, and its composition would be as follows:

- | | |
|--|--|
| a. City Manager | j. Director of Transportation |
| b. City Attorney | k. Finance Director |
| c. City Planner | l. Director of Florida Keys Aqueduct Authority |
| d. City Emergency Operations Coordinator | m. Monroe County Liaison |
| e. Chief Building Official | n. School Board Liaison |
| f. Fire Chief | o. Tourism Office Liaison |
| g. Chief of Police | p. Red Cross Representative |
| h. Director of Public Works | q. Liaisons to Private Utilities (Telephone, Cable, and Natural Gas) |
| i. Director of City Electric System | |

In this draft ordinance, the city manager would be the designated chairperson of the task force, and the city planner would serve as the vice-chairperson. As a result of following the operational aspects of the recovery ordinance, the city will be reviewing portions of it. The size of the redevelopment task force and the need for a planner to actually go out on damage assessments (with the chief building official and director of public works) are two particular concerns.

Leading the Charge

Who organizes the task force and ultimately takes responsibility for driving the process is a question central to the success of the entire enterprise. Ideally, this role should fall to the community’s chief executive, whether that be a mayor, city or town manager, or county executive or board president. However, it is not uncommon for this executive official to delegate lead agency responsibility to some other official, such as the planning director. When this happens, it remains important that the chief executive has initiated or at least actively blessed the process and that this surrogate retains the active support of the chief executive. In many cases, particularly in larger jurisdictions, a post-disaster planning effort will bring together representatives of agencies or departments that have not worked together in years. In smaller communities, it is more likely that a good deal of informal interpersonal contact takes place on a regular basis, but it is still vitally important that the lead agency or official in the planning process has the clear support of the mayor or town manager in order to ensure the full cooperation and support of the other participants.

The need for such support may seem less apparent in communities where a state mandate drives the necessity for preparing a post-disaster plan, but that would be an unfortunate perception. Even in Florida, with the strongest mandate in this area and the clearest guidance, plan quality varies widely

In many cases, particularly in larger jurisdictions, a post-disaster planning effort will bring together representatives of agencies or departments that have not worked together in years.

Getting the Right People: Task Force Representation

As suggested in this chapter, two essential participants of a task force would come from agencies involved either hazard mitigation or emergency management activities. The list below suggests specific types of officials who should be involved in post-disaster planning at either a state or local level as well as some typical private-sector participants who have a major stake in the policies and objectives of the plan. Those with a more direct stake in the process are italicized.

1. HAZARD MITIGATION

Local:

- *Environmental officer*
- *Floodplain manager*
- *Building official*
- *Planner/planning director*
- *Zoning administrator*
- *Public works director/city engineer*
- *Parks and recreation (where acquisition is a viable option)*
- *Stormwater management official*
- *Economic development director*
- *Finance officer*
- *Transportation official*
- *Housing department*

Special Districts:

- *Regional planning organization*
- *Regional flood control organization*

State:

- *State hazard mitigation officer*
- *State NFIP coordinator*
- *State planning agency*
- *State insurance commission*
- *State housing/building code agency*
- *Natural resources department*
- *State environmental protection agency*
- *Tourism and economic development agency*
- *Transportation department*

2. EMERGENCY MANAGEMENT

Local

- *Emergency manager*
- *Police chief*
- *Fire and rescue official*

State:

- *Emergency management agency*
- *State police*

3. GENERAL

Local

- *Public information officer*
- *GIS specialist*

State:

- *Public information officer*

4. PRIVATE SECTOR

- *Chamber of commerce*
- *Utility companies*
- *Neighborhood organizations*
- *Homeowners associations*
- *Local religious or charitable organizations*
- *Social service agencies*
- *Red Cross representative (quasi-governmental)*
- *Environmental organizations*
- *Private development agencies*

and executive support for interagency cooperation can make a significant difference in the results achieved. This is also true whether the plan is simply an element of the comprehensive plan, which almost invariably is prepared under the leadership of the planning department, or is a stand-alone plan, sometimes prepared under leadership from emergency management. Because of the extensive interagency cooperation needed to effect successful post-disaster reconstruction, executive leadership remains essential in all circumstances.

Choosing the right leadership for the task force itself will vary with the circumstances and may depend heavily on personal characteristics of potential candidates for this role. French and Associates (1995) suggests a resident

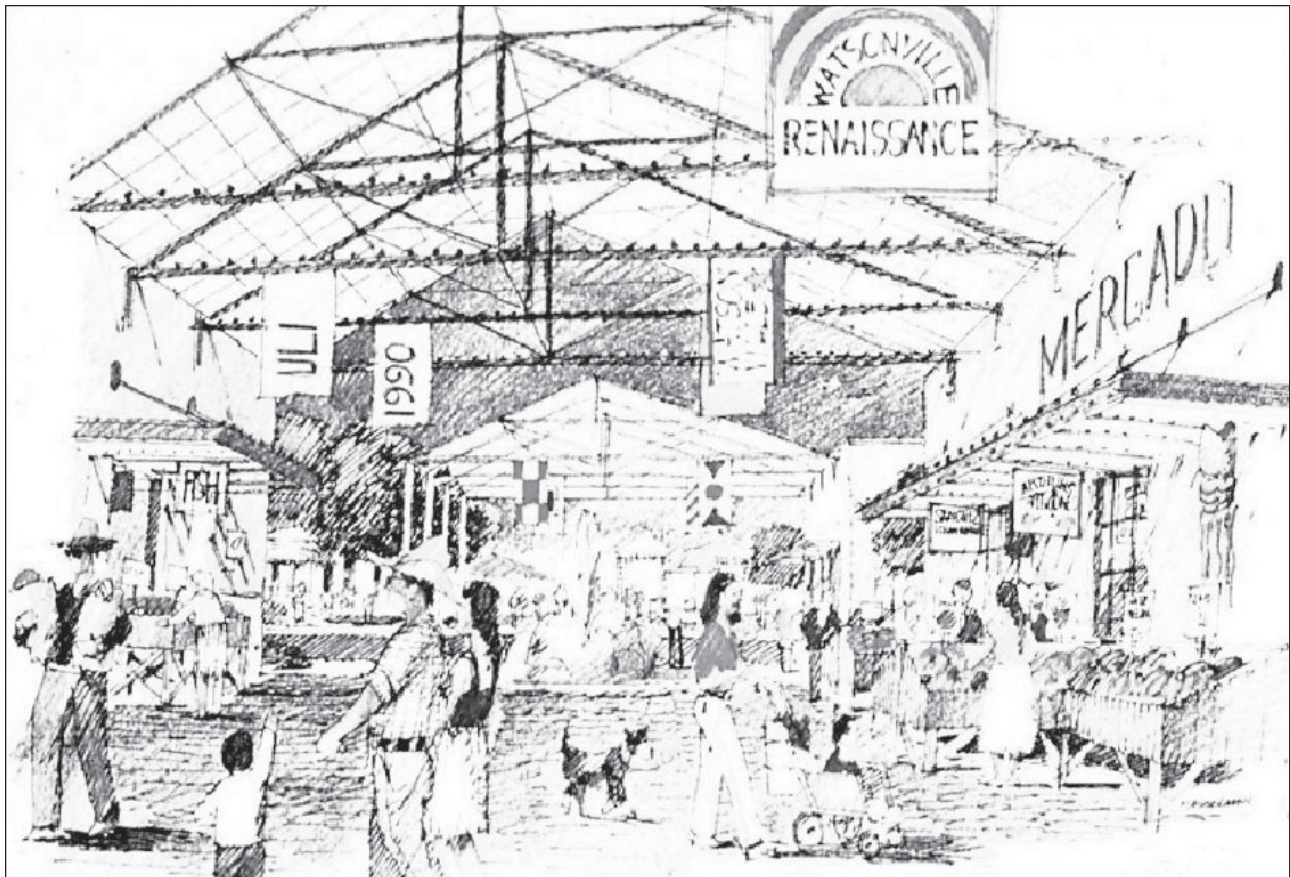
as leader—at least for the flood-related planning efforts that the firm’s guidebook addresses—and that the “planner or other staff member” provide administrative support. This is probably wise, but more important is the qualification that this person have an “ability to get people to work together and get things done.” This should include an ability to pace the work so that neither members’ expectations nor the schedule become unrealistic.

When the Clock Is Ticking

It is generally best that a community initiate the process of developing a disaster recovery and reconstruction plan when no disaster is looming on the horizon and there is ample time to consider the welter of complex issues and interrelationships involved in implementing effective post-disaster reconstruction and mitigation. There are times, however, when it is either apparent that the clock is ticking down to a major disaster or when the disaster strikes in the midst of the planning process. Much less ideally, but frequently, a community is spurred by the aftermath of a disaster to construct a plan virtually overnight. An example of the first instance might involve a northerly or mountainous community that becomes aware that heavy snowmelt and, perhaps, looming ice jams portend a flooding crisis within weeks or months. In heavily forested areas, a prolonged drought often signals the potential for wildfire disaster. The other two possibilities are obvious enough from historical experience. In these cases, executive leadership is essential in determining which steps are most essential in preparing a minimal post-disaster plan with details that will attend to the most important issues at hand, while shortcutting most others. Planners and emergency managers are likely to play some of the most decisive roles in helping to determine what those suitable shortcuts might be.

One shortcut candidate is hazard identification, simply because there may be no time for careful work in this area and much existing information can be marshaled into service in choosing appropriate short-term targets for mitigation efforts. Conversely, it would seem that much immediate emphasis in such circumstances ought to be placed on developing an inventory of funding sources for post-disaster activities that can be tapped efficiently and quickly during the post-disaster period, so that the maximum amount of outside resources can be brought to bear on the problems the jurisdiction has chosen to address.

Despite the necessity of such decisions when these occasions warrant, planners ought not to miss the opportunity to muster support in the disaster aftermath for more substantial planning efforts in the future. Post-disaster crises have nurtured a fair amount of invention in the realm of emergency public participation, notably through the increasingly frequent use of charettes, which typically involve residents, a team of design experts from outside the community, FEMA, and the state emergency management agency in intense efforts to solve problems within a highly compressed time frame. Within 30 days of the March 1, 1997, tornado that devastated Arkadelphia, Arkansas, a four-day recovery planning charette was conducted by a project team composed of planners, urban designers, economists, and engineers. Within another 30 days, the project team and the Disaster Recovery Committee developed a reconstruction strategy that provided a framework for the community’s long-term recovery (Woodward-Clyde 1997a; Schwab 1998). The primary advantage in the post-disaster setting is that the limited time allowed forces everyone involved to focus on essential issues in practical but, hopefully, creative ways. Charettes have played a major role in communities facing either total relocation or massive redevelopment.



This sketch for a rebuilt marketplace was developed during an Urban Land Institute charette held in Watsonville, California, following the 1989 Loma Prieta Earthquake.

French and Associates (1995) suggests five points to consider when dealing with time constraints for preparing a post-flood mitigation plan after the disaster “in order to take advantage of the window of opportunity that the flood has presented and to settle any uncertainties residents may have about their future.” It is noted here that these same points could easily apply to most other post-disaster scenarios.

- Dedicate a person to work on it full time
- Have frequent (e.g., twice per week) planning committee meetings that involve residents
- Do not delay the planning effort in order to obtain detailed data; an adequate plan can be based on generalized information
- Enact a temporary moratorium on reconstruction in areas most likely to be acquired
- Design the plan to address overall issues and make general recommendations (e.g., recommend that additional studies be conducted before finalizing some projects)

As has been said elsewhere in this report, natural disasters are almost invariably cyclical and will happen again. As the Hilton Head Island story (see the sidebar on page 87) suggests, even a near-miss can become the impetus for a more serious public commitment to planning for post-disaster recovery and reconstruction.

Setting the Stage

The goal of this chapter is to review the steps involved in pursuing the development of a plan for post-disaster recovery and reconstruction, including an overview of the process of rallying support behind the very idea of building a more disaster-resistant and sustainable community.

In order to make hazard mitigation and post-disaster recovery and reconstruction a focus of political action, planners must seize strategic opportunities to raise and maintain the profile of natural hazards as a public issue. A major point of this document is that there are specific times in the cycle of natural disasters when people become more receptive to messages concerning change. Once the issue has gained that profile, a crucial component of the planning process is to propose and organize a multiagency task force that will involve all key players in local government in soliciting public input and molding it into a plan of action. (See Chapter 5 for a model ordinance establishing a task force to guide this process.) No group of professionals is likely to be better than planners at orchestrating that process and maintaining its focus on the big picture, so long as elected officials support that orchestration and allow planners the necessary time and resources to do that work.

DEVELOPING COMMUNITY CONSENSUS AND VISION

Requiring implementation in the midst of crisis, a plan for post-disaster recovery and reconstruction is an unusually fragile instrument of public policy. It is unlikely to succeed unless it enjoys broad and knowledgeable support both from the public and within local government. The question is how to build and maintain that support so that it is available to undergird difficult decisions at crucial moments in the aftermath of a disaster.

As a general proposition, the need to build consensus around a vision for the community's future in order to make a plan successful is not a new subject for planners. Since the late 1960s, urban planning literature has contained a profusion of writings concerning techniques and strategies for encouraging citizen participation, enhancing public education about the goals and benefits of planning, and shaping the resulting awareness into agreement on basic public values and objectives (for example, Smith 1979; De Sario and Langton 1987; Moore 1995). Federal, state, regional, and local government agencies have published a host of manuals, studies, and guidelines concerning public participation in planning processes.

The central theme of many of these writings concerns the need to build public awareness that a specific problem exists and that there is a need to solve it through some type of public action. In the view of Innes (1996), the development of these tools for fostering meaningful participation, through what some have called "communicative rationality," has gone far enough to put to rest old criticisms like those of Altshuler (1965) that planners lacked the kind of broad-ranging knowledge needed to prepare a comprehensive plan that retained any validity for decision makers. Instead, they can tap the resources, ideas, and expertise of diverse participants in the planning process, producing a plan that reflects the informed wisdom of the community as a whole.

The process of building consensus has two stages. The first involves building consensus around the very need for a plan in the first place. While this may often be taken for granted in developing comprehensive plans for communities long accustomed to the idea of planning and zoning, it may yet be a necessary step for communities with no historical context for land-use planning. The mere fact that a community is accustomed to zoning does not guarantee that residents will accept new land-use restrictions based on concerns related to hazard mitigation. Planners will likely find a need to build public acceptance of the value of planning for post-disaster recon-

A major point of this document is that there are specific times in the cycle of natural disasters when people become more receptive to messages concerning change. Once the issue has gained that profile, a crucial component of the planning process is to propose and organize a multiagency task force that will involve all key players in local government in soliciting public input and molding it into a plan of action.

Launching the Post-Disaster Planning Process: Nags Head, North Carolina

Nags Head is a small town (pop. 1,838) on a barrier island, making it highly vulnerable not only to hurricanes, which strike occasionally, but to steady coastal erosion from northeastern storms every winter and spring. Erosion rates, according to town planner Bruce Bortz, vary from two to 10 feet per year, but are not consistent. A mild winter can slow that rate for a while, but a severe hurricane can escalate the damage dramatically. Moreover, depending on the weather patterns, any given location may receive as much new sand in deposition as another loses to erosion.

In such an environment, it did not take a major disaster to spur Nags Head at least to study the situation. In 1984, the town hired David Brower, a professor of urban planning at the University of North Carolina, as a consultant to prepare a study that examined the value of structures close to the oceanfront and the policies that would be needed to protect such real estate. The study, prepared every five years as part of the town's participation in the federal Coastal Zone Management Program, determined that 40 percent of the town's real estate value was within 300 feet of the ocean.

"Our town council is very proactive about protecting the tax base," Bortz says, "so this study evolved into pretty strong policies on a land-use plan to protect that value and our citizens and structures." Those policies evolved into a post-disaster and mitigation plan, adopted in 1988, that looks at a number of issues ranging from ordinance amendments to development policies. One example that Bortz cites concerns the fate of private roads that wash away in a storm. "We won't expend public funds to replace them," Bortz says, "and we don't allow private roads anymore." The plan has undergone some minor changes since its adoption, and the town is now completing, with Brower, a follow-up study looking at the same property value issues but "with much greater accuracy using GIS." It will examine by value the property directly adjacent to and in floodplains using a series of criteria, with the help of two planning grants to support updating the town's mitigation plan.

One aspect of the development of the plan probably reflects Nags Head's nature as a small town. There was no special task force set up to develop the plan, which was handled by the town's staff in cooperation with the town council and planning board. That does not mean the public had no say in the plan. "One overriding goal that helped in this plan," Bortz says, "was the strong feeling that we wanted to retain the town's family beach atmosphere. That means single-family, low-density, no high-rise hotels. And that helped sell the plan."

It has also been accepted well by the construction community. "It provides a scenario for getting the town back on its feet," he adds. "There are several things that must happen [after a disaster] before a builder can get a building permit, but there is some certainty in the process for builders."

Given the town's early start, it is unsurprising that Bortz sees Nags Head as having driven the development of state requirements under North Carolina's Coastal Area Management Act (CAMA), which requires mitigation plans in 20 coastal counties and their municipalities. "Communities have to develop strong mitigation policies we already addressed in 1985," he notes. CAMA, passed in 1985, "was weak on hurricane mitigation," he says. But new policies, distributed to municipalities in 1990 and 1995 by the Department of the Environment and Natural Resources' Division of Coastal Management, strengthen the original requirements concerning land-use plans. Bortz says they contain a number of ideas that appear to have been borrowed from the Nags Head plan.

struction, particularly where the risk is perceived as distant or infrequent. Gaining acceptance of the need to address natural hazards serves as the prelude to the second stage, that of developing a plan and building consensus around its goals and policies. At this point, the planning process is accepted, and the debate is over the specific goals that will emerge and the means of realizing them. Public involvement should permeate this process, and the best modern tools, such as the Internet and cable television, should be used in combination with direct public contact to maintain and promote an intelligent dialogue on the natural hazards problems the community is

addressing. Keeping the editorial boards of local newspapers apprised of the planning process also helps gain support.

Probably the closest analogy to the type of consensus building involved in planning for natural hazards reduction is the experience of environmental regulators, who often must raise the public awareness of complex scientific and technological questions in order to build support for new policies (Ozawa 1991). Many of the environmental threats that environmental agencies must address are somewhat abstract or confusing to the average citizen, yet the nation as a whole has forged a remarkable consensus behind the need for strong environmental protection. This consensus has held firm despite a wide array of attacks on specific programs and regulations.

Planners will often encounter a certain amount of fatalism in public perceptions of natural hazards. The occasional observation that no place is without its hazards, for instance, is true enough if one cares nothing about probabilities. Here we have the link between the debate over natural hazards policy and that over environmental policy, for in both areas critics repeatedly have noted a need for public education concerning assessments of comparative risk. Despite the technical jargon that surrounds much discussion of risk, planners are in an ideal position to help elevate public awareness of natural hazards. Especially at the local level, they are in a position to mobilize and redirect public concern both before and after natural disasters and to mold it into a lasting base of support for new land-use policies.

The key to success seems partly to involve timing because the essential task in mustering support for a change in policy is that of winning sustained public attention. Historically, advocates of natural hazard risk reduction have not always been noticeably effective. Concerning the growing potential for disaster as a result of new residential development in fire-prone areas of California, for instance, Coleman (1996) notes that an "entire series of reports have been written over the last 35 years, all of which contain essentially the same kinds of concerns and even have amazingly similar recommendations." While some state legislation resulted, the results in terms of adoption and implementation of those recommendations at the local level were far from universal.

How do planners sustain public attention for reducing risk from natural hazards? The experience of cities like Tulsa in developing effective and comprehensive floodplain management strategies suggests that it can be a prolonged process based on nurturing public dissatisfaction with the disastrous results of existing policies and land-use practices (Schwab 1996a). Planners need to accept a crucial but demonstrable paradox. The immediate aftermath of a disaster may not be the ideal time to start constructing a plan for long-term reconstruction because people are anxious to restore normalcy to their lives. However, in most disasters, there is about a 30-day window of opportunity to incorporate a planning framework into the disaster recovery effort. It is also an ideal time to raise awareness that a process needs to be undertaken to reexamine land-use patterns and to plan for the aftermath of future disasters. In the absence of any existing plan for post-disaster recovery and reconstruction then, the immediate aftermath of a disaster is a time for planners to do what they can to mitigate future hazards, to also accept the limits of what they can do under the circumstances, and to look toward fostering an ongoing and probing discussion of how the community will address its vulnerabilities in the future. It is precisely this sense of timing and opportunity that FEMA has been encouraging in local communities as it has strengthened its emphasis on planning for hazard mitigation (FEMA 1990).

As a result, planners should not rule out the possibility of initiating a public discussion of natural hazards in the aftermath of an event. The real

Planners will often encounter a certain amount of fatalism in public perceptions of natural hazards. The occasional observation that no place is without its hazards, for instance, is true enough if one cares nothing about probabilities.

In the absence of any existing plan for post-disaster recovery and reconstruction then, the immediate aftermath of a disaster is a time for planners to do what they can to mitigate future hazards, to also accept the limits of what they can do under the circumstances, and to look toward fostering an ongoing and probing discussion of how the community will address its vulnerabilities in the future.

point is that the damage from natural disasters is cyclical and will likely spiral upwards with subsequent events as long as the issue remains unaddressed. Thus, it is possible in a city with a floodplain to make clear that even minor, frequent events, such as 10- or 20-year floods, augur much larger disasters unless changes are made.

Some infrequent events, however, provide little in the way of warning. The New Madrid earthquake fault is a classic example of a low-probability, high-risk hazard. It would be folly to wait for this estimated 200-year event before raising public awareness of the need for action. Planners and emergency managers in Missouri, Arkansas, Kentucky, Indiana, Illinois, Alabama, and Tennessee must do what they can to arouse public concern and support for whatever mitigation measures can be developed before a highly uncertain but potentially devastating event ultimately occurs. These steps can serve to minimize the confusion and controversy that will inevitably follow such an event (CUSEC 1993).

Communities that plan for long-term reconstruction have no way of knowing when their plans will be implemented. They can only rest assured that, when that time comes, they will be better prepared than most to make effective use of the available state and federal assistance to emerge from the disaster with a safer, more disaster-resistant community. Without wishing for the worst, their civic leaders at least can know that they will be in an advantageous position to extract a silver lining from future disasters when they occur.

The next section of this chapter will outline the initial task of identifying the hazards that must be the subject of public discussion in this planning process.

HAZARD IDENTIFICATION AND RISK ASSESSMENT

Meaningful local land-use policy cannot address hazards in the abstract. The starting point of the planning process must be an identification of the hazards facing the community and the risks they pose to life and property. FEMA's *National Mitigation Strategy* (1995c) describes hazard identification and risk assessment as "the cornerstones of mitigation," establishing "both a common point of departure and the bounds within which plans and alternatives can be formulated, debated, and decided on." Moreover, empirical research by French et al. (1996) indicates that "high-quality information (hazard data, mapping, interpretation, etc.) would translate reasonably into less damage from earthquakes," and, by extension, for other well-researched hazards as well. An abundance of good information serves to guide the local development market as well as drive local plans and their implementation. A 1997 FEMA document, *Multi-Hazard Identification and Risk Assessment*, is a good initial source for information about the identification of natural and technological hazards and the risks they pose to life and property. Chapter 7 will go into more detail on hazard identification and risk assessment for each of the major natural hazards dealt with in this document.

Three key terms defined in the glossary in Appendix B are worth differentiating here before discussing the process. These are, in the order in which they should be addressed in the planning process, hazard identification, vulnerability assessment, and risk assessment. FEMA (1997b) describes hazard identification as a process of "defining and describing a hazard, including its physical characteristics, magnitude and severity, probability and frequency, causative factors, and locations/areas affected." Assessing vulnerability means taking stock of the degree to which human life and property are exposed to damage from that hazard; in other words, how much damage and loss of life could the

Communities that plan for long-term reconstruction have no way of knowing when their plans will be implemented. They can only rest assured that, when that time comes, they will be better prepared than most to make effective use of the available state and federal assistance to emerge from the disaster with a safer, more disaster-resistant community.

Launching the Post-Disaster Planning Process: Hilton Head Island, South Carolina

Like Nags Head, Hilton Head Island (pop. 24,000) occupies a barrier island along the Atlantic coast, but with a much larger real estate base and population at stake. Compliance with South Carolina's Beachfront Management Act required Hilton Head to develop a plan for post-disaster recovery. However, Hilton Head Island also had a close call that further motivated its planning. When she arrived in 1988, says long-range planner Jill Foster, the town council had budgeted money to draft a post-disaster and mitigation plan, but had never actually done it. But within a month after Hurricane Hugo hit, narrowly missing the town, the council budgeted money to hire The Mitigation Assistance Corporation (TMAC) of Boulder, Colorado, to prepare a plan.

TMAC president Clancy Philipsborn stationed one of his staff members on the island for three months to solicit citizens' input into the plan. The town recruited a planning committee with more than 20 members representing a diverse cross-section of public and private organizations including utility companies, property owner associations, emergency medical crews, the fire department, and the chamber of commerce, among others. The 140-page plan (not counting its extensive appendices) touches on an impressive range of practical post-disaster issues, including troublesome areas like immediate reentry into disaster-affected zones, and entailed coordination with Beaufort County emergency management officials and other public entities and jurisdictions throughout the area. Philipsborn's team and the committee also "went directly to several organizations" for their comments. In all, Foster estimates, about 100 people were directly involved in the plan development process.

Like its neighbor to the north, South Carolina also has special planning legislation affecting coastal areas, in this case its Beachfront Management Act, passed in 1990, which contains a mandate for coastal communities to prepare post-disaster plans. Like the Hilton Head Island plan, the act was largely motivated by the fallout from Hurricane Hugo. But Foster says the Hilton Head Island plan did not result from the act because "the intent to plan preceded the act," although the plan does state that it was prepared under the act's authority. If the Hilton Head Island plan proves anything, it is that good fortune with respect to what could have happened can be as effective in motivating post-disaster planning as being hit by the real thing.

community conceivably suffer? This is differentiated from risk assessment, which focuses on probabilities and is described by FEMA (1997b) as a process for "evaluating risk associated with a specific hazard and defined in terms of probability and frequency of occurrence, magnitude and severity, exposure, and consequences."

Step 1. Identify and Map the Community's Natural Hazards

The first step in hazard identification and risk assessment involves mapping the known natural hazards, a procedure that will vary with the nature of the disaster. By now, every planner in a municipality with a floodplain should know that FEMA for years has developed maps of local flood hazard zones as part of NFIP. These are probably among the most precise guides to the contours of any local natural hazard. However, seismic mapping also exists for earthquakes and volcanic hazards, and storm surge zones have been identified for coastal areas. Tornadoes are by far the most problematic threat because they can occur virtually anywhere given the right atmospheric circumstances. Regardless of these variances, the first step is to document all of them and identify as accurately as possible the areas potentially affected by them.

Step 2. Document and Quantify What's at Risk

The second step in hazard identification and risk assessment is to develop an inventory, to the extent possible, of the built environment that potentially

Launching the Post-Disaster Planning Process: Lee County, Florida

Lee County (pop. 335,000), unlike the towns in the two previous case studies, qualifies as a truly large—and rapidly growing—jurisdiction. Nonetheless, like Hilton Head Island, says David J. Saniter, the county's emergency programs manager, the county used the experience of Hurricane Hugo to motivate the development of its post-disaster ordinance. Although Florida specifically requires a post-coastal storm recovery plan for communities in coastal counties, Saniter also concedes that the quality of and commitment to such planning can vary significantly from one jurisdiction to another (a situation noted by Robert Deyle and Richard Smith in their case study of Hurricane Opal in Chapter 10). Thus, it is not unimportant that he observes that Lee County "expanded upon that plan after Hurricane Andrew," which "put a scare into people about what could happen in Lee County."

Lee County is quite possibly the nation's leading example of creative initiatives to inject emergency management concerns into the development approval process as a result of an unrelenting emphasis by Saniter's office on implementation. "We have to fight and fight and fight," Saniter says of such efforts, "but we started getting things into the comprehensive plan. And at least we discharged our responsibility. We told the county board what would be impacted." This intervention is unusual, Saniter concedes, noting that in other counties, "my colleagues are scared of planning" and hesitate to intervene in the process to express their concerns. Saniter, however, brought three years of planning experience into his emergency management job when he was hired 17 years ago.

One truly unique implementation device that Saniter doubts can be found anywhere else in the country is the county's All Hazards Protection District, which uses a property tax levy to generate about \$900,000 yearly to fund mitigation measures and emergency public shelters, all with the blessing of the board of county commissioners.

Saniter emphasizes that successful post-disaster planning requires a long-term commitment to the process, but adds that this "learning and educating process" has resulted in support from the development community and its attorneys.

would be affected by these hazards. This inventory not only will indicate the extent of possible damage from the hazard but will also serve as a rough indicator of the threat to human life because people tend to be where transportation or buildings are, and the total or partial collapse of structures or parts of structures is a primary cause of death and injury in a disaster. This potential damage to life and property is what constitutes vulnerability, and the likelihood of that damage—quantifying the probabilities—is what constitutes risk. A flood in an unpopulated and unbuilt area, for example, poses little or no risk. On the other hand, the risk posed by even a modest earthquake in downtown Los Angeles can be quite high. The potential damage from an eruption of Mt. Rainier, located as it is within view of Washington's major metropolitan areas, could easily be catastrophic (Krakauer 1996).

Because predicting the future is strictly a matter of probabilities, the only certain data come from past experience. Thus, planners documenting risk must include in their reports the history of previous natural hazards events, their magnitudes, and an inventory of the human and property damages that occurred. Those magnitudes should be expressed numerically, in a statistical or other mathematical measure, such as the Richter scale (earthquakes), Saffir-Simpson scale (hurricanes), Fujita scale (tornadoes), or flood probabilities (for example, an x -year flood). More detailed explanations of such documentation appear in Chapter 7.

The age of housing stock and other structures can vary significantly within a community. It is no accident that, when a natural disaster strikes,

some parts of town suffer disproportionate losses, including some types of historic properties, older housing that often serves lower-income residents, and older commercial districts that may often lie just outside the central business district. It is important to build into the process, preferably with the use of computerized databases and GIS, a pre-disaster inventory of vulnerable structures and to use this information to evaluate building performance on a geographic basis. This is not just a building department function, though building officials are necessarily involved, because it can also reveal much to planners about needed changes in development patterns for the future.

It is important to realize generally that advances in information management technology are making the automation of these tasks possible at an increasingly rapid rate. A good deal of technical sophistication is now available far less expensively today than ever before, and progress will continue at an exponential rate. In addition, coordination of hazard-related databases and GIS technology can occur at a statewide level through state emergency management agencies. Probably the most promising venture in this regard is underway through the Governor's Office of Emergency Services (OES) in California, which faces possibly the most daunting array of natural hazards anywhere in the nation. Topping (1994) has prepared the agency's GIS strategic plan as a first step in guiding the development of a system that gained considerable value following the Northridge earthquake. A valuable part of the plan discusses strategies for funding this cooperative effort.

Planning agencies often need technical assistance from scientific experts and from state and federal officials in doing a complete hazard inventory and risk analysis for their local plans. Many communities hire outside consultants for this purpose. Chapter 7, which examines hazard identification in greater detail, discusses for each hazard the available resources to which communities can turn for information and advice.

ELEMENTS OF THE POST-DISASTER PLAN

As discussed in the previous chapter, the aftermath of a natural disaster can be an extremely trying period for public officials seeking to restore normalcy to the community and to rebuild. A well-organized plan rooted in good factual detail can make the process manageable and give an appreciative public the sense that someone is in charge and had the foresight to think through the issues and contingencies the community might face during the long process of reconstruction.

Focusing on the details of implementation is at the heart of preparing the elements of the plan for long-term post-disaster reconstruction. Everything matters. The point of this section is to outline briefly the issues that ought to be addressed. Figure 4-1 is a matrix that outlines the various long-term reconstruction policy issues covered in this section and the types of local agencies that would usually be designated with responsibility for that function in a local ordinance, which implements the plan itself. It should be noted that an actual plan will detail many specific implementation measures with agency assignments on a more detailed level than this matrix suggests. Consulting existing plans from other communities is a good way to adapt this level of detail to the precise needs of a particular local government. As these plans usually tend to involve numerous players (depending on the size of the jurisdiction), the watchword in post-disaster planning is cooperation. Planners, however, are in a good position, if supported in this role by the local chief executive, to orchestrate or coordinate the process and to ensure that the plan is a meaningful reference point for all the actors involved.

Focusing on the details of implementation is at the heart of preparing the elements of the plan for long-term post-disaster reconstruction. Everything matters.

As these plans usually tend to involve numerous players (depending on the size of the jurisdiction), the watchword in post-disaster planning is cooperation.

Figure 4-1. Agency Assignments for Post-disaster Recovery and Reconstruction Functions

The chart on the opposite page is intended as a suggestive indication of the local government agencies likely to be assigned to specific action tasks in a municipal post-disaster plan. Agency assignments at a county level obviously would be somewhat different. The list of functions mirrors those in the section of Chapter 4, “Elements of the Post-Disaster Plan,” but is not intended to be exhaustive. Agency designations are intended to be relatively generic, and the overall pattern is distilled from a variety of local plans submitted to APA for this project and does not reflect the experience of any particular jurisdiction. Moreover, in typical plans, the functions listed would often be broken down into specific actions assigned to individual lead agencies; no attempt is made here to be so specific, hence multiple agencies may be listed for single functions.

To clarify the typical roles of planners, five columns have been left with a white background to highlight these functions: building, community development, historic preservation, planning, and redevelopment. Although planners can be found in a wide variety of agencies in local government, these agencies employ the vast majority of planners and are the ones where planners are likely to have some role in the process of preparing and implementing the post-disaster plan. In smaller communities, in particular, planners are most likely to find themselves in combined planning and building departments that handle both building and zoning code enforcement.

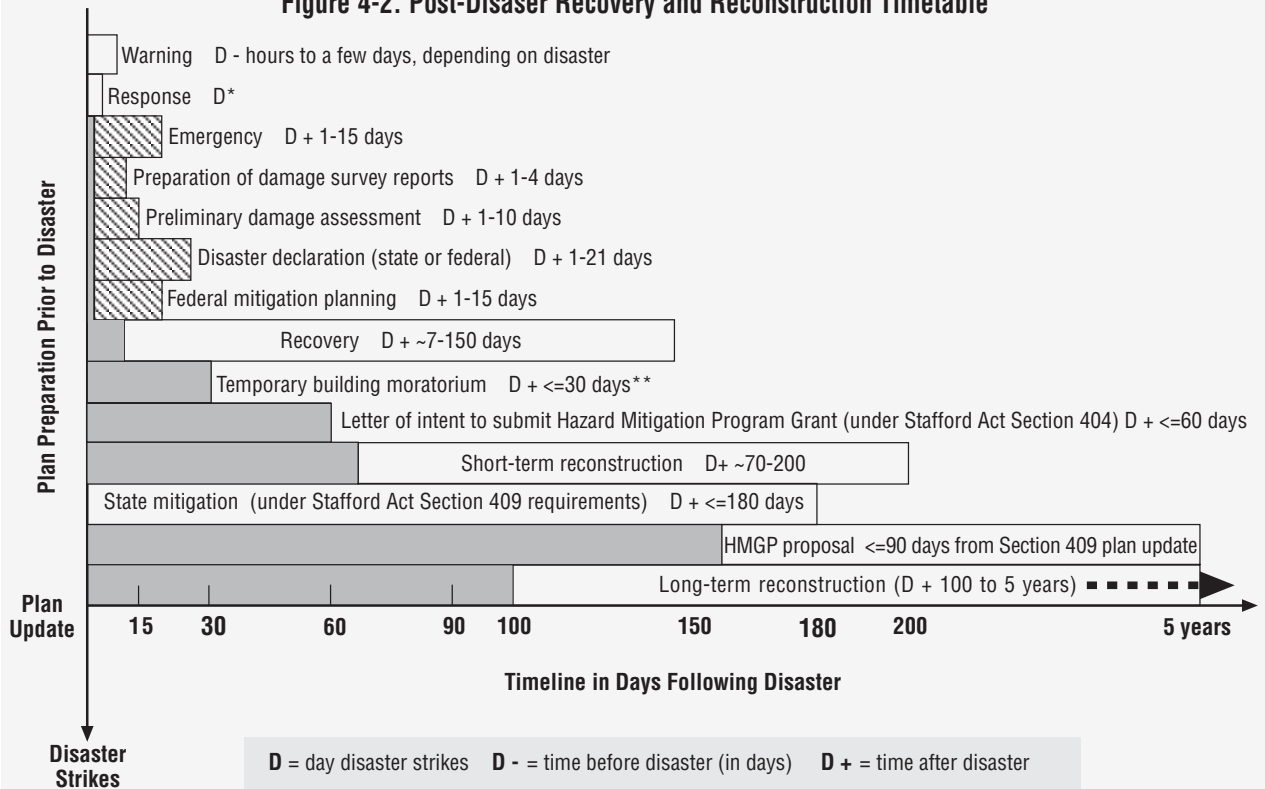
It should also be noted that this chart includes an additional category of functions beyond those listed in this chapter. Response/Early Recovery deals with functions that are implemented immediately during or after the disaster and are addressed in detail largely in the community’s emergency operations plan, a document developed through the local emergency management office. They are listed here to round out the inventory but are not discussed in the text because they are not part of planners’ direct involvement in post-disaster recovery. The exception would primarily be any role planners would play prior to a disaster in identifying appropriate sites for emergency shelters and emergency operations centers.

Key to agency abbreviations in chart:

BF	Budget and finance	HP	Historic preservation commission
BG	Building	PL	Planning and zoning
CA	City attorney	PR	Parks and recreation
CD	Community development	PS	Public safety (police/fire/emergency medical crews)
CM	City manager or mayor	PW	Public works (including publicly owned utilities)
ED	Economic development	RD	Redevelopment agency
EM	Emergency management	SW	Solid waste/sanitation
EN	Environment	TR	Traffic/transportation
HE	Health		
HO	Housing		

FUNCTION	BF	BG	CA	CD	CM	ED	EM	EN	HE	HO	HP	PL	PR	PS	PW	RD	SWTR	
RESPONSE/EARLY RECOVERY																		
Evacuation							X							X				
Urban search and rescue														X				
Emergency shelter provisions							X			X	X							
Mass care (food, water, medicine)							X	X						X				
ORGANIZATION AND AUTHORITY																		
Empower recovery task force			X		X													
Designate lead agency					X													
Operations policy					X													
Set up disaster accounting systems	X				X													
Coordinate with emergency manager					X	X					X							
Public participation and hearings											X					X		
REHABILITATIVE																		
Temporary housing	X		X							X	X					X		
Refuse disposal																		X
Damage assessment	X				X						X							X X
Restoration of utility services															X			
Establish reconstruction priorities					X	X				X	X			X				
Reoccupancy permits	X								X		X			X	X			
Emergency demolition	X	X			X													
Emergency permitting	X				X						X							
Loan processing	X		X		X	X				X						X		
Toxic cleanup								X	X						X			X
LAND USE																		
Identify sites for emergency operations											X			X				
Identify new lessons	X						X				X			X				
Compliance with regs. from lessons							X				X					X		
Replanning of stricken areas	X		X					X	X	X	X		X	X	X	X		X
Reexamine street patterns for access					X						X		X	X	X	X		X
Feasibility of emergency evacuation						X					X		X	X				X
Historic preservation	X									X	X					X		
Implement area building moratoria	X	X			X						X							
Reevaluation and update of plan	X		X	X	X	X			X	X	X					X		
REGIONAL COORDINATION																		
Coordination with relief agencies							X											
Temporary housing				X						X	X							
Financial assistance channels	X		X	X	X				X							X		
Transportation repairs/restoration														X			X	X
Emergency legislation		X			X													
Media contact					X													
Mutual aid agreements	X				X									X	X		X	X

Figure 4-2. Post-Disaster Recovery and Reconstruction Timetable



The timeline above is derived from a number of sources, some pertaining to specific types of disasters or jurisdictions. It is intended to be suggestive but not precise, except where statutory requirements apply.

*Response generally refers to those activities undertaken to deal with the immediate crisis as soon after the disaster as it is possible for relief efforts to be mobilized. Often, these may last only a day or two. But in situations where a disaster occurs more than once, as with continuing earthquake aftershocks or prolonged flooding (as occurred in the Midwest in 1993), this response can be stretched to several weeks. Please see Appendix B for definitions of response, recovery, reconstruction, and related terms as used in this document.

**The duration of moratoria generally ought not to be more than 30 days. Often communities will distinguish between very short-term moratoria for permits involving minor repairs (for example, 10 days in Lee County, Florida) and a longer moratorium for more serious repairs or reconstruction of totally destroyed buildings.

Who is in charge? Who reports what to whom? Waiting for a disaster is no way to find out.

Implementation also inevitably involves time lines and sequences. Figure 4-2 delineates the time periods during which various certain essential tasks must or likely will be performed, focusing to some extent on external deadlines that drive the process. The matrix in Figure 4-3 suggests the likely period, using the definitions in the glossary (Appendix B), during which a community would expect to implement the elements of its post-disaster plan.

Organization and Authority

Who is in charge? Who reports what to whom? Waiting for a disaster is no way to find out. As discussed in Chapter 2, the emergency period immediately following a disaster is largely the responsibility of the local and state emergency management agencies and, in a presidentially declared disaster, of FEMA and its partners in the *Federal Response Plan*. Most people are still accustomed to thinking that the story ends there. As this chapter has tried to demonstrate, it is only the beginning of a long period of recovery and

Figure 4-3. Timeline for Post-Disaster Plan Elements

The table below uses the same post-disaster plan elements as those in Figure 4-1 and in the final section of Chapter 3. The intent here, however, is to illustrate roughly the time periods during which the various functions would come into play, allowing for the fact, discussed earlier, that these periods are not fixed in time or even in absolute sequence. Different parts of a community or region may enter more advanced periods earlier than others. Nonetheless, this table may help to give some sense of work flow for communities developing their own plans.

Note: Unshaded boxes with comments are intended to define limited amounts of preparatory work, or, in the case of mutual aid agreements, to indicate a need simply to make operational agreements worked out during the pre-disaster period.

FUNCTION	PREDISASTER	EMERGENCY PERIOD	SHORT-TERM RECOVERY	LONG-TERM RECONSTRUCTION
ORGANIZATION AND AUTHORITY				
Select recovery task force	Shaded			
Empower recovery task force		Shaded		
Designate lead agency	Shaded			
Operations policy	Shaded			
Set up accounting systems for disaster assistance	Shaded			
Coordinate with emergency manager	Shaded			
Public participation and hearings	Shaded			
REHABILITATIVE				
Temporary housing	Identify sites	Shaded	Shaded	
Refuse disposal	Identify sites	Shaded	Shaded	
Damage assessment	Train teams, set MOUs	Shaded	Shaded	
Restore utility services		Shaded	Shaded	
Establish reconstruction priorities	Shaded		Shaded	
Reoccupancy permits	Set policies		Shaded	
Emergency demolition	Set policies	Shaded	Shaded	
Emergency permitting	Set policies		Shaded	
LAND USE				
Identify new lessons from damage assessments	Review case studies	Shaded	Shaded	Shaded
Compliance of rebuilding with regulations from new lessons				Shaded
Replanning of stricken areas	Identify nonconforming uses, pre-FIRM bldgs.		Shaded	Shaded
Identify sites for emergency operations	Shaded			
Reexamine street patterns	Plan		Shaded	Shaded
Feasibility of emergency evacuation plans	Identify shelters, road capacity, vulnerability		Shaded	Shaded
Historic preservation	Identify vulnerable structures	Shaded	Shaded	
Implement building moratoria	Adopt policies	Shaded	Shaded	Shaded
Reevaluate and update plan				
REGIONAL COORDINATION				
Coordinate with relief agencies	Predisaster planning	Shaded	Shaded	
Temporary housing	Identify sites	Shaded	Shaded	
Financial assistance channels	Prepare inventory	Shaded	Shaded	
Transportation	Plan	Shaded	Shaded	
Emergency legislation	Shaded			Shaded
Media contact	Predisaster education	Shaded	Shaded	Shaded
Mutual aid agreements	Shaded	Put into effect		

The real issue is not so much which entity is put in the lead role but whether, if it is someone other the city manager or mayor, that entity and its director enjoy the full support of the local chief executive and legislative body in that role.

Prior training and rehearsal of these responsibilities tends to allow many types of urban officials (primarily in line agencies) to internalize their operational responsibilities to a point where they can follow the plan without even consulting it during the recovery period.

reconstruction. The question few communities have addressed directly is who will manage long-term reconstruction in accordance with a post-disaster plan. Establishing both the authority and the organizational structure for managing reconstruction is the primary objective of the model ordinance in Chapter 5. The objective here is to outline the rationale and the method.

Designated lead agency. Who will coordinate the process and oversee compliance with the intent of the post-disaster plan? There is no single answer to this question, but there are several possibilities that have worked or can work, depending on local traditions, local government structure, and other factors that may influence this decision, such as the nature of the jurisdiction (e.g., city, county, jurisdiction size). Three likely candidates are the mayor's or city manager's office, the planning or community development department, or a local redevelopment agency. Where a post-disaster plan and local ordinance establish a recovery and reconstruction task force, a designated representative of the lead agency, presumably its director, will then serve as the task force chairperson.

The real issue is not so much which entity is put in the lead role but whether, if it is someone other the city manager or mayor, that entity and its director enjoy the full support of the local chief executive and legislative body in that role. Because a disaster often involves a good deal of reliance on outside assistance, a clear choice of leadership for managing long-term recovery and reconstruction also provides a central point of contact, information, and accountability for the outside world. This, in turn, increases the community's ability to marshal the external resources it needs.

Empowerment of a reconstruction planning task force. The plan should set out the circumstances and guidelines for empowering a task force specifically to deal with overseeing the process of planning for long-term reconstruction following the disaster. The point of this element should be to incorporate the intent of the discussion in Chapter 3, under "Long-Term Goals and Short-Term Pitfalls," dealing with task force composition. This element of the post-disaster plan should establish the composition of the task force in advance of a disaster, so that the actors can anticipate and train for their roles. This group is distinct from the broader body overseeing plan development, mentioned at the beginning of this chapter, and is focused on implementing the reconstruction process itself. The Los Angeles plan (1994) describes this as a "proactive rather than reactive approach. . . through post-event formation of a long-term reconstruction task force and preparation of a strategic plan for reconstruction."

Operations policy. Once the lead agency has been chosen, it is important to establish the line of reporting and responsibility for implementing recovery and reconstruction. If this report in its entirety has established anything, it is that this process is complex and often represents a struggle by the entire community to reassert its viability. That struggle will proceed much more smoothly if a post-disaster plan already has established the mechanisms and timelines for various municipal officials to perform their assigned tasks and to report to the lead agency in order to keep the recovery process well-coordinated.

In an analysis of the effectiveness of the Los Angeles plan after the Northridge earthquake, Spangle Associates and Robert Olson Associates (1997) found that prior training and rehearsal of these responsibilities tends to allow many types of urban officials (primarily in line agencies) to internalize their operational responsibilities to a point where they can follow the plan without even consulting it during the recovery period. For the lead agency, and even for other staff agencies, consultation is more likely to be necessary, but, for many other local officials, the time constraints involved

in post-disaster responsibilities may make internalization through training a more efficient option. The point is to establish this in the plan and train people accordingly, and, then, after the plan has been tested, to reevaluate how well it has worked and to update the plan on the basis of experience.

Just as there is a lead agency for overseeing the recovery and reconstruction process, post-disaster plans spell out specific actions to implement their stated policies and designate lead agencies and participating agencies for those actions.

Operations policy should also address the probable need for interdepartmental assignment of personnel with special skills needed in an emergency and beyond. For instance, employees with bilingual skills may be vital for certain recovery operations in agencies other than those that hired them and can be lent to others that need such services.

Coordination with emergency manager. This topic was covered in Chapter 2, so it should be sufficient to note here that a point repeatedly made in current disaster literature is that there are no clear lines between the emergency period, short-term recovery period, and long-term reconstruction. Certain aspects of all three of these processes may be occurring within different parts of a community and its local government at the same time. In many of the communities studied for this report, including those examined by Robert Deyle and Richard Smith for the Hurricane Opal case study in Chapter 10, it is apparent that planners and emergency managers too seldom communicate with each other. The result is that planners do not have an effective sense of the challenges facing the community in managing emergency response and post-disaster recovery and a lack of understanding among emergency managers of the important role planning can play in moving the community beyond short-term recovery and in incorporating hazard mitigation into everyday (i.e., pre-disaster) planning activities.

Public participation and hearings. The first section of this chapter discussed the need to build community consensus behind a vision for how the community will rebuild after a disaster in accordance with the goals it has already laid out in its comprehensive plan. The plan itself should contain reasonably extensive and effective opportunities for public input and comment before it is adopted, and those opportunities should allow for meaningful public education in the bargain. Because economic recovery is so central to the success of any post-disaster recovery effort, special attention needs to be paid to involving the business community and soliciting its expertise on issues that will facilitate business revitalization. Because the plan will need both to be updated periodically and to undergo revisions in the aftermath of actual disasters, it helps if the plan includes provisions for ensuring continued public education and input on the plan's goals and purposes. The resources on citizen participation mentioned in that section, as well as others available from organizations like APA and the International City/County Management Association, should be sufficient to allow any community planning agency to craft an effective system for involving the public and winning its cooperation in implementing a post-disaster plan.

Rehabilitative Functions

No matter how brilliant a community's vision for long-term reconstruction may be, in the aftermath of a disaster few residents will show much patience with that vision unless the local government is prepared to respond quickly and effectively in restoring fundamental needs like housing and basic services like trash disposal. Unfortunately, as various examples throughout this document illustrate, trash disposal—including the disposition of toxic materials spilled or released during the disaster—takes on gargantuan proportions compared to normal circumstances. In the absence of some clear procedures, the city may not

The plan itself should contain reasonably extensive and effective opportunities for public input and comment before it is adopted, and those opportunities should allow for meaningful public education in the bargain. Because economic recovery is so central to the success of any post-disaster recovery effort, special attention needs to be paid to involving the business community and soliciting its expertise on issues that will facilitate business revitalization.

only find itself hard-pressed to make emergency arrangements for such services, but it may also be paying private contractors premium prices in a seller's market. The rehabilitative functions necessary to buy time to handle long-term issues include all aspects of cleaning up and assessing damaged sites, and of processing those assessments and repair permits so as to facilitate the return to habitable structures of the maximum number of local residents in the shortest possible time frame.

This rehabilitation occurs simultaneously in both the public and private sector, with the former overseeing the latter through regulation. For the sake of sorting out operational from regulatory responsibilities in the plan, the following discussion divides rehabilitative functions into those involving primarily public or private responsibilities. It should be noted that building departments, not planners, are principally involved in the latter group of responsibilities, but that these elements address issues about which planners may wish to express some concerns during the plan development process.

Public-Sector Responsibilities

Temporary shelter. Providing the temporary shelter people need is a function for emergency managers, but planners should play a vital role by identifying appropriate sites in advance. Emergency shelter sites generally revert to their original uses, such as schools and community centers, after the recovery period, but other forms of temporary housing, including manufactured housing, can and often do become more permanent than may have originally been envisioned. Planners can help to ensure during the pre-disaster period that, if this happens, the sites identified for such housing are zoned appropriately.

Refuse disposal sites. Planners are normally involved in solid waste management only to the extent that facilities to accomplish this mission must be sited somewhere. Certainly, the process of contracting for collection and disposal is most likely to be handled by a public works or sanitation department to whatever extent the local government is not performing this

This debris was moved to the side of the streets in southern Florida after Hurricane Andrew in 1992. Clearance and removal require planning and coordination to avoid creating extra work.



function itself. However, the post-disaster plan can make provisions for gaining a quick estimate of the scope of the problem, as in the plan for Hilton Head Island (1993), which incorporates this into the damage assessment process described below. Debris clearance is often traffic clearance as well, to the extent that roadways are blocked by felled trees or flood muck and thus impede other recovery functions. Lee County, Florida, (Ordinance 95-14) establishes road clearance as its first priority in this area, followed by area medical, fire, law enforcement, and emergency response facilities, recognizing, in effect, that the overriding priority is access.

The volume of debris amassed for collection and disposal following a major disaster can easily escalate overnight by orders of magnitude (U.S. EPA 1995); in the aftermath of Hurricane Andrew, in fact, the area had to dispose of a volume of debris equal to what it normally manages over a five-year period. Rush-hour traffic jams in parts of southern Dade County, Florida, in the fall of 1992 sometimes consisted of nothing but long lines of trucks carrying their daily load of construction debris to designated area landfills. That situation was an extreme but speaks to the crisis planners must anticipate: Where will the debris go? Designating appropriate temporary and permanent disposal sites as part of the post-disaster plan allows this question to be incorporated into an area's long-term land-use plans for the siting and eventual closure of landfills. The issue, however, does not stop there, for a great deal of construction debris is potentially recyclable. Planners can help to designate appropriate sites and procedures for managing the process of sorting recyclable materials from nonrecyclables and thereby aid in conserving landfill space for the longer term. Ensuring the smooth functioning of this service also speeds the clearance of debris-ridden sites so that properties may be repaired and rebuilt, and enhances the prospects for economic recovery by eliminating potential eyesores.

Assessment of building conditions and overall damages. This process was described at the beginning of Chapter 2 in the description of the preliminary damage assessment (PDA). The PDA is used to determine whether a presidential disaster declaration is justified. However, damage assessment is an ongoing task that may take different forms at different stages of response and recovery, starting with a minimal windshield survey, involving observations from passing vehicles by fire, police, and emergency management personnel, to more detailed and in-person surveys by building inspectors. The function of damage assessment should be included and addressed as an element in a post-disaster plan regardless of the magnitude of the disaster as a matter of clarifying lines of responsibility. For instance, the Florida Department of Community Affairs model (TBRPC/Hillsborough County 1995) provides for the designation of a local damage assessment team responsible for conducting the assessment.

The town of Hilton Head Island (1993) spells out three levels of damage assessment, which ends with a damage survey report. Doing so provides local officials with a quick general survey early on that anchors progressively detailed assessments as needed within the days following the initial event. These types of assessments are, in order:

- the windshield survey, usually done within 24 hours to assess overall impact and conducted from a moving vehicle;
- the initial assessment, more detailed and done within three to four days and conducted with town and county, and if necessary, state officials; and
- the preliminary damage assessment, or PDA, to warrant federal assistance.

Restoring utility services is an essential prerequisite for beginning economic recovery and for restoring some measure of comfort to those whose routines have been disrupted.

Restoration of utility services. Few of the effects of a disaster make people feel more helpless and isolated than the loss of heat, power, and telephone service. Although various modern technological innovations in solar heating, photovoltaic cells, and cellular telephone service are making some people increasingly independent of highly centralized service delivery systems, the fact remains that most people rely on grid-based utility services most of the time. Moreover, even these decentralized utility technologies are vulnerable to interruption under certain circumstances. Restoring utility services is an essential prerequisite for beginning economic recovery and for restoring some measure of comfort to those whose routines have been disrupted. It is a matter of public safety, as well, for local firefighting ability is at stake when electrically operated water pumps no longer work. It can also be a matter of life and death for home-bound elderly people, the disabled, and others, or for families stranded without power in cold climates, such as happened in January 1998 in Quebec and upstate New York.

Unless a publicly owned electric utility is involved, most of the problem of restoring utility services will typically fall to the private sector. However, utility services that typically are in the public sector, such as sewer and water lines, are necessarily affected by electric power outages. Also, the nature of the service disruption will vary with the nature and extent of the disaster. Floods, for instance, are far less likely to disrupt electric service (with the exception of ground-level transformers) than are disasters involving high winds or seismic shaking. But the 1993 Midwest floods did disable water service for the entire Des Moines metropolitan area by overflowing the levees protecting the water treatment plant.

It is thus essential that the post-disaster plan address the need for restoration of all utilities and outline priorities for accomplishing this mission. This is often linked closely with the restoration of critical public facilities. For instance, the Hilton Head Island plan (1993) establishes three top priorities each for restoration of electrical and telephone service. (See Figure 4-4.)

Where private utilities have their own plans for emergency restoration of services, it is sufficient to refer to that plan and simply make clear who the responsible parties are in each instance. For instance, the Hilton Head Island plan lists both public service districts and private companies and the specific services and locations for which they are responsible. However, the local government's indication of desired public priorities can assist and direct the privately owned utility in its operations. It may also be necessary to detail any required cooperative efforts between units of government where public service districts serve more than one jurisdiction or municipality or where regional entities are involved. This may involve making arrangements with other utilities for mutual support. Incorporating mitigation techniques into the reestablishment of utilities may also affect timelines and procedures, as well as requiring mutual assistance from an outside utility.

Establishment of reconstruction priorities. Public facilities often suffer as much damage as private property in a disaster. Civic buildings, fire and police stations, hospitals, and schools have all suffered damage or destruction in major disasters. One critical function of a post-disaster plan is to establish the community's priorities concerning reconstruction of these facilities, given the obvious fact that limited resources and personnel may not allow simultaneous rebuilding of everything.

In many plans for post-disaster recovery and reconstruction examined for this report, a single element dealing with restoration of public facilities addresses both the restoration of public utilities and the reconstruction of public buildings and facilities. While these issues clearly are interrelated,

Figure 4-4. Priorities for Utility Restoration, Hilton Head, South Carolina

Electrical Restoration Priority

1. Hilton Head Hospital
2. Fire Stations and Emergency Medical Service Bases
3. Hilton Head Federal Emergency Operations Center

Telephone Restoration Priority

1. Hilton Head Hospital
2. Hilton Head Dispatch
3. Hilton Head Federal Emergency Operations Center

they can be quite different in an operational sense, and so we recommend that these issues not be confused or conflated. There are many variables that may enter into the selection of priorities for rebuilding public facilities, including the likelihood that the damage will cripple essential public services whose operation depends on the condition of the facility, and the urgency of the need for the services provided. In this sense, hospitals and public safety facilities almost always rise to the top of the list, as do any facilities that serve as emergency operations centers or shelters. (However, other elements listed in this chapter ought to address siting of the latter two functions with an eye to making them as immune to danger as possible.) On the other hand, the restoration of public recreational facilities, while important in the long term, would not seem as urgent in the immediate post-disaster environment.

Dealing with demand for building permits. This issue is tightly tied to the implementation of mutual aid agreements, another element discussed below under regional cooperation. It deserves attention here, however, because one of the most predictable consequences of the damage and destruction resulting from a disaster is a surge in permit applications. While this is not a problem with which planners will deal directly (except when they assist in performing paperwork functions to fill in for building officials out in the field), it is an issue the plan itself should address because of the serious problems that a growing backlog of applications can cause, including poor oversight in the permitting process, inadequate and hurried inspections, and public disgruntlement at the slow pace of the recovery.

FEMA provides limited assistance to states and communities to perform building department functions, such as inspections and substantial damage determinations under NFIP, and planning functions, such as plan review, but the requested assistance must have been addressed in the post-disaster FEMA-state agreement. There are two parts to this assistance. First, the community can get help in evaluating local codes and the building department's existing capacity. Second, as a result of the evaluation, the community may be eligible for assistance for extraordinary costs involved in the plan review and in the permitting of reconstruction. In addition, for the short term, under the public assistance program in Section 406 of the Stafford Act, FEMA can help local departments with health and safety inspections related to determining the habitability of buildings.

Financial assistance channels. Knowing where to access financial assistance both for restoration of business activity and for residential reconstruction allows for a more smoothly functioning process of recovery and reconstruction. This is the primary reason why the effective use of disaster assistance was identified as a policy objective of the plan in Chapter 3. People are deeply concerned about money in the recovery period following a disaster. Local officials can point people in the right direction and even help find sources of money they might otherwise never have known existed.

Private-Sector Responsibilities

Reoccupancy standards and permitting. Post-disaster conditions can pose a bewildering variety of threats to public health and safety, many of them lurking in residential buildings and in workplaces. The safety of residential buildings is particularly crucial because of their round-the-clock occupancy. When and under what conditions may people reoccupy partially damaged structures? Clearly, the goal is to rehouse people as soon as this can be done safely. The plan needs to establish how the work involved in performing this task can be done expeditiously and the standards that will be applied for interim reoccupancy of damaged structures. These policies need to be established in the pre-disaster period, though the implementation will flow out of the information generated through the damage assessment process.

One specific set of criteria that must play a role in this element relative to buildings in floodplains pertains to NFIP minimum regulations governing the determination of substantial damage, which refers to damage where the cost of restoring the building to its pre-flood condition would equal or exceed 50 percent of its pre-flood market value. Any community participating in NFIP must enforce provisions of its floodplain management ordinance dealing with measures to reduce future flood damage.

Emergency building demolition procedures. Disasters result in irreparably damaged buildings, many of which may constitute an imminent danger to public health and safety. There is no question that the city may use its police powers to remove these dangers in a timely fashion, but it still must follow due process. Moreover, having the capability in place to do so requires some planning because the work load can escalate dramatically, particularly following a significant earthquake or wind-driven event like a tornado or hurricane. While most of the implementation usually will fall to the building department, the plan should spell out the criteria and procedures that apply in an emergency.

As an example, the Los Angeles plan (1994) makes it the city's policy that demolition "be done as expeditiously as possible." It then calls for:

- establishing criteria for contractual agreements (and the contracts themselves) with the private sector;
- due processes and procedures for demolition;
- clarifying roles and prerogatives concerning historic buildings and reconciling legitimate hazard mitigation and historic preservation interests;
- doing the same concerning design review decisions connected with post-disaster repair and rebuilding of public structures; and
- including historic preservation and design review representatives in the investigations to minimize potential controversy.

Emergency permitting of building repairs. As with demolition proceedings, the work load for processing permits for building repairs will escalate dramatically after a disaster. A community without special procedures, including mutual aid agreements to borrow building permit personnel from other communities or private contractors, will find its residents growing surly as bureaucratic delays prevent necessary repairs, or even worse, residents may bypass the permitting process entirely, thus derailing post-disaster mitigation efforts.

In addition to importing permit-processing personnel as needed, an issue covered under the subsection below on regional coordination, the community can establish in its post-disaster plan and by ordinance criteria and procedures for streamlining and expediting permit review. In some cases, as in Oakland following the East Bay Hills fire (see case study in Chapter 11), this can be accomplished in part with the use of a special one-stop permit processing and disaster assistance center near the scene of the disaster.

The ordinance should spell out the length of time during which this system will apply. It may also make special provisions for deferring the payment of required fees to allow people a chance to recover first. Of course, permitting must still take place with an eye to mitigation, for example, by requiring elevation or similar measures in a floodplain, in accordance with local ordinances implementing NFIP. Local departments will want to avoid permitting that is at cross purposes with the substantial damage requirements of NFIP, particularly where the need arises to delay rebuilding to facilitate acquisition of substantially damaged properties.

Land Use

Of the various categories of elements in the post-disaster plan, this section is the most crucial. The overall intent is to provide for the means of learning valuable new land-use lessons from the disaster, to enable the city to incorporate them consistently into its mitigation plans and to amend its post-disaster plan as needed, and thus to minimize future risk by fostering a culture of adaptation to new information. This is, in other words, the primary feedback loop. More specifically, the appropriate amendments would tend to focus on updating priorities for changes in land uses or properties for acquisition or various forms of hazard mitigation, as well as planning changes in capital improvements planning, street width and design, and other issues affecting overall urban design.

Identifying new lessons. It is important for planners to remember that the first day of the post-disaster period is also the first day of the pre-disaster planning period that should precede the next event. When that lesson permeates the community's thinking, the identification of new lessons can serve as a powerful driver for all other land-use elements in the post-disaster plan, most particularly including the process of reevaluating and updating the plan after each disaster and modifying appropriate linkages with the local comprehensive plan as well. Thus, the progression from identifying new lessons to their incorporation into an amended plan should be seen not as a sequence of planning steps, but instead as a closed loop that leads to steady improvements in shaping a more disaster-resistant community. The most explicit way to remind the entire community of the need for reassessment is to include in the plan itself a discussion of planners' intent to revisit the hazard identification section of the plan after any disaster in order to incorporate new lessons.

What is the relationship of newly discovered or known hazards coming out of recent hazard events to existing or planned land-use patterns? Are these hazards serious or probable enough in future events to justify new land-use efforts to mitigate their effects? Earthquakes remain a key area where these

Local departments will want to avoid permitting that is at cross purposes with the substantial damage requirements of NFIP, particularly where the need arises to delay rebuilding to facilitate acquisition of substantially damaged properties.

It is important for planners to remember that the first day of the post-disaster period is also the first day of the pre-disaster planning period that should precede the next event.

Thus, the progression from identifying new lessons to their incorporation into an amended plan should be seen not as a sequence of planning steps, but instead as a closed loop that leads to steady improvements in shaping a more disaster-resistant community.

It does little good to learn valuable new lessons about natural hazards affecting the community if none of them are put to use. It is essential to prepare in the post-disaster plan a means for incorporating those lessons as rapidly as possible into the development regulations that will guide the reconstruction process.

The plan should contain policy statements indicating clearly, before the disaster occurs, that the most hazardous areas will not necessarily be rebuilt.

lessons are continuing to materialize because of the difficulty of adequately identifying subterranean faults. The fault slippage that caused the Northridge earthquake, for instance, was approximately 11 miles below the surface and had not previously been identified. Once these new lessons have been identified, land-use planning can provide a mechanism for associating them with appropriate new policy responses. These responses can extend to implications for infrastructure extension or replacement, for access routes and the feasibility of future evacuations, and for the zoning of various types of buildings and building construction techniques. State agencies can play a role in this process by facilitating the transfer of geologic and other data that local planners can use as a tool to reduce local hazards (for example, see the recommendations in Seismic Safety Commission 1994b).

Compliance of rebuilding with regulations developed from new lessons.

It does little good to learn valuable new lessons about natural hazards affecting the community if none of them are put to use. It is essential to prepare in the post-disaster plan a means for incorporating those lessons as rapidly as possible into the development regulations that will guide the reconstruction process. This may be, however, one of the most challenging elements of the entire plan precisely because it takes time to study, identify, and analyze new hazards information from a disaster, and even more time to craft regulations in response to them. It is often not possible for all rebuilding to await such analysis. But the plan should contain policy statements indicating clearly, before the disaster occurs, that the most hazardous areas will not necessarily be rebuilt.

Nonetheless, the entire process of rebuilding often takes years. In the initial stages, a temporary rebuilding moratorium of reasonable duration can buy some time where land use, rather than construction standards for rebuilding, is the central issue. Many of the plans and ordinances examined for this report anticipate a moratorium of up to 30 days, but what is allowable in any given jurisdiction may depend on state planning laws and existing local ordinances. (For a summary of applicable state laws concerning building moratoria, see Ziegler (1997), Section 11.03 [2], dealing with express statutory authority.) The model ordinance in Chapter 5 provides advance authority for a designated director of the local recovery organization to establish a moratorium for up to 90 days, subject to review by the city council within that time. The actual time needed will depend to a considerable degree on the type of hazard involved and the history and extent of knowledge of its occurrence locally. In other words, some cases are fairly obvious and require little additional study, but others are more complex and demanding, particularly where new hydrologic or geologic studies are required.

While it is likely to be impossible to apply these lessons to all post-disaster reconstruction, it is better to apply it where possible than not at all. Providing for some process of review and revision that will allow this to happen is an astute move for any local government.

Siting of emergency operations centers. If a local government is going to function effectively during a crisis, it must at least secure its own facilities for continual operation. More than one city hall found itself below decks in the Midwest floods of 1993, a situation that forces the staff to pay primary attention to salvaging and relocating valuable documents and equipment when they should be focused on recovery and reconstruction. During a 1996 flood, the same thing happened to the village of Plainfield, Illinois, whose 1990 tornado is the subject of the case study in Chapter 9.

While the security aspects of emergency operations are the responsibility of local emergency managers, planners can play a role in the pre-disaster

period by identifying alternate sites for continued governmental operations during disasters. If there is any danger that existing city offices will be affected by predictable types of disasters, planners can find suitable office locations outside known or probable hazard-prone areas that would allow government to resume its essential functions in the post-disaster period.

Replanning of stricken areas. Replanning uses the new lessons about local hazards to reshape the community's long-term vision for particularly hard-hit parts of the city. This function ought to be addressed in two stages: pre-disaster and post-disaster. The pre-disaster portion of this element would entail the identification of areas that may not be rebuilt after a disaster, accompanied by options for how those areas may be treated during the post-disaster period. The post-disaster aspect would consist of a review and analysis of these same areas to determine the most appropriate resolution of the planning problems they present.

If an area has proven more vulnerable than previously thought, perhaps reducing density or even considering acquisitions or easements for open space should become an option. The Los Angeles plan (1994) incorporates this function into its process of long-term reconstruction with both a restrictive and an opportunistic action program:

If an area has proven more vulnerable than previously thought, perhaps reducing density or even considering acquisitions or easements for open space should become an option.

Pre-event

- D.5.1 Identify the relationship of identified natural and man-made hazards and unique economic, housing, growth management, and urban design opportunities to Safety Element and community plan land-use and hazard mitigation policies.
- D.5.2 Revise community plans to acknowledge areas with identified natural and man-made hazards and, where appropriate, adjust land-use and other designations with the involvement of community planning advisory councils and the city planning commission.
- D.5.3. Conduct studies leading to adoption of specific plans and special overlay zones in areas with identified natural and man-made hazards, providing for appropriate mitigation based on specific circumstances.

Post-event, long term

- D.5.4. Modify community plan land-use designations in response to newly discovered hazard conditions which cannot be mitigated other than through change of use or reduction of planned land-use densities.
- D.5.5. Modify community plan land-use, circulation, and other designations (elements) to reflect economic development, housing, growth management, or urban design opportunities generated by the disaster.

Reexamination of street patterns for emergency access. The Oakland fire case study in Chapter 11 illustrates the significance of this element all too well. The issue applies to other hazards as well. For example, Topping and Sorensen (1996) describe the use of GIS in a new town plan formulated for Kobe, Japan, following its 1995 earthquake. The plan provides multiple road crossings across a fault zone to and from the community so as to preserve access if one or more is blocked. Reexamination of street patterns is also a potent consideration in coastal and riverine floodplains, particularly in areas of active erosion (see the Nags Head case study in Chapter 4 on page 84). In floodplains, roads should approach buildings from the direction opposite the floodplain and avoid disrupting the natural drainage pattern (Morris 1997).

Disaster Threats and Planning Solutions for Historic Buildings

“Haste makes waste” is an adage that has special poignancy with regard to historic properties in the aftermath of a disaster. Hasty decisions are particularly devastating when they are made without any guidance from a post-disaster plan developed beforehand. Local planning departments and historic preservation commissions can play an important role in preparing owners and building officials to make informed decisions during a period when time is often critical. It is important that they understand the obstacles to survival that historic properties may face in the aftermath of a disaster. Carl L. Nelson (1991), in *Preserving the Past from Natural Disasters*, lists the “unthinking or seemingly uncontrollable actions” that may hasten the destruction of damaged historic resources in the aftermath of a natural disaster.

WHAT COULD GO WRONG

1. Restorable buildings are torn down.
2. Architectural elements are carted away with the debris.
3. Trees are tossed out rather than replanted.
4. Property owners make hasty and inappropriate repairs.
5. Archeological resources are disturbed by heavy equipment.
6. Government agencies—such as building permit offices and landmarks commissions—may operate with conflicting goals.
7. Normal design review procedures for changes to historic properties may be suspended.
8. A crush of construction applications may overburden officials.
9. Inspections of historic structures may be carried out by persons with minimal or no qualifications, including volunteer structural engineers and other experts from outside the area.

Preplanning for these problems can make a big difference. The following are some options to consider in preparing the historic preservation element of a post-disaster plan, which should be clearly linked to the historic preservation element of the local comprehensive plan.

WHAT COULD GO RIGHT

1. Provide local public safety officials with maps and floor plans for major historic facilities, such as museums, private libraries, etc. Having these may help to prevent damage from some of the emergency operations such officials must perform following a disaster.
2. Establish lines of communication in advance between local planning and building officials and a designated disaster coordinator for such facilities.
3. Use a thorough inventory of local historic resources and their vulnerabilities to establish priorities for post-disaster preservation efforts. Not everything may be saved, but it is important to know what is most likely to be restorable and why.
4. The historic preservation community can be mobilized by plan to muster second opinions about buildings that might otherwise be deemed appropriate for demolition. Maintaining efficient and effective review procedures for such buildings may identify alternatives that save such buildings from the wrecking ball. Evaluating historic buildings for structural repairs often requires special expertise beyond that of a structural engineer or building inspector.
5. Work with the state historic preservation officer (SHPO) and others to provide or identify for the owners of historic buildings training resources and opportunities pertinent to protecting their buildings from the impacts of disasters.
6. Identify, create, and promote the use of financial and technical assistance resources for hazard mitigation and retrofitting for historic resources and, where possible, incorporate suitable historic properties into local hazard mitigation plans.

Feasibility of emergency evacuation plans. The logic of addressing this point, and of reassessing it in the disaster aftermath, flows naturally from the point above. However, in addition to public safety officials, emergency managers should be involved in the preparation of this element.

In some highly vulnerable locations, such as coastal barrier islands, evacuation issues may be deemed to pose larger questions concerning long-term development patterns. For instance, in its section addressing post-disaster mitigation opportunities, Hilton Head Island (1993) explores the merits of an evacuation-based growth cap. The idea was to conduct a study of what would constitute an acceptable growth limit given the fact that the town has only a single bridge and causeway for access to the mainland. In a separate section (pages 134-136), the plan discusses the constitutionality of such a cap, noting decisions from Florida (*City of Hollywood v. Hollywood, Inc.*, 432 So.2d 1332, 1983; *Healy Co. v. Town of Highland Beach*, 355 So.2d 813, 1978) that suggested that an annual growth cap based on sound planning would pass muster. Such a cap has been in effect in Sanibel, Florida, for some years without any apparent legal challenge. However, it is important to note that Sanibel is nearly built out. A community cannot use a growth cap to escape its responsibilities to build adequate infrastructure for the growth it has already permitted, including that necessary to facilitate evacuation.

One important caveat noted in the Hilton Head Island plan's legal discussion is that a town's refusal to invest in the expansion of evacuation infrastructure might undercut the justification for growth controls. A second that has continued to vex the town since the plan was prepared is its inability to win effective cooperation from mainland communities and the state in coordinating evacuation traffic in hurricane situations. Long-range planner Jill Foster (1997) reports that this lack of cooperation results, as in Hurricane Fran, in traffic congestion immediately after residents reach mainland routes. During Hurricane Hugo, she says, the mere lack of a highway patrolman at a rural intersection three counties away from Hilton Head Island resulted in a 55-mile-long backup that delayed traffic for three hours. Nonetheless, Hilton Head Island plans to revisit the issue as it develops new plans in the future including a combination flood and hurricane hazards mitigation plan.

Historic preservation. Built in another era, engineered to earlier standards, many historic buildings are no longer deemed seismically safe or capable of standing up to other natural hazards, such as wind and flood damage. Reconciling the preservation of the historic structure with public safety needs in view of modern engineering standards poses one of the more vexing dilemmas in disaster planning. As noted previously, involving representatives of the historic preservation community in the necessary decisions and task forces can aid in reducing the level of tensions. Nelson (1991) describes how Mayor Joseph P. Riley of Charleston, South Carolina, succeeded in saving much of that city's heritage following Hurricane Hugo with a timely invitation to historic preservation leaders to assist in the reconstruction process. Nelson also discusses the role California preservationists played in slowing the demolition of damaged historic structures with a second opinion campaign directed at saving those that needed only minor surgery to remain usable. The accompanying sidebar highlights both the obstacles to successful post-disaster historic preservation and the planning solutions that can minimize the losses that might otherwise result.

Turner (n.d.), in one of a series of handbooks produced for the U.S. Geological Survey, outlines the essential measures that can be taken to ensure adequate attention to historic preservation during post-earthquake

Reconciling the preservation of the historic structure with public safety needs in view of modern engineering standards poses one of the more vexing dilemmas in disaster planning.

The point is that a moratorium should be anything but indiscriminate, as different parts of a community, especially a larger city, are often affected in very different ways.

Nature on the rampage shows little respect for humanly designed political boundaries, and the vast proliferation of suburban, township, and small town governmental structures that dot the American landscape has made the need for interjurisdictional cooperation ever more apparent.

recovery and reconstruction. Despite problems in this area following the Loma Prieta earthquake (described in a case study in Chapter 12), he notes that California shortly thereafter enacted California Public Resources Code, Section 5028, which requires a local government to obtain permission from the State Office of Historic Preservation before demolishing any disaster-damaged building. This forces the local government to document the extent of damage. Turner suggests that such mechanisms could well be adapted in other states and that Ohio set a midwestern precedent by including in its state disaster plan provisions for including state historic preservation office (SHPO) personnel on damage assessment and damage survey teams regarding public historical sites. Since the 1993 Midwest floods, representatives from SHPOs are often included on hazard mitigation teams.

Plans for hazard mitigation of historic properties in the post-disaster plan should take account of the funding assistance provided by FEMA under the Hazard Mitigation Grant Program created under the Stafford Act, as discussed previously, and the technical assistance available for preparing the required state hazard mitigation plan, which certainly can include guidance on the treatment of historic buildings. In addition, public assistance money may reimburse the costs of demolition for unsafe historic buildings after the proper determinations are reached in cooperation with a SHPO. Other sources of monetary and technical assistance outside FEMA that the plan can incorporate include the National Endowment for the Arts, the National Park Service, and the American Institute of Architects.

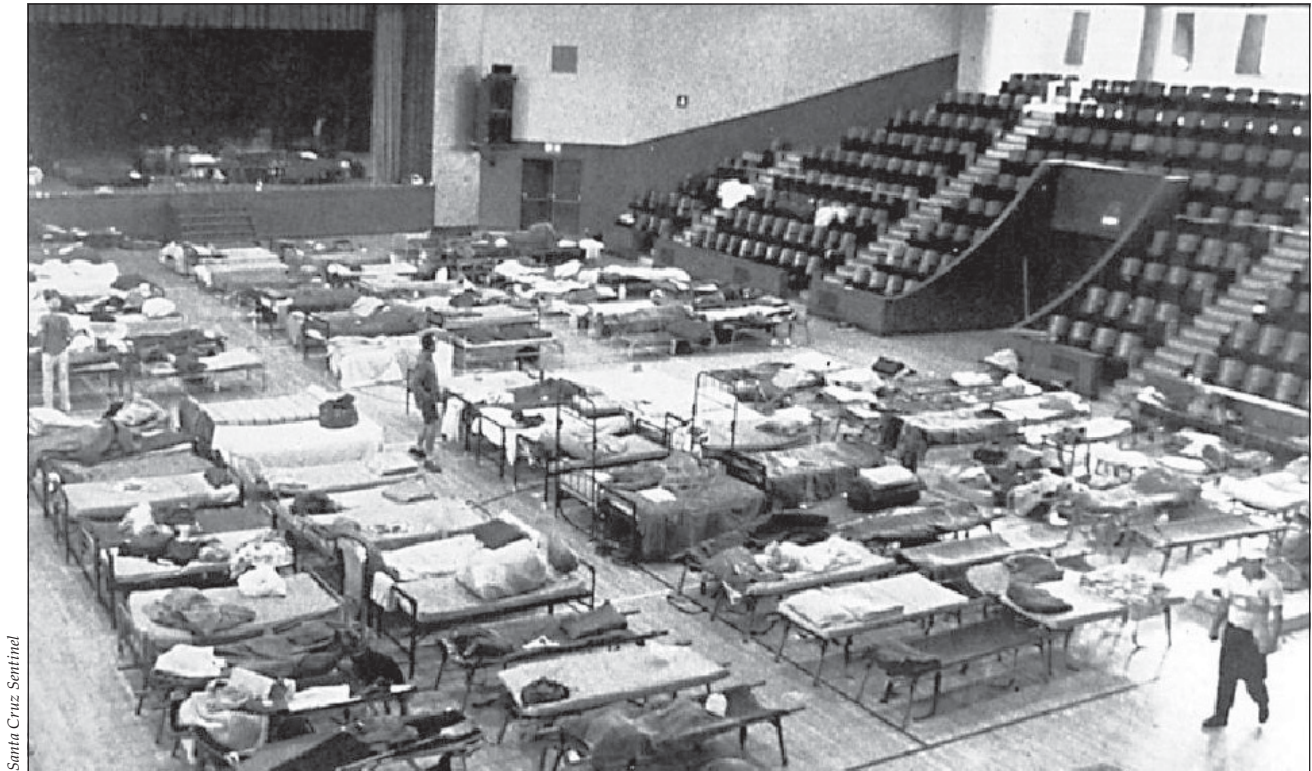
In addition to Nelson (1991) and the USGS guidebook, FEMA Region I (n.d.) and the National Trust for Historic Preservation (1993) have produced helpful short guides for safeguarding, or restoring, historic properties from the effects of natural hazards.

Implementation of area-specific building moratoria. A building moratorium is a typical post-disaster plan device, designed to buy time for local officials to gain control of the recovery and reconstruction process before irrevocable decisions compromise opportunities for mitigation. It also provides building officials with the time they need to complete damage assessments and establish priorities, often in triage fashion, for the use of limited local public resources. Although the formulas vary, plans spell out levels of damage that will trigger the imposition of a building moratorium for a specific area of the community. The point is that a moratorium should be anything but indiscriminate, as different parts of a community, especially a larger city, are often affected in very different ways. Where little or no damage has occurred, there is little or no rationale for restraining development. Hilton Head Island provides for three damage classes depending on levels of damage. For more commentary on this point, see the model ordinance in Chapter 5. Although placing this issue within other land-use elements in the post-disaster plan is an option, addressing it in a separate element would ensure that the plan establishes a clear rationale for putting a building permit moratorium into effect.

Regional Coordination

Rare indeed is the disaster of any consequence that affects just one local jurisdiction and whose impacts stop at the city limits. Nature on the rampage shows little respect for humanly designed political boundaries, and the vast proliferation of suburban, township, and small town governmental structures that dot the American landscape has made the need for interjurisdictional cooperation ever more apparent. The need for coordination is accentuated when a disaster reaches the level of a state or presidential declaration because mechanisms of state and federal disaster relief come into play. As if that were not enough, a host of nonprofit services stand

ready to respond but need effective points of contact in local communities so that their efforts are not duplicated and wasteful. Natural disasters spur marvelously the generosity of the American people, but effectively distributing donated relief supplies requires some planning and coordination lest their arrival merely add to the chaos or frustration. (Although it is a more extreme example, Underhill (1956) comments in her wonderful book on the Navajo Nation on the tribal president's bewildered reaction when he examined boxes of totally inappropriate donations sent in the early 1950s to help suffering Navajos cope with a crippling winter blizzard in the Arizona mountains.)



Santa Cruz Sentinel

The essential point is that no post-disaster plan can be regarded as complete without some component detailing the nature of the community's relationships with:

- neighboring local governments;
- regional planning commissions (the federal Economic Development Administration has funded regional planning commissions to hire a long-term recovery coordinator in the post-disaster period, especially when there is a clear relationship between recovery and a community's economic viability);
- higher-level jurisdictions, such as the county, state, or federal government; and
- nonprofit and private-sector entities that may aid relief and recovery efforts.

Coordination with nonprofit relief services. The first step in detailing this section of the plan is to establish an effective inventory of those nonprofit entities that are likely to respond to or be involved with the

This civic auditorium served as an emergency shelter in Santa Cruz, California, in the aftermath of the Loma Prieta earthquake in 1989.

community in the event of a disaster. For the most part, planners will not deal directly with such services unless they are involved with long-term reconstruction. It is nonetheless valuable to be aware of their role and the external resources they may bring to the community.

FEMA maintains coordination with major national organizations, such as the American Red Cross, Mennonite Disaster Services, and many others through National Voluntary Organizations Active in Disasters (NVOAD). NVOAD thus is an effective source of information on the strengths of the various organizations and the types of tasks they typically perform. Most communities also have local and regional organizations, often including national and local businesses, that are willing and able to assist in emergencies or to donate goods and services to disaster-stricken areas. Examples include Anheuser-Busch Company's provision of drinking water during the 1993 Midwest floods, and donations by farm organizations in the past of food or livestock feed to aid other regions stricken by drought or flood. Some resources of this type may come to light during the public participation segment of the preparation of a post-disaster plan and can then be incorporated into the element of the plan providing for oversight and coordination with nonprofit disaster services.

As noted in the introduction to this section, it is necessary to have some coordination concerning incoming donations and their appropriateness for use in the local community. The American Red Cross is usually given this responsibility, with the local emergency management office taking responsibility for advertising through the news media and other channels information on the types of individual and corporate donations that would be most helpful in view of the situation. (A plainly stated delineation of these responsibilities appears in Annex L, "Volunteer Services," of the Tampa Bay regional hurricane plan (TBRPC 1992).) However, it should also be assumed that there may well be a need to coordinate the distribution of such supplies with neighboring jurisdictions and some policies to guarantee fairness and efficiency.

It should not be assumed that such aid is limited strictly to the emergency period. As noted in the example from Boone, North Carolina, concerning the effective use of disaster assistance, organizations like Habitat for Humanity may well be prepared to play a role in more long-term reconstruction, for example, by helping to restore the low-income housing stock in a community. Christmas in April is another group, similar to Habitat for Humanity, that works on repairs to homes for the elderly. Consulting local representatives of such organizations beforehand, including community development corporations, may open new avenues for effective long-term reconstruction with private resources coordinated with official local government objectives.

Coordination of temporary housing services. This is an ideal area of cooperation between emergency managers and planners. Housing is often in short supply in a disaster-stricken community because so much of it may have been devastated. Relief agencies, working with emergency management officials, are already busy providing temporary shelter for disaster victims in quickly assembled manufactured home parks, schools, or whatever other arrangements will meet people's needs in a crisis. Where then does a community put the disaster volunteers as they arrive?

An additional area of focus for some local governments, particularly in coastal areas, is the provision of emergency shelter for evacuees away from the worst-hit communities, such as those located on barrier islands. Small mountain communities vulnerable to wildfires may also fall into this category. In this instance, self-reliance is self-defeating, and what is needed is an agreement with a host community that is capable of handling some or all of the victims from the evacuated area. Planners can use the planning

process in this instance to find suitable locations outside hazardous areas. Their study should first examine existing shelter locations relative to locations within hazardous areas, including the accessibility of roads that will move people out of hazard-prone locations to safe shelter.

Transportation. Disaster victims suffer disconnection with the outside world almost entirely in one of two ways: loss of communications and loss of transportation. Disruption of the latter can take a wide variety of forms, as all modes are vulnerable depending on the circumstances. A thorough plan for regional coordination of the restoration of transportation access needs to consider air, water, rail, and street and highway issues. Almost nowhere else is the need for regional cooperation so apparent because transportation routes are the ties that bind communities. In the case of state and interstate highways, railroads, and navigable rivers, they also invariably involve management by entities other than local government. Although airports are often managed by large central municipal governments, entire metropolitan areas, if not larger regions, have some stake in their restoration to normal service. Thus, even the local post-disaster plan element addressing transportation should at a minimum establish responsibility for effective liaison between local transportation officials and those in metropolitan, regional, special district, state, or federal agencies who are managing recovery in these areas.

One clear example of the stake that an individual community has in a major transportation artery involves the fate of the Embarcadero Freeway in San Francisco following the Loma Prieta Earthquake. The overhead freeway was long seen as critical in delivering a steady flow of tourists to Chinatown, but in the end its reconstruction was abandoned in favor of a sunken freeway that has reunited the community with its nearby waterfront. In that instance, San Francisco officials were able to control the outcome after a vigorous debate.

A different type of example emerged from the massive flooding of midwestern states in 1993, when thousands of miles of railroad track were rendered unusable. Railroad officials worked long hours rerouting shipments along those tracks that remained viable, adding long hours and miles to freight shipments through the Midwest. For communities along those routes that relied on the railroads to deliver farm products and other supplies, restoration of the flooded trackage to service was essential to their own economic recovery, even though they themselves could exercise no direct control over the progress of the effort. Both situations emphasize the need for local input and coordination with nonlocal officials concerning transportation issues.

The potential fragility of regional transportation corridors is an issue that especially affects the viability of emergency evacuation plans for communities, particularly in coastal or riverfront locations, with a need to remove large numbers of residents from harm's way. The discussion above about Hilton Head Island's reservations about pursuing an evacuation-based growth cap and the potential futility of doing so in light of a lack of regional coordination of emergency transportation routes illustrates the potency of this element of interjurisdictional coordination. Most major transportation routes run through numerous local jurisdictions, and traffic coordination in an emergency can be a mess. While that particular function can be handled largely through cooperative agreements among local public safety officials, it is important to know that such agreements are in place.

Beyond that, however, lies the possibility of permanent damage to transportation infrastructure, as has occurred in many earthquakes and is not uncommon in other types of disasters. Flooded or wind-damaged bridges, underpasses, and other potentially long-term obstructions to traf-

fic require some prior consideration of intermunicipal agreements concerning the temporary rerouting of traffic and mitigation plans for the restoration of damaged transportation facilities. Very often, these considerations require cooperative efforts with county, state, regional, and federal transportation officials to effect a solution.

Emergency legislation at state and federal levels. Often, in the process of preparing a plan for post-disaster reconstruction, community officials identify needed programmatic changes at the state or federal level that would require new legislation. In such instances, the plan should include discussions of the types of legislation that would produce the needed improvements. While the local community cannot control the disposition of its proposals to state or federal legislators, a well-documented case illustrating why a certain type of enabling statute or some other measure would help often does result in new legislation. Florida and California plans, in particular, contain a number of examples of such issues. The Los Angeles plan (1994), for example, included lobbying for and supporting legislation to create disaster-loss reserve funds at the state and federal levels to implement a seismic retrofit program for state facilities.

Coordinated media contact for accuracy and consistency. Natural disasters offer wonderful opportunities for officials at all levels to garner media attention. The cacophony that is sure to result when everyone is allowed to do so is best avoided with a clear plan of action for directing media questions to a single designated source through whom information from other participants can be channeled. Not only is this a wise option within specific communities, but where questions do not pertain to a particular jurisdiction, it is also preferable, through prior agreement, to channel them to a more regional source of information, such as a county public information office or even the governor's press office. Officials drafting post-disaster plans should anticipate different levels of emergencies and consider what might be appropriate based on the geographic extent and magnitude of the disaster. In disaster field offices, both federal and state media representatives are often co-located to facilitate such coordination.

Mutual aid agreements. Especially within a diverse metropolitan area, there are going to be significant variations in the capabilities of neighboring communities to respond to the challenges of a natural disaster. No single relatively unscathed community in a disaster-stricken area can expect to remain an island of tranquility if its neighbors are struggling. Everyone benefits from quickly implementing previously developed agreements to provide assistance where it is needed. These agreements can cover virtually any of the functions previously discussed in this chapter, including the use of police and fire personnel, emergency housing, the restoration of damaged transportation routes and utilities, communications, social services, building inspectors, and, yes, even planners.

The Division of Emergency Management of the Florida Department of Community Affairs (1994) has a statewide mutual aid agreement to which local jurisdictions may become parties that covers many of these points. The Building Officials Association of Florida covers one major specific need following disasters with its own memorandum of understanding with the state to supply the inspectors needed after a disaster for habitability inspections (Florida DCA 1995b). These agreements spell out procedures for identifying needed assistance and dispatching the appropriate personnel to the requesting communities.

Floods often involve the need for additional building officials, many of whom are needed in extreme flood events to make the required substantial damage determinations under the NFIP. This is also true in nonflood events

that occur wholly or partially in floodplains, as in the case of the Plainfield, Illinois, tornado. (See Chapter 9.)

The post-disaster plan offers an opportunity for community self-assessment to determine where potential deficiencies in resources and personnel might surface following a disaster. No community can reasonably ratchet up the size of its staff or its stockpile of equipment to meet all the contingencies that might occur in a disaster. The sensible approach is to identify these potential shortcomings and remedy them through interjurisdictional mutual aid agreements that allow the community to call upon outside resources when they are needed, much as communities have long done with such public safety emergencies as fires or civil disturbances.

Reevaluating and Updating the Post-disaster Plan

One final issue must be considered in completing the inventory of post-disaster plan elements—that of keeping it current. Plans that age without periodic revision become largely irrelevant, but it is not hard to build into a plan provisions for revisiting the issues addressed and updating the elements in light of new experience. Certainly, two events ought to trigger an automatic update of the plan: the actual occurrence of a disaster, which allows the plan to be tested and revised on the basis of its actual successes and failures, and changes in the comprehensive plan requirements that affect the workings of the post-disaster plan. Beyond that, the plan should include some routine periodic schedule according to which the planning department can reexamine the validity of the assumptions underlying its work plan, or simply alter some provisions to reflect changes in the community over time. The update probably ought to occur somewhere between every one and five years, depending on the frequency and severity of the natural hazards events affecting the community.

FEMA already requires post-disaster revisions of state hazard mitigation plans, but individual communities have the opportunity to monitor their own plans in far more detail. Including a program for periodic review and revision also allows a community to measure its progress and ensure implementation of those actions it decided to address in the pre-disaster period. With the widespread and growing use of various types of community and sustainable development indicators, planners have the opportunity to use this process in the post-disaster plan to incorporate into those indicators measurements of the community's progress toward a more disaster-resistant future.

Including a program for periodic review and revision also allows a community to measure its progress and ensure implementation of those actions it decided to address in the pre-disaster period.

Chapter 5

A Planner's Tool Kit

Most communities never need to avail themselves of the full arsenal of planning tools that exists to address hazard mitigation and post-disaster reconstruction issues. It is worthwhile, however, to establish a full inventory of those tools and to understand how they might be used effectively to tackle specific challenges. Most planners dealing with natural hazards issues have learned on the job and not in planning school. This chapter is designed as a primer for those new to the task and as a quick reference source for veterans.

Whole books have been written about many of the specific techniques outlined here. This chapter, therefore, will not seek to discuss any of them in depth but will provide an overview of the range of tools planners can use and references to other sources that can provide whatever depth is needed. For that reason, the text of this chapter will consist simply of brief commentaries on the most valuable features of each tool, supplemented by a pull-out chart (Figure 5-1 on page 117) comparing the circumstances under which the tools might be used.

The planning tools described in this chapter have been divided into emergency measures and the larger roster of tools appropriate to long-term hazard planning. Emergency measures may be under the direct authority of other departments. If so, the planner's role is discussed. The long-term measures have been divided into several categories. The descriptions note whether the tool is especially adaptable, or unsuitable, for particular types of post-disaster scenarios.

This chapter concludes with a model recovery and reconstruction ordinance prepared by Kenneth C. Topping specifically for inclusion in this report. The model ordinance integrates the use of many of the most essential planning and emergency management tools to facilitate post-disaster recovery and reconstruction and should be read closely in connection with the details of the tool kit itself.

EMERGENCY MEASURES

Damage Assessments

Damage assessments are a focal point of the post-disaster environment. The building department is usually in charge of this process, but planners should participate on the assessment team in order to obtain data specific to planning issues. The sidebar on the following page lists the data types that are most useful in a planning context. The challenge for planners is to help design the assessment process to glean as much useful information for local planning purposes as possible while also meeting the needs of state and federal disaster agencies considering a disaster declaration or seeking to identify specific causes of damage. Combining damage assessments with modern data management tools, such as a Global Positioning System (GPS)

The building department is responsible for administering any moratorium on development after a disaster, but planners should coordinate with building officials so that they are aware of the time planners may need to revisit the pre-disaster plan. A moratorium can buy valuable time for planners to reassess the wisdom of rebuilding in a stricken area before the permits are issued.

Temporary housing sites can become permanent unless recovery and reconstruction are managed effectively. . . . Preparing effectively for this problem in a plan for post-disaster recovery can minimize problems by ensuring that temporary housing is provided in areas conducive to residential uses.

or a Geographic Information System (GIS), described below under “Long-Term Measures,” is increasingly the sign of a department sophisticated in disaster planning operations. (For more information on this topic, see FEMA 1994, Unit 3.)

Development Moratorium

The building department is responsible for administering any moratorium on development after a disaster, but planners should coordinate with building officials so that they are aware of the time planners may need to revisit the pre-disaster plan. A moratorium can buy valuable time for planners to reassess the wisdom of rebuilding in a stricken area before the permits are issued. Planning departments must use the tool selectively, however, by applying it to areas where a strong justification emerges from damage assessments. (For more details on this topic, see the model ordinance at the end of this chapter.)

Temporary Repair Permits

Because the building department is responsible for issuing repair permits, planners will not be making decisions about allowing permits for repairs. They can, however, help set policy that allows city officials to distinguish between those temporary repairs that get part of the community back on its feet and those that may compromise important opportunities for hazard mitigation. (See the model ordinance below.)

Demolition Regulations

The building department is in charge of issuing demolition permits, but planners should provide input where they feel existing regulations or practices may impede long-term planning goals, particularly in the area of historic preservation. Chapter 4 discussed the opportunities here for using emergency demolition to remove the most damaged buildings quickly, to allow neighborhoods to remove dangers and eyesores that may threaten or stymie redevelopment, and to involve special interests, such as the historic preservation community, in decisions on landmarks in order to avoid unnecessary controversy over disaster policies. (See the model ordinance below.)

Zoning for Temporary Housing

Temporary housing sites can become permanent unless recovery and reconstruction are managed effectively. The administration and development of temporary housing for disaster victims is largely the domain of social services and emergency services departments. Preparing effectively for this problem in a plan for post-disaster recovery can minimize problems by ensuring that temporary housing is provided in areas conducive to residential uses. It can also allow planners to collaborate with other city officials, such as those involved in housing and human services, in identifying locations that will facilitate the effective delivery of emergency services to displaced residents following a disaster and to avoid potential social conflicts that can arise in already tense surroundings. Periodic updating will be required as land-use patterns change within the community, especially if areas suitable for temporary housing become built out. (For more information, see the model ordinance below and Governor’s Office of Emergency Services (1993, Ch. 22).)

Setting Priorities for Infrastructure Repairs

Setting priorities for repairs to infrastructure is predominantly the responsibility of the public works or engineering department. Ideally, a community will

Gathering Planning Data Through Damage Assessments

The table below is an attempt to categorize for planners the types of damage assessment data most valuable for purposes of planning post-disaster recovery and reconstruction. It illustrates some of the reasons planners should involve themselves in the damage assessment process, at least to the extent of shaping the agenda for the types of information collected.

DATA NEEDED FOR POST-DISASTER RECOVERY AND RECONSTRUCTION	FLOODS	EARTHQUAKES	HURRICANES	TORNADOES	WILDFIRES
Areal extent of damage	1	1	1	1	1
Number and location of destroyed structures ^a	1	1	1	1	1
Number and location of red, yellow, green tagged buildings or unsafe buildings if tagging is not used ^b	1	1	1	1	1
Use and occupancy of each damaged structure, number of residential units by tag ^c	1	1	1	1	1
Historic status or approximate age ^d	1	1	1	0	1
Type of construction ^e	1	1	1	0	1
Condition of infrastructure—bridges, streets, sewers, water lines, etc. ^f	1	1	1	0	1
Dollar value of damage ^g	0	0	0	0	0

Key:

1 = very important

0 = less important

Notes:

- Locational information is critical and unlikely to come in the form that planners would like for combining with other planning data. Usually, damage data are collected by address; planning data are often assembled by parcel number. Planners may need to devise a system for incorporating damage data into existing databases, such as a Geographic Information System (GIS) or a Geographic Positioning System (GPS).
- Most areas subject to earthquakes are prepared to use the ATC-20 system for damage assessment with red, yellow, and green tags. With earthquakes, it is important to remember that aftershocks mean that damage assessment is done over and over again.
- Planners need to know the uses of damaged structures. If they have a database system into which they can enter the tagging data, they will not have to rely on field inspection for this information. This is an area for preplanning. Quickly identifying the number of housing units that cannot be occupied is essential for planning shelters, temporary housing, and permanent replacement housing. Similarly, quickly identifying damaged commercial and industrial buildings can help you anticipate needs for temporary business sites and facilities.
- Historic status is important because FEMA procedures for demolition and repairs are different for these buildings.
- Type of construction is important because it may indicate the need for a mitigation program based on construction type (URMs or tilt-ups in earthquakes, unelevated buildings in floods, houses with certain kinds of roofs in hurricanes and wildfires, etc.). However, this can be much more problematic in the case of tornadoes.
- Decisions about rebuilding depend on knowing the status of infrastructure.
- Value of damage is a part of the assessment because the state and FEMA need it to determine the need for a disaster declaration and the level of aid needed.

have used its post-disaster plan to identify the most essential infrastructure and set priorities for repairs, replacement, or movement out of hazardous areas. It can then move quickly to implement a pre-existing priority list after the disaster, based on its inventory of damaged structures and roadways. Such a list must remain somewhat flexible, be updated regularly, and be revised based on emergency circumstances. This tool has some implications for planning priorities and must be coordinated with current budgetary realities, ongoing pre-disaster mitigation efforts for public facilities, and effective plans for accessing federal disaster assistance. (For more information, see BSSC (1987a); Hanley (n.d.); and David Plummer & Associates (1995).)

LONG-TERM MEASURES

In addition to rebuilding the community and restoring normal economic and social activity, all the tools below should be used to reduce vulnerability to natural hazards and enhance public safety. Many of these tools will be used outside the disaster recovery context and should be part of an ongoing program of hazard mitigation. However, to the extent possible, we attempt to discuss in precise terms the triggers that activate the use of these tools specifically in the post-disaster period. It is important also to keep in mind that the tools can be used to address hazards other than those that are mentioned specifically. Figure 5-1 may serve as a more comprehensive guide in this respect.

While the tools described below are listed in six categories related to the authority that enables planners to use them, some tools may be used in other contexts. The division of categories is not clear-cut because, in real life, communities employ a variety of methods to organize their local development codes. Many design tools separated here into the section on design controls, for instance, appear in local zoning ordinances, as do some subdivision tools. While building codes might not always be seen in that context, they do affect design and provide a form of quality control in the context of mitigating natural hazards. To avoid redundancy, however, we have listed each tool just once in the category where it best belongs.

General Planning Tools

Fee simple acquisition. The most effective but probably most costly way of moving development out of harm's way is to acquire the land and retain it in public ownership for open space. The most common use of this approach is in floodplains, perhaps secondarily in coastal zones. But it has also been used in mountainous areas including such Southern California communities as Claremont, where wildfire and landslide hazards are prevalent. Occasionally, the two objectives combine, as in Bellevue, Washington, which developed an open space program for managing riparian open space in an area with steep riparian slopes (Sherrard 1996). Boulder's plan for Boulder Creek, also a hilly riverine environment, merits attention as well (Havlick 1995). Arnold, Missouri, the subject of the case study in Chapter 8, provides a highly successful example of a community combining an ongoing greenway acquisition program with post-disaster dollars to accelerate the achievement of its objectives (Brower, Beatley, and Blatt 1987, Ch. 5; Wetmore 1996a and 1996b).

Property acquisition has a special context in the flood program because of specific National Flood Insurance Program (NFIP) provisions and funds for this purpose. The best approach remains one of targeted priorities established through a long-range plan that includes multiple objectives and funding sources to help underwrite the cost of acquisition.

The merits of property acquisition are not limited to floodplains, however. Salt Lake City, faced with resident concern about the construction of a

The most effective but probably most costly way of moving development out of harm's way is to acquire the land and retain it in public ownership for open space. The most common use of this approach is in floodplains, perhaps secondarily in coastal zones. But it has also been used in mountainous areas including such Southern California communities as Claremont, where wildfire and landslide hazards are prevalent.

Figure 5-1. Planning Tools and Their Post-Disaster Applications

TOOLS BY CATEGORY	FLOOD	HURRICANE	EARTHQUAKE	WILDFIRE	TORNADO	LANDSLIDE
EMERGENCY						
Damage assessment	X	X	X	X	X	X
Development moratorium	X	X	X	X	X	X
Temporary repair permits	X	X	X	X	X	X
Zoning for temporary housing	X	X	X	X	—	—
Prioritize infrastructure repairs	X	X	X	X	X	—
PLANNING TOOLS						
Acquisition	X	X	X	X	X	X
Easements	X	X	—	X	—	X
Infrastructure policy	X	X	X	X	—	X
Floodplain management plan	X	X	—	—	—	—
Environmental review	X	X	X	X	X	X
Annexation plans	X	X	X	X	—	X
Stormwater management plan	X	—	—	—	—	—
ZONING TOOLS						
Nonconforming uses	X	X	X	X	X	X
Performance standards	X	X	X	X	X	X
Special use permits	X	X	X	X	—	X
Historic preservation	X	X	X	X	X	—
Density controls	X	X	X	X	—	X
Floating zones	X	X	—	X	—	X
Overlay zones	X	X	X	X	X	X
Coastal Zone Management regulations	X	X	—	—	—	—
Floodplain zoning	X	X	—	—	—	—
Setbacks	X	X	X	X	—	X
Site plan reviews	X	X	X	X	—	X
Height and bulk regulations	X	X	—	X	—	X
Wetlands development regulations	X	X	—	—	—	—
SUBDIVISION CONTROLS						
Subdivision regulations	X	X	X	X	—	X
Road width/access	X	X	X	X	—	X
Water supply	—	—	X	—	—	—
Hillside development regulations	—	—	—	X	—	X
Open space requirements	X	X	X	X	—	X
DESIGN CONTROLS						
Trees and vegetation	X	X	—	X	—	X
Design review	X	X	X	X	X	—
Building codes	X	X	X	X	X	X
FINANCIAL TOOLS						
Targeting grant funds	X	X	X	X	X	X
Relocation aid	X	X	X	X	—	X
Special districts	X	X	X	X	X	X
Redevelopment projects	X	X	X	X	X	X
Lending policies	X	X	X	X	X	X
Transfer of Development Rights	X	X	—	X	—	X
MANAGEMENT TOOLS						
Interjurisdictional coordination	X	X	X	X	X	X
Geographic Information System	X	X	X	X	X	X
Geologic investigation	—	—	X	—	—	X
Soil stability ratings	X	X	X	—	—	X
Public education	X	X	X	X	X	X

Easements can be a very cost-effective means of controlling development without having to accept the responsibilities of being a public landlord. One means of securing easements is to work closely with nonprofit land trusts who generally share the community's mitigation goals and are willing to move quickly to acquire conservation easements or to accept donated easements.

residential apartment building astride a known fault line on the Wasatch Front, acquired the parcel immediately to the north, including some old apartments it then refurbished, and established Faultline Park as permanent urban open space that serves in part as a public education tool on seismic hazards (Tyler 1995). However a community chooses to proceed, it is clear that additional money for land acquisition is often available after a disaster for those communities ready to take advantage of it. Collaboration with local officials in this area can yield significant dividends.

Easements. Easements can be a very cost-effective means of controlling development without having to accept the responsibilities of being a public landlord. One means of securing easements is to work closely with nonprofit land trusts who generally share the community's mitigation goals and are willing to move quickly to acquire conservation easements or to accept donated easements. The Nature Conservancy is a national organization that has teamed up often with local and state governments to preserve land through donations, easements, and other means. The Land Trust Alliance has produced some excellent guidebooks on this subject. (For more information, see Lind (1991); Land Trust Alliance (1993); and Trust for Public Land (1995).)

Infrastructure development policies. The placement of infrastructure in hazard-prone areas is a significant step in facilitating the development of those areas. The post-disaster period offers a time for reassessing the desirability of replacing damaged infrastructure in such locations, and of considering mitigation options (e.g., elevating roadways, widening culverts) making use of Federal Emergency Management Agency (FEMA) Public Assistance or Hazard Mitigation Grant Program (HMGP) funds to accomplish such objectives (Design Center for American Urban Landscape 1994, pp. 31-36).

Infrastructure considerations are often particularly critical when they involve facility extensions beyond the city limits. Philipsborn (1997), in the example of Boone, North Carolina, discussed in Chapter 3, notes that the city planned to "waive current policy by agreeing to extend sewer and water services to the proposed new site" of a nursing home in order to facilitate its relocation out of the city's floodplain to a new location outside the city limits. What might normally have been seen as a sprawl generator instead served a purpose for flood mitigation.

Infrastructure in the urban/wildland interface is uniquely vulnerable because of the high temperatures wildfires can generate and the speed with which they often move through an area. Where a city chooses to extend sewer and water lines and other utility services is a powerful influence on development patterns and can help orient construction away from the most hazardous areas. Where a city does choose to extend these facilities, however, it can also take precautionary measures to protect that investment. One common measure applied to both publicly and privately owned utilities is to require that power, telephone, cable, and other lines be placed underground (Slaughter 1996, Ch. 5).

While engineering measures can address many of the serious seismic safety concerns that attend the development of infrastructure and utility lifelines, it is also reasonable for planners to argue that these measures will be even more effective if siting avoids the areas where the hazards are greatest. Moreover, many public facilities influence the siting of other development that follows. The siting of these facilities and the extension of infrastructure not only can set a worthwhile public example, but also can facilitate or discourage other types of private investment. Maximizing the safety of public and utility infrastructure also increases the community's ability to recover and to restore essential services following an earthquake.

FEMA has produced a series of useful manuals addressing seismic hazard abatement for lifeline utility services. (See also BSSC (1987a) and BSSC (1987b).)

In the end, there is no substitute for incorporating natural hazard mitigation considerations into infrastructure policy as a matter of routine in all project reviews. Sometimes, this is as much a matter of influencing the timing of development as of actually preventing it, depending on the other public policy objectives involved. Adequate public facilities ordinances (APFOs) have become a means of staging growth by clarifying where and when a community intends to provide the infrastructure to support it (White 1996).

Designed primarily to steer development away from areas where local governments want to slow growth, these ordinances force developers to pay for the necessary expansion of infrastructure if they wish to build in areas where the infrastructure does not already exist. This can include impact fees for schools, the costs of adding new water and sewer lines, and a host of other particulars that facilitate the presence of new housing or commercial development. While these measures do not prevent development in hazardous areas, they can be used to raise its costs and thus provide a market mechanism for redirecting development to areas where infrastructure already exists. Much of the original objective of APFOs was to conserve public infrastructure expenditures, but communities can recraft their ordinance language to use this tool to limit development in hazard-prone areas. Obviously, APFOs are a companion measure to infrastructure development policies and help to make them more effective in their intent. They have been widely used in Florida and Maryland. (For more information, see Morris and Schwab (1991); Maryland Office of Planning (1996); and White (1996).)

Floodplain management plan (and flood insurance regulations). The regulations associated with NFIP can be viewed in either of two ways: as a set of restrictions that dictate how a community may build in a floodplain, or as a starting point for creative local efforts to mitigate flood hazards. Many communities are ambivalent when choosing between these perspectives because of development pressures, but repetitive losses and the emotional shock of a major flood have induced in others a change of heart, even to the point of relocating entire communities (Becker 1994a and 1994b). While NFIP requires only the adoption and enforcement of a floodplain management ordinance, the desire to provide a first-rate rationale for the ordinance can be the motive force behind a floodplain management plan that can examine the full range of issues facing the community. (See also Wetmore (1996a and 1996b); Schwab (1996a); Tulsa (1994); and FIFMTF (1995).)

FEMA's Community Rating System (CRS) is an attempt to provide communities with incentives through rate reductions to take those extra steps in developing and implementing an effective floodplain management plan. It uses a scoring system for a variety of activities, including public information, mapping and regulatory activities, flood damage reduction, and flood preparedness. (See sidebar). The higher the score, the more rate reductions a community earns, in 5 percent increments from the standard insurance rates. FEMA (1995e through 1995f) has produced various publications connected with CRS to delineate the point system, provide examples of quality plans, and encourage local initiative in responding to flood problems. Communities developing floodplain management plans should also take note of the Flood Mitigation Assistance (FMA) program created by Congress under the National Flood Insurance Reform Act of 1994 (P.L. 103-325) to provide grants through FEMA to communities for cost-effective mitigation projects. FMA requires a community to develop a flood mitigation plan as a prerequisite for obtaining funds for projects.

In the end, there is no substitute for incorporating natural hazard mitigation considerations into infrastructure policy as a matter of routine in all project reviews. Sometimes, this is as much a matter of influencing the timing of development as of actually preventing it, depending on the other public policy objectives involved.

CRS Credited Activities

PUBLIC INFORMATION ACTIVITIES

Elevation Certificates
 Map Determinations
 Outreach Projects
 Hazard Disclosure
 Flood Protection Library
 Flood Protection Assistance

MAPPING AND REGULATORY ACTIVITIES

Additional Flood Data
 Open Space Preservation
 Higher Regulatory Standards
 Flood Data Maintenance
 Stormwater Management

FLOOD DAMAGE REDUCTION ACTIVITIES

Repetitive Loss Projects
 Floodplain Management
 Planning
 Acquisition and Relocation
 Retrofitting
 Drainage System Maintenance

FLOOD PREPAREDNESS ACTIVITIES

Flood Warning Program
 Levee Safety
 Dam Safety

Environmental reviews. Although they are hardly synonymous, it should not be surprising that many of the most hazardous areas are also among the most environmentally sensitive. Floodways, coastal zones, hillsides, and forested areas all provide essential habitat for countless varieties of flora and fauna, yet their scenic and other amenities are likewise immensely attractive for human development. The purpose of environmental reviews is to construct a clear picture of what resources are affected, and in what ways, by proposed development. Although the National Environmental Policy Act (NEPA) brought this mechanism to prominence on the national scene, many state laws establish environmental review mechanisms beyond those of federally mandated environmental impact assessments.

Mandelker (1997), among others, has noted that state environmental policy acts (SEPAs) responded in most cases to the failure of local planning to address environmental concerns, yet differ from local comprehensive planning in largely adopting a case-by-case approach to environmental problems by focusing on reviewing the environmental impacts of individual proposed development projects. This can lead to some duplication of SEPA reviews in local planning and development approval processes. APA's *Growing SmartSM Legislative Guidebook* has sought to integrate environmental reviews with planning and development regulations in its model state planning legislation. It also uses natural hazards as a trigger for environmentally sensitive areas ordinance reviews. The state of Washington includes geologically hazardous areas and 100-year floodplains in its sensitive areas legislation.

Annexation plans. The problem of controlling development just beyond the city limits is a classic one in American urban planning. State laws governing extraterritorial zoning controls by municipalities vary widely, so there is no good way here to discuss the issue briefly. Likewise, planners must consult state laws to determine what annexation policies will be legitimate for their own community. The essential principle for natural disasters, however, is that mitigation should be included as a routine consideration in proposed annexations, particularly in the aftermath of a natural disaster, where there may be some reason to annex a devastated area to facilitate redevelopment and where it may be in the municipality's best interests to gain greater control over the quality of that redevelopment. Healdsburg, California, for instance, requires a specific plan prior to annexation that includes an evaluation of geologic hazards. Specific plans and development agreements are potent tools for incorporating such concerns into the annexation process (Tyler 1995).

Stormwater management plans. As it is evident that storms can produce floods, it stands to reason that poorly managed stormwater flows can accelerate and exacerbate them, almost invariably adding a load of nonpoint pollutants in the bargain. In recent years, as Miller (1994) notes, stormwater management has become more holistic in many communities as they have begun to grapple with the larger impacts of past watershed management practices. Although the U.S. Environmental Protection Agency (EPA) has pushed municipalities to develop adequate stormwater management plans for environmental reasons, using the regulatory device of requiring applications for municipal stormwater permits, these have the impact of also pushing the same local governments to control flooding by better managing stormwater runoff. Local planners should seize this process as an opportunity for better water quality and nonstructural flood control rather than allowing their communities to regard these as just another set of onerous federal mandates (Schwab 1992).

The purpose of stormwater management plans, often developed by special watershed management districts, is to develop water policy for an entire

Floodplain Management Plan Elements

In formulating community development goals and in adopting floodplain management regulations, each community shall consider at least the following factors—

- (1) *Human safety*;
- (2) *Diversion of development* to areas safe from flooding in light of the need to reduce flood damages and in light of the need to prevent environmentally incompatible floodplain use;
- (3) *Full disclosure* to all prospective and interested parties (including but not limited to purchasers and renters) that (i) certain structures are located within flood-prone areas, (ii) variances have been granted for certain structures located within flood-prone areas, and (iii) premium rates applied to new structures built at elevations below the base flood substantially increase as the elevation decreases;
- (4) *Adverse effects of floodplain development* on existing development;
- (5) *Encouragement of floodproofing* to reduce flood damage;
- (6) *Flood warning and emergency preparedness plans*;
- (7) *Provision for alternative vehicular access and escape routes* when normal routes are blocked or destroyed by flooding;
- (8) *Establishment of minimum floodproofing and access requirements* for schools, hospitals, nursing homes, orphanages, penal institutions, fire stations, police stations, communications centers, water and sewage pumping stations, and other public or quasi-public facilities already located in the flood-prone area, to enable them to withstand flood damage, and to facilitate emergency operations;
- (9) *Improvement of local drainage* to control increased runoff that might increase the danger of flooding to other properties;
- (10) *Coordination of plans* with neighboring communities' floodplain management programs;
- (11) The requirement that *all new construction* and substantial improvements in areas subject to subsidence be *elevated above the base flood level* equal to expected subsidence for at least a 10-year period;
- (12) For riverine areas, requiring *subdividers to furnish delineations for floodways* before approving a subdivision;
- (13) *Prohibition of any alteration or relocation of a watercourse*, except as part of an overall drainage basin plan. In the event of an overall drainage basin plan, provide that the flood-carrying capacity within the altered or relocated portion of the watercourse is maintained;
- (14) Requirement of *setbacks for new construction* within Zones V1-30, VE, and V on a community's FIRM;
- (15) Requirement of an *additional elevation above the base flood level for all new construction* and substantial improvements within Zones A1-30, AE, V1-30, and VE on the community's FIRM to protect against such occurrences as wave wash and floating debris, to provide an added margin of safety against floods having a magnitude greater than the base flood, or to compensate for future urban development;
- (16) Requirement of *consistency between state, regional, and local comprehensive plans* and floodplain management programs;
- (17) *Requirement of pilings or columns* rather than fill, for the elevation of structures within flood-prone areas, in order to maintain the storage capacity of the floodplain and to minimize the potential for negative impacts to sensitive ecological areas;
- (18) *Prohibition*, within any floodway or coastal high hazard area, of plants or facilities in which *hazardous substances* are manufactured;
- (19) Requirement that a *plan for evacuating residents* of all manufactured home parks or subdivisions located within flood-prone areas be developed and filed with and approved by appropriate community emergency management authorities.

Source: 44 CFR 60.22(c) (part of the National Flood Insurance Program (NFIP) Regulations for Floodplain Management). Emphasis has been added.

The Community Rating System

THE FLOODPLAIN MANAGEMENT PLANNING PROCESS

Communities in the National Flood Insurance Program (NFIP) that use the Community Rating System (CRS) receive a reduction of floodplain insurance premiums for actions they have taken to reduce flood losses. As of October 1, 1998, 894 communities, representing 66 percent of the NFIP policy base, are now participating in CRS. CRS communities are given credit points for 18 activities in four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. The greater the number of creditable actions taken, the larger the reduction in floodplain insurance premiums for residents. Credit points are based upon how well an activity implements the goals of the CRS. Communities may receive credit points for floodplain management planning, open space dedication, and acquisition and relocation of floodprone properties.

CRS guidance materials stress that the floodplain management planning process is far more valuable than the plan document that results from it. Planning is viewed as a crucial means for overcoming the problem of conflicting goals and actions by various local government departments and by the public that may hinder flood loss reduction. There are seven recommended steps in the CRS planning process.

Problem Identification. The local government should obtain data describing water sources, depth of flooding, repetitive loss areas, special hazards, and other information from FEMA regional offices and other federal and state agencies.

Flood Hazard Area Inventory. CRS credits are given for an inventory that addresses floodprone buildings, damage projections, development trends, development constraints (including zoning and subdivision regulations), critical community facilities (i.e., hospitals, water treatment plants), and floodprone areas that provide natural and beneficial floodplain functions (e.g., flood storage areas and wildlife habitats).

Review of Possible Activities. The local government needs to review all existing and proposed activities that can prevent or reduce flood losses. It must also review activities that can protect the natural functions of the floodplain, including stormwater quality management, wetlands protection, and open space conservation.

Coordination with Other Agencies. There needs to be a review of government agencies whose activities may affect floodplain management efforts or that could support such efforts. The state NFIP coordinator, FEMA regional hazard mitigation officer, and regional planning agencies staff will be helpful in this regard.

Action Plan. This plan must include a schedule and budget for all activities that will be taken to reduce flood losses. CRS materials recommend that each community develop its own criteria for selecting which activities are appropriate to its needs and that are fiscally reasonable.

Public Input. The participating local government must document how residents, affected businesses and organizations, and local officials will be involved in the floodplain management planning process. CRS recommends a task force of community representatives.

Adoption and Implementation. The plan must be officially adopted by the local legislative body to receive CRS credit. A planning department staff person should be assigned responsibility for coordinating the implementation of actions listed in the plan.

Source: Morris (1997). CRS figures were updated in 1998.

watershed, including the full range of issues like aquatic habitat preservation, water supply, water quality (through pollution prevention and runoff controls, among other devices), scenic preservation, and the development of greenways. These plans generally rely on a good deal of interjurisdictional cooperation for their success because most of the truly effective controls on the nonpoint-source runoff that affects stormwater quantity and quality rely on local zoning and subdivision regulations (Herson-Jones 1995; Jeer et al. 1998).

Some of these local controls may be outside the planning department, perhaps in the building department, such as regulations concerning

construction practices. One possibly underestimated factor in helping to minimize flooding risks due to excess runoff and water channel clogging is the application of best management practices to soil erosion and runoff from construction sites. Construction regulations adopted in the form of erosion control ordinances can require builders to undertake measures to stem erosion during the periods when bare soil is subject to the forces of wind and precipitation. These efforts can include straw bales, detention ponds, and other devices to arrest the movement of soil downhill and into waterways, where sediment can clog the flow of flood waters in an emergency. (For more information, see Kennedy (1992); NIPC (1991); Wisconsin DNR (1989).)

A related but more difficult challenge is that of controlling nonpoint runoff from agricultural operations, usually a subject tackled through state or federal environmental regulations and through programs of the U.S. Department of Agriculture's Natural Resources Conservation Service. The swampbuster provisions of the federal Food Security Act of 1986 have also gone some distance in reining in this problem. Among other notable efforts in this area are those of the states in the Chesapeake Bay region.

Capital improvements plans. Capital improvements programming is the multiyear scheduling of public physical improvements. Local governments, to be run soundly and efficiently, must have a means of projecting both their needs for physical improvements and their means over time of paying for them. The capital improvements plan (CIP) is the way to accomplish this. These improvements can include everything from street widening to sidewalk and curb repair to lighting renovations, among dozens, if not hundreds, of other possibilities. The plan deals with the means of financing these activities, such as general obligation bonds, special assessments, the use of state and federal grants, and various taxing devices. Many of these are discussed below under financial tools, but their inclusion in a CIP is critical for ensuring the priority of such projects on the local public agenda.

The relevance for disaster planning is clear. CIPs can call for public expenditures to reduce hazards through a variety of locally appropriate hazard mitigation and disaster protection measures, including raising bridge heights in flood-prone areas, widening culverts, seismic strengthening of buildings, and the development of emergency public shelters. (For more information, see Bowyer (1993) and So and Getzels (1988).)

The relevance for disaster planning is clear. CIPs can call for public expenditures to reduce hazards through a variety of locally appropriate hazard mitigation and disaster protection measures, including raising bridge heights in flood-prone areas, widening culverts, seismic strengthening of buildings, and the development of emergency public shelters.

Zoning Tools

Zoning is a versatile tool in dealing with almost all natural hazards. It can be used:

- to prevent new development in hazardous areas;
- to allow new development in hazardous areas while minimizing densities;
- to influence the level of site plan review that a proposed development project must undergo;
- as an incentive to retrofit an existing building to resist forces associated with natural hazards (as when density bonuses are offered in exchange for retrofitting buildings);
- to control changes in existing building occupancy in hazardous areas; and
- to facilitate the post-disaster rebuilding process in severely damaged areas (Schwab 1998).

Floodplain management is the most frequent hazard-related objective of zoning because not only is flooding the most common hazard, but also because mapping of flood hazards most easily lends itself to such purposes. Most communities rely on the use of Flood Insurance Rate Maps (FIRMs) to determine the boundaries of floodplain zones in local ordinances. The mapping process itself is described in greater detail in Chapter 7. In concert with floodplain management regulations based on NFIP minimum requirements, zoning remains one of local government's most powerful tools for controlling development in special flood hazard areas, especially if it is tied to a well-prepared floodplain management plan. Nonconforming use regulations are reinforced by provisions in NFIP regarding the reconstruction of substantially damaged buildings. Setbacks can be used to provide waterfront buffers and minimize flood exposure of buildings. Density restrictions can orient development away from the most hazardous areas. All of these devices are described elsewhere in this section, but a floodplain district in the zoning ordinance is the land-use umbrella under which flood mitigation objectives can be pursued.

In a post-disaster period, a community is likely to see more requests to rebuild nonconforming uses than it would under any other circumstances. For that reason, the model ordinance presented later in this chapter offers some practical alternatives in the post-disaster setting to the strict application of normal rules concerning nonconforming uses.

Focusing strictly on hazard mitigation, however, is a major mistake. Floodplain zoning is an ideal regulatory tool for achieving multiple community planning objectives, including resource conservation, open space, water-quality protection, and recreation goals. (See also Wetmore (1996a and 1996b); Schwab (1996a and 1997); FIFMTF (1995); and Maryland Office of Planning (1993).)

Nonconforming use regulations. In zoning law, nonconforming uses are those that predate the passage or amendment of a zoning ordinance that disallows them in the district where they are found. Because they existed prior to passage of the ordinance, they are allowed to continue but are restricted by judicial and statutory rules from expanding, changing, or being rebuilt. In a post-disaster period, a community is likely to see more requests to rebuild nonconforming uses than it would under any other circumstances. For that reason, the model ordinance presented later in this chapter offers some practical alternatives in the post-disaster setting to the strict application of normal rules concerning nonconforming uses. One obvious means of preparing for such possibilities, however, is to use the pre-disaster plan to identify zoning districts with high incidences of nonconforming uses.

The ability to rebuild is the privilege most directly affected by planning for the post-disaster period and hazards legislation, most particularly NFIP. As discussed above, local ordinances adopted in conformance with NFIP allow rebuilding but require elevation to the base flood elevation if the building is substantially damaged. Local ordinances may be stricter than the federal requirements. Furthermore, the CRS offers credit in the form of reduced insurance rates for property owners in a community that requires a building to be raised to the base flood level when the cumulative cost of construction actions needed to improve or repair damage to it equals 50 percent of its market value. In such a case, the community is responsible for tracking the cumulative cost of substantial improvements or the amount of substantial damage. CRS also gives points if the community sets its substantial damage standard at less than 50 percent of market value. Normally, these requirements apply only when any single flood causes that extent of damage. Finally, note that the Increased Cost of Compliance (ICC) provision in NFIP policies issued or renewed after June 1, 1997, provides for up to \$15,000 to property owners to bring substantially damaged or repetitively flooded properties into compliance with local floodplain management requirements (FEMA 1997d).

Beyond those provisions, local governments can use zoning to effect a good deal of hazard mitigation in the area of nonconforming uses. Having

established restrictions pertaining to wildfire hazards, floodplain areas, earthquake liquefaction zones, landslide hazard zones, or other problem areas, local zoning can then allow planners to enforce limitations on the ability to rebuild in place once a structure has been substantially damaged from any source or for any reason. Those limitations may require options other than relocation, such as elevation, seismic retrofitting, or fire-resistant construction. Obviously, the boundaries for the defined districts must be justified through sound hazard identification techniques in order to withstand legal challenges. This is primarily a gradual remedy when planners recognize the existence of an undesirable situation and wish to use the post-disaster reconstruction process in part to force any rebuilding to comply with new standards or to eliminate uses that no longer are deemed acceptable in their current location. (See also Williams (1986, Vol. 4A, Ch. 114) and the model ordinance below.)

Environmental or hazard-related performance standards. Increasingly, detention ponds and swales are common mitigating features of new developments complying with standards for stormwater management. Even outside delineated hazard zones, development activity and planning for wider areas like watersheds can significantly affect disaster vulnerability. The case study of Arnold, Missouri, in Chapter 8 provides an illustration of how upstream development in a metropolitan area can have serious detrimental impacts on downstream communities. Such problems have been cited for years in a number of Chicago suburbs and often involve serious issues of interjurisdictional cooperation, addressed in the sections on general planning tools (above) and management tools below.

Landscaping, site plan reviews, and other tools described in this chapter all intersect at a variety of points, but may also be used individually by communities that do not adopt all of the other related devices. The post-disaster period may be an ideal time to press the political agenda for establishing new performance standards, particularly with regard to the design or rebuilding of planned unit developments.

A good example of the effective use of hazard-related performance standards in the context of floodplains is the zoning Wake County, North Carolina, employs for flood hazard areas that include not only FIRM-specified floodplains, but a list of soil types specified in the county soil survey and referred to in the ordinance as flood hazard soils, mostly consisting of silt and sand. The burden is on the property owner in those locations to prove that such soils are not part of the floodplain. The regulations vary according to the size of the drainage area, with the strictest applying in areas of 100 acres or more, where the applicant must show that any rise in water level resulting from building on the property can be contained on the property. The only alternative is to secure easements from neighboring property owners to allow for that rise. (See also Maryland Office of Planning (1995c) and Schwab (1997).)

Special use permits. Zoning ordinances often designate zones within which specified uses are permitted only if they meet certain conditions or established criteria. It is then up to local officials to grant or deny a permit application based on the compliance of the proposed use with those conditions or criteria, which must be clearly stated in the ordinance. In the post-disaster context, these criteria presumably would relate to the reduction of adverse environmental impacts or the minimization of vulnerability to natural hazards. For example, in hurricane- or tsunami-prone coastal zones or in mountainous terrain with landslide or wildfire potential, the feasibility of evacuation might be the basis for some criteria governing special use permits.

Floodplains are prime candidates for the application of this tool. For instance, in a model ordinance that Livingston County, Michigan, prepared

Landscaping, site plan reviews, and other tools described in this chapter all intersect at a variety of points, but may also be used individually by communities that do not adopt all of the other related devices. The post-disaster period may be an ideal time to press the political agenda for establishing new performance standards, particularly with regard to the design or rebuilding of planned unit developments.

for one of its townships, the only permitted principal uses in floodplain, wetland, and steep land areas are public and private nature reserves and wildlife areas, and public forest preserves, game preserves, hunting areas, fishing sites, and boat-launching sites. All other principal uses allowed in the coexisting zoning district require a special use permit. (See also Schwab (1997).)

Regulations dealing with damaged historic properties. The issue of regulation of damaged historical property was addressed in Chapter 4 under “Elements of the Post-Disaster Plan.” It bears repeating that having some regulations already in place as part of a post-disaster plan makes matters easier when the problem arises. Even more important is identifying as precisely as possible all historic properties in hazard-prone areas, as well as the proposed mitigation techniques most appropriate in each case. Planners undertaking such an inventory should include not just listed properties, but any structures more than 50 years old that potentially could be listed properties, and be aware that state historic preservation officers (SHPOs) use this broader definition of their area of concern. The National Trust for Historic Preservation and SHPOs have a number of good information booklets available concerning restoration techniques for various types of historic buildings and categories of disaster damage. (See also Nelson (1991); NTHP (1993); Utah Division of State History (n.d.); and FEMA Region I (n.d.).)

Downzoning/density controls. At a minimum, planners should be able to articulate concerns about the limitations of building codes in mitigating hazards in areas where reduced density or outright prohibition of building would be a more effective solution. Better structural engineering solves many problems but not all, and it often is not the most cost-effective solution to a problem. Engineering solutions face practical limits in terms of both technology and economics. Planners should move aggressively to examine the land-use planning lessons from each disaster to identify areas where downzoning might be an effective approach in minimizing future hazard vulnerability. The key benefit of downzoning is simply that it minimizes the risk to future development.

That said, downzoning is potentially one of the most politically controversial approaches to many natural hazards problems precisely because it involves at least a perceived, and often a real, diminution in the value of land for development purposes. Whether a proposal for downzoning a severely damaged area in the aftermath of a disaster will be politically palatable may depend on the degree to which planning and consensus building in the pre-disaster period have prepared people to understand its logic.

As a more general proposition, density controls established prior to an area’s development are somewhat easier to sell if clearly tied to serious hazard-related concerns. In the urban/wildland interface, for example, minimum-lot-size regulations, provisions for clustered development, and other density restrictions are all zoning tools that may serve to reduce hazard vulnerability by allowing homes to be sited safe distances away from fuel sources. Performance controls can relate levels of density to slope factors and other objective hazard measures as local policy makers deem appropriate. Slope/density ratios work off the simple concept that density should decrease as slopes increase on the assumption that steeper slopes require more grading and other slope-disturbance activities. Portola Valley and Rancho Cucamonga, California, both have used slope/density regulations in order to minimize steep slope hazard problems (Olshansky 1996).

Because some seismic mitigation measures can be quite expensive, it is worth remembering that there is a converse truth: pre-existing high density may make it easier in some situations to finance the cost of stringent

Downzoning is potentially one of the most politically controversial approaches to many natural hazards problems precisely because it involves at least a perceived, and often a real, diminution in the value of land for development purposes. Whether a proposal for downzoning a severely damaged area in the aftermath of a disaster will be politically palatable may depend on the degree to which planning and consensus building in the pre-disaster period have prepared people to understand its logic.

mitigation measures. This became apparent, for instance, in the redevelopment of San Francisco's Mission Bay area, which is largely built on relatively unstable infill. The area plan's life-safety section requires detailed soil-engineering and geologic investigations for each new building site, with especially stringent construction standards for critical facilities. Larger projects may be able to bear these costs more easily, making it logical to put higher-intensity uses on poorer soils. (See also Tyler (1995).)

Floating zones. In the zoning ordinance, a floating zone is one that has no specific geographic designation but carries instead a descriptive designation that attaches to an appropriate parcel of land when ordinance conditions are met. In the recovery period following a disaster, this tool can be used effectively to control redevelopment in a severely damaged area, as the special conditions attaching to the zone can then be put into effect. An important caveat is that not all states permit the use of this device.

The South Florida Regional Planning Council's model plans suggest the use of floating zones as one element of a post-disaster plan in which the community could decide in advance to activate predetermined density reductions according to the extent of overall property damage occurring in particular locations.

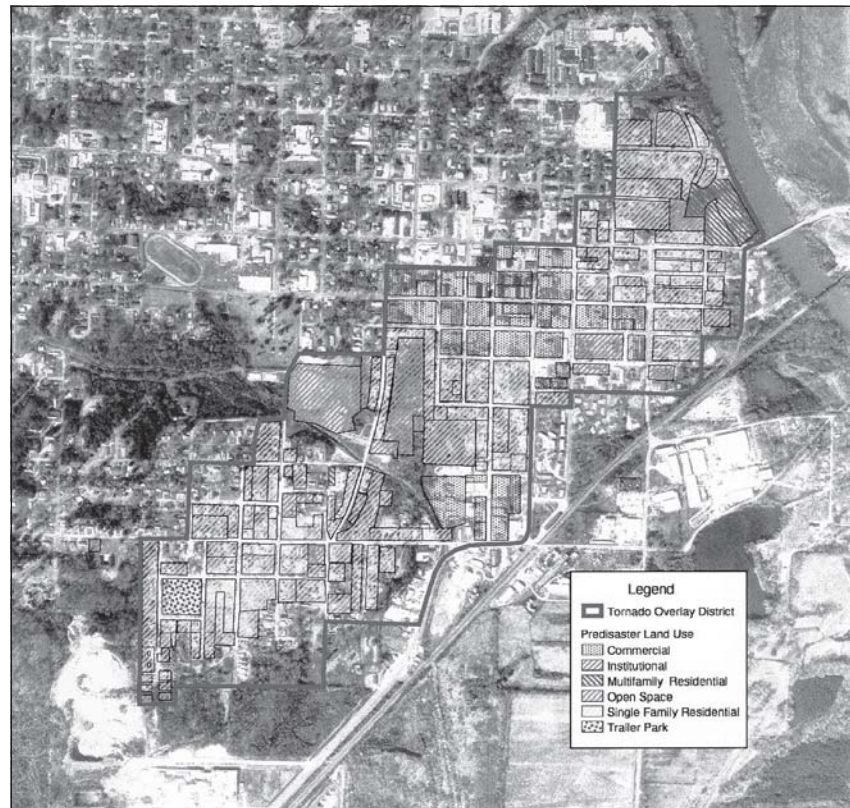
The Nags Head, North Carolina, plan offers a particularly apt example in connection with incipient inlets, areas where coastal erosion is carving out a water pathway through a barrier island. A severe coastal storm or hurricane can often sever an island in two by vastly accelerating that intrusion. North Carolina's Coastal Area Management Act addresses the problem of inlet hazard zones by allowing structures of no more than 5,000 square feet at a density of no more than one unit per 15,000 square feet of developable land. (For more information, see Williams (1986, Vol. 1, Ch. 28); South Florida RPC (1990); and Beatley, Brower, and Schwab (1994).)

Overlay districts. Overlay districts are used to solve problems in zoning codes that are not adequately addressed in conventional use districts. Generally, they aim to address specific needs that cut across other district designations and whose inclusion would result in a level of delineation in normal districts that would serve to confound zoning enforcement efforts. They also allow a degree of flexibility that is often needed in dealing with environmental constraints, with floodplains being a common example. They are called overlays because they add a separate layer of regulations to the area to which they apply that are distinct from the underlying traditional zoning. Overlay districts can be used in almost any hazard context to establish special conditions for various uses, including many of the disaster-specific tools below. Examples would include an urban/wildland interface district, a hillside protection district, a riverfront or shoreline district, or an earthquake high-hazard zone (as in areas with high soil liquefaction or along fault lines).

Arkadelphia, Arkansas, following the March 1, 1997, tornado that struck that community, established as part of its rebuilding process a design overlay district for the tornado-damaged parts of town. This enabled planners to introduce a number of measures that facilitated the development of quality affordable housing, including clustered development and parking, zero lot line zoning, and shared facilities. Pieter de Jong, project manager for the Arkadelphia Recovery Plan, pointed out that the value of the disaster overlay district for Arkadelphia is that it encourages innovative redevelopment strategies as compared to what would be allowable under the existing commercial and residential zoning district requirements (Woodward-Clyde 1997a). This approach is especially relevant for the smaller rural communities, which may be burdened with outdated (often Euclidean) zoning regulations, and are then confronted with a major disaster

Overlay districts can be used in almost any hazard context to establish special conditions for various uses, including many of the disaster-specific tools below. Examples would include an urban/wildland interface district, a hillside protection district, a riverfront or shoreline district, or an earthquake high-hazard zone (as in areas with high soil liquefaction or along fault lines).

This aerial photo of Arkadelphia, Arkansas, shows the tornado overlay district the city created to facilitate reconstruction after disaster struck in March 1997, and the underlying zoning districts that pre-existed the tornado. Woodward-Clyde Consultants, FEMA's prime contractor for such planning, helped the city prepare its redevelopment plan.



URS Greiner Woodward-Clyde

recovery effort. It serves as an example of how this device can be used to take advantage of opportunities to reshape development in heavily damaged neighborhoods in the aftermath of a disaster. (See also Kennedy (1991); Maryland Office of Planning (1995b); and Schwab (1998).)

Coastal zone management regulations. Barrier islands, dune systems, tidal wetlands, estuaries, and coral reefs all pose special planning problems and opportunities not encountered elsewhere. Various federal and coastal state statutes impose specific mandates and constraints on local communities and provide particular federal mechanisms for addressing many of these challenges. In some cases, the community may be able to identify a need or opportunity to work with the state or federal government to preserve parts or all of the local coastal zone in wildlife reserves, marine sanctuaries, or even national parks. While many of these initiatives may be undertaken as much for environmental protection as for hazard mitigation, they often serve both purposes simultaneously, as is the case with the Coastal Barrier Resources Act.

State laws and policies can deal directly with the problem of restricting development in designated storm damage zones. For instance, Rhode Island Coastal Resource Management Council regulations prohibit reconstruction on dunes after 50 percent property destruction.

Clearly, the primary body of legislation addressing this issue is the federal Coastal Zone Management Act and its related state statutes and regulations. In addition, however, many communities enact their own special protective measures for coastal areas. The specific techniques employed in local coastal management include many of the zoning and subdivision tools detailed in this chapter, often for reasons other than hazard mitigation, such as preserving the historic or architectural character of the community. It may be noted here, though, that the replanning of badly damaged coastal planned unit developments and the use of coastal construction control lines (discussed in

Barrier islands, dune systems, tidal wetlands, estuaries, and coral reefs all pose special planning problems and opportunities not encountered elsewhere. Various federal and coastal state statutes impose specific mandates and constraints on local communities and provide particular federal mechanisms for addressing many of these challenges. In some cases, the community may be able to identify a need or opportunity to work with the state or federal government to preserve parts or all of the local coastal zone in wildlife reserves, marine sanctuaries, or even national parks.

more detail in the Florida context in Chapter 10), which amount to setbacks based on coastal erosion, represent opportunities in the post-disaster period for planners to reduce future vulnerability. (See also Beatley, Brower, and Schwab (1994); R.I. Division of Planning (1989); and FAU/FIU (1995).)

Setbacks. Removing housing and other buildings from wildland interface hazards can be partly accomplished through required setbacks that establish minimum distances from trees, cliffs, highly flammable vegetation (e.g., shrubs and chaparral), and other landscape features that may enhance the volatility, speed, and temperature of a wildland fire. Fire officials generally recommend a 30-foot buffer between homes and wildland vegetation to reduce vulnerability. As with much else in this area, adequate hazard identification efforts can help to clarify specific local needs and thus justify effective adaptations to local circumstances.

As noted in the subsection above on coastal zone management regulations, states like Florida and Rhode Island have been using statutorily mandated setbacks to control construction near the seacoast. North Carolina's Coastal Area Management Act requires a setback of at least 30 times the average annual rate of erosion in the local area, measured from the first line of vegetation. Myrtle Beach, South Carolina, has prescribed a 50-year erosion line that allows only such uses as sun decks and gazebos seaward of that line.

Riparian corridors also deserve attention with regard to setbacks because they serve an extra function of conveying stormwater, and proper maintenance can help to reduce flooding. Experience in Bellevue, Washington, demonstrates, however, that the issue along riparian corridors, especially those with steep banks, may not always be as simple as just establishing setbacks. Retaining and replanting native vegetation may also be needed to preserve a river's viability as an effective natural channel for flood waters, reducing damage to property. These issues play a role in landscaping requirements, discussed below in the section on design review (Sherrard 1996).

California law strongly encourages the use of setbacks relative to earthquake faults in the Alquist-Priolo Act, which requires geologic investigations within one-eighth of a mile of a fault line. The regulations established by the California Mining and Geology Board require a minimum setback of 50 feet from any active fault for habitable buildings. Determining accurately the location of all such faults may require geologic investigations, a tool discussed below. (For more information, see Beatley, Brower, and Schwab (1994); Olshansky (1996); Tyler (1995).)

Site plan reviews. Site plan review almost invariably applies to new projects and only rarely to the reconstruction of existing sites. Such reviews, however, provide an opportunity for planners to assess patterns of damage in hazard-prone areas and to apply those lessons to new development. For instance, planners can consider the design and location of structures, parking lots, and other improvements with an eye to drainage, soil integrity, vegetative landscaping, and other issues that may affect the disaster-resistant qualities of a proposed development. Schwab (1993) has also suggested using site plans with proposed industrial and commercial developments to evaluate conformance with performance standards where hazardous materials are involved. This could easily be adapted to ensure the disaster-resistant storage of such materials. (See also Thurow, Toner, and Erley (1975) and Maryland Office of Planning (1995c).)

Height and bulk regulations. Height and bulk have special significance in a coastal zone, particularly in the coastal high-hazard area. A major issue that has driven some legislation and lawsuits in this area is visibility and the public's right to an ocean view. That issue clearly originated with concerns

Removing housing and other buildings from wildland interface hazards can be partly accomplished through required setbacks that establish minimum distances from trees, cliffs, highly flammable vegetation (e.g., shrubs and chaparral), and other landscape features that may enhance the volatility, speed, and temperature of a wildland fire. Fire officials generally recommend a 30-foot buffer between homes and wildland vegetation to reduce vulnerability.

Site plan review almost invariably applies to new projects and only rarely to the reconstruction of existing sites. Such reviews, however, provide an opportunity for planners to assess patterns of damage in hazard-prone areas and to apply those lessons to new development. For instance, planners can consider the design and location of structures, parking lots, and other improvements with an eye to drainage, soil integrity, vegetative landscaping, and other issues that may affect the disaster-resistant qualities of a proposed development.

The rules that govern the subdivision of land clearly provide some of the best opportunities planners have to create sites that are both buildable and safe. Lots can be configured to keep structures out of the floodplain, to reduce fire and landslide hazards in forested and mountainous wildlands, or to reduce the exposure of buildings to fault slippage, among other possibilities.

In hillside areas, the need is to pursue such subdivision design features as clustering with an eye to resource conservation and the use of those areas requiring a minimum of grading and soil-disturbing activities during construction. Special attention should also be paid to road access and minimizing the amount of linear roadway needed for access to the number of homes that will be built in comparison to conventional subdivision design.

about public access and aesthetics, but, in some areas, there are valid safety considerations relating to the distortion of wind patterns and flying debris that may also favor the establishment of height and bulk restrictions. Strong building code enforcement is an essential accompaniment to such regulations in any event. Nags Head, North Carolina, has combined a number of concerns with its desire to maintain a family beach atmosphere in enacting zoning changes that include strict setback, height, and open space requirements for oceanfront motels and condominiums (Bortz 1990).

Wetlands development regulations. Floodplains and wetlands are far from synonymous, particularly after two or more centuries of human activity in draining wetland areas for agriculture and development. Nonetheless, protection of remaining wetlands areas plays an important secondary role in reducing flood hazards, and while these regulations clearly serve their own environmental purposes, they also form part of an overall strategy for flood hazard mitigation. The environmental elements of a comprehensive plan should account for these benefits as a selling point for winning public acceptance and understanding of community objectives in this area. (See also Burke et al. (1988).)

Subdivision Controls

Subdivision regulations. The rules that govern the subdivision of land clearly provide some of the best opportunities planners have to create sites that are both buildable and safe. Once a lot is created, it is enormously difficult to prevent building. The roots of effective subdivision regulations in this regard stem inexorably from thorough and accurate hazard identification at the beginning of the planning process. This may include requirements for hazard assessments to accompany subdivision applications in known hazard zones. Lots can be configured to keep structures out of the floodplain, to reduce fire and landslide hazards in forested and mountainous wildlands, or to reduce the exposure of buildings to fault slippage, among other possibilities. Clustering is increasingly popular as a means of preserving open space in new subdivisions, and Arendt (1996) has addressed the merits and methods of this technique at considerable length. Various Planning Advisory Service (PAS) Reports have addressed issues concerning subdivision design for earthquake, landslide, and floodplain hazards respectively. (See also Maryland Office of Planning (1994).)

In hillside areas, the need is to pursue such subdivision design features as clustering with an eye to resource conservation and the use of those areas requiring a minimum of grading and soil-disturbing activities during construction. Special attention should also be paid to road access and minimizing the amount of linear roadway needed for access to the number of homes that will be built in comparison to conventional subdivision design (Olshansky 1996).

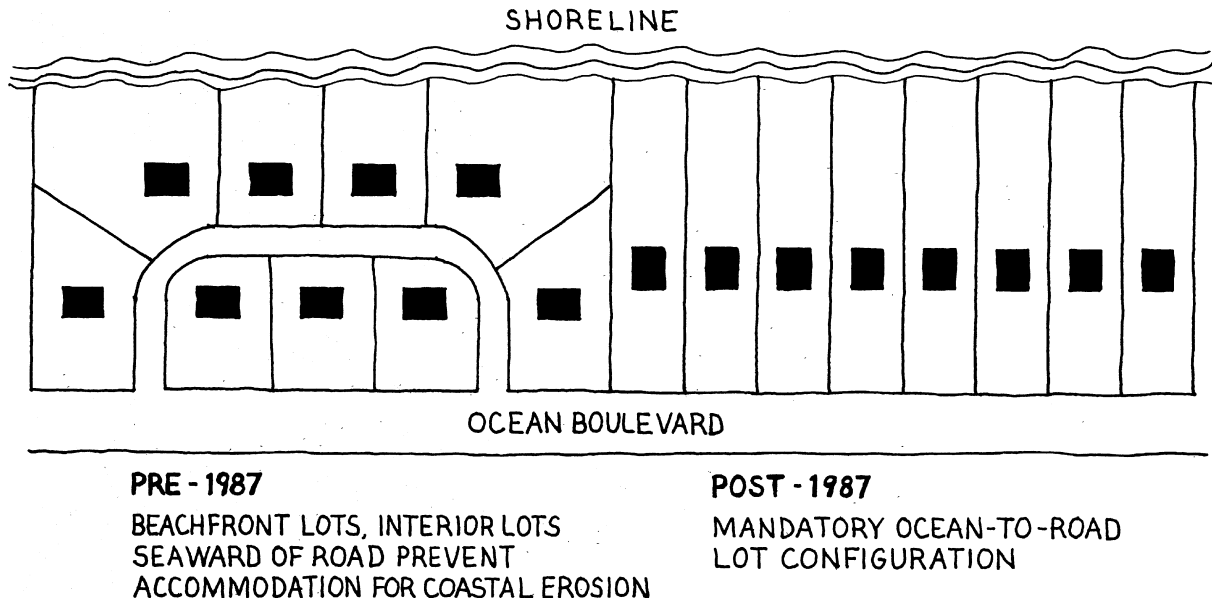
The mapping of special flood hazard areas offers excellent opportunities for planners to apply this practical information as they review the design and lot layout of subdivisions, consider street access and layout, the positioning of utilities and detention basins, open space dedications, tree preservation, landscaping requirements, and a host of other floodplain management issues that come into play with each new subdivision proposal. Planners can also draft subdivision ordinances that prescribe standards for these items with respect to the documented hazards. This is obviously a proactive rather than post-disaster measure, as are many of the tools discussed here, but the implications are enormous.

The Nags Head, North Carolina, subdivision ordinance requires lots on the ocean side of the major north-south road parallel to the coast to be

configured perpendicular to the ocean and road. (See Figure 5-2). If coastal erosion subsequently threatens the structures built on those lots, this configuration allows the houses to be moved landward, and the ordinance then provides for a reduction of required setbacks from 30 to 15 feet to accommodate those circumstances (Morris 1997).

Nags Head has provided for some post-disaster planning intervention to mitigate flood hazards in existing subdivisions by allowing the possibility, prior to rebuilding, of requiring that adjoining lots in common ownership be combined into one large lot (Bortz 1990).

Figure 5-2. Nags Head, North Carolina, Oceanfront Lot Requirements



As noted above concerning setbacks, California's Alquist-Priolo Act already restricts development near earthquake faults. The concept of avoiding visible or known fault lines is merely a starting point, however, for the seismic considerations that ought to enter into lot configurations and subdivision design because direct fault rupture accounts for only a tiny fraction of overall earthquake damage. Extensive local mapping of earthquake fault traces, liquefaction zones, and other natural seismic hazards is an essential prelude to effective review of lot shape, building placement and design, and overall subdivision layout in order to minimize problems. In most cases, where the hazards are known to be moderate or severe, requiring geologic investigations of the site (see the section below on management tools) will give planners better data with which to review subdivision plans and minimize exposure to seismic hazards. The use of clustering and the preservation of more geologically hazardous areas of a site for open space or parkland represent the adaptation of well-known conservation planning devices to a seismically hazardous setting. Portola Valley, California, has used this device in allowing a developer in an area crossed by the San Andreas Fault and flanked by unstable hillsides to create smaller, clustered lots and keep vulnerable areas in permanent open space. (See also Jaffe, Butler, and Thurow (1981); William Spangle and Associates (1988); Tyler (1995).)

Road width and access regulations. Another byproduct that planners can derive from thorough seismic hazard identification is the ability to identify

Extensive local mapping of earthquake fault traces, liquefaction zones, and other natural seismic hazards is an essential prelude to effective review of lot shape, building placement and design, and overall subdivision layout in order to minimize problems.

In planning new development in an area potentially subject to wildfire hazards, planners can work to ensure that local traffic will not exceed the carrying capacity of the roads for evacuation and fire access purposes. Many roads in wildfire hazard areas, particularly those with steep slopes, are notoriously narrow relative to the need for fire equipment to reach threatened areas in an emergency.

potential limitations on access to damaged areas following an earthquake. Where are the major arteries that may fail for which there are no satisfactory alternative routes? Particularly vulnerable areas may include those where access requires traversing a mountain pass or crossing a bridge over a major waterway. This is largely a transportation and capital improvements problem, but one with major consequences for recovery and reconstruction policy in the event of failure. It is also a significant consideration in identifying land-use lessons in the aftermath of a disaster and influencing post-disaster road and bridge rebuilding priorities to remedy known deficiencies (BSSC 1987a).

The same concerns can be brought to bear on post-flood transportation repairs, to say nothing of pre-flood design of subdivisions in flood hazard areas. If some roads needed for access and evacuation are washed out, are there residents who will be stranded for lack of a secondary evacuation route? The solution almost always is to locate driveways and streets in those areas of the subdivision least likely to be flooded and approaching buildings from the direction opposite the floodplain, preferably not disrupting natural drainage patterns so as to minimize erosion and runoff problems. While remedying a subdivision road design that is deficient in this regard may be more difficult, in the aftermath of a major flood it may be possible to reorient some access routes if the local government is able to acquire the appropriate properties for this purpose (Morris 1997).

In planning new development in an area potentially subject to wildfire hazards, planners can work to ensure that local traffic will not exceed the carrying capacity of the roads for evacuation and fire access purposes. Many roads in wildfire hazard areas, particularly those with steep slopes, are notoriously narrow relative to the need for fire equipment to reach threatened areas in an emergency. Planners considering road width should also consider their value as fire-breaks. In the aftermath of a disaster, as discussed elsewhere in this report, planners also have the opportunity to reassess the adequacy of local roads in terms of experience and to advocate for rebuilding them in a safer fashion (Slaughter 1996, Ch. 5).

Water supply. More detail is provided on the subject of water supply in Chapter 7. What bears noting here is that, where a city or county has no plans to extend water lines to meet development, it can insist that homes not near a natural source of accessible water for fire protection, such as a pond or stream, must include some other water supply mechanism that can assist firefighters, such as a cistern, swimming pool, or dry hydrant (NFPA n.d.).

Hillside development regulations. Wildfires have some known behavioral patterns as they sweep through canyons, down hills, and across other natural features. Many of these patterns depend on updrafts and downdrafts to feed the fire with bursts of oxygen, and flammable structures or vegetation lying in the path are extremely vulnerable. High winds are accelerated by natural wind tunnels and serve to exacerbate these patterns. Hillside development ordinances can take advantage of this knowledge to regulate the placement of structures relative to vegetation, cliffs, and other natural or landscaped features.

Regulations should serve double duty in simultaneously addressing landslide hazards. One sure way to accelerate erosion is to reduce or strip the vegetative cover that holds soil in place, so construction practices, grading, landscaping, lot orientation, and architectural design should all be reviewed with regard to the primary objective of protecting the site against such deterioration. Vegetation issues, which extend beyond considerations in subdivision review alone, are discussed separately below in a section on design controls. In addition, engineering reports on slope stability provide essential information to help planners ensure that building sites are chosen

to maximize public safety. (For more information, see Olshansky (1996) and Erley and Kockelman (1981).)

Open space requirements. Hillside development virtually demands some open space concessions in order to preserve the integrity of the sensitive area involved. A community simply cannot afford to pepper the hillside environment with homes in the same way that urban flatland is developed, where grid designs and high density are often appropriate. All the risk factors already discussed—slope instability, soil erosion, loss of vegetative cover, and wildfire fuel factors—plus other community values, such as aesthetics and habitat and view protection, require a second look at the way in which steep slopes are carved into lots. Requiring the dedication of open space and parkland in such areas is a valid regulatory measure to protect all these values and to ensure public safety. In many cases, however, a community may wish to look at the use of easements or actual acquisition (perhaps through a land trust or some public/private partnership) of hillside land to get this job done (Olshansky 1996).

Flood mitigation poses another opportunity for the use of open space requirements. Preserving a linear park along riparian corridors can be part of the strategy in a planned unit development, preserving wetlands, woodlands, and other natural features that minimize flooding by controlling streambank erosion while enhancing the visual and recreational qualities of a site. The trees filter and absorb runoff, and the community gains a combination of other open space and parkland benefits. (See also Brooks and Deines (1995 and 1996).)

Design Controls

Good design of the built environment is an essential element of effective mitigation. What makes one building less susceptible to wind or fire damage than its neighbors? Why do flood waters swirl past one building, inflicting minimal damage, while another suffers the brunt of nature's blow? The answer to these questions often lies in a combination of considerations involving both the design and choice of materials in the structure itself and the design and contours of the immediate surroundings, such as the slope of the land, the vegetation, and building placement within the lot. The two previous sections dealt with the larger contexts of zoning and overall subdivision design. This section addresses issues specific to individual buildings and the parcels of land on which they sit.

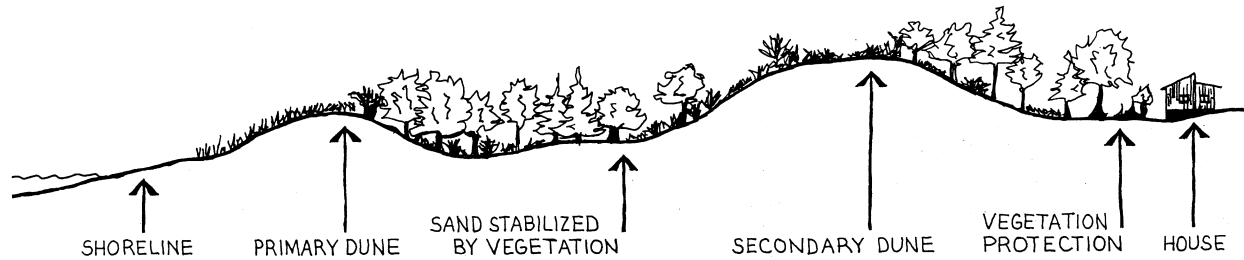
Tree conservation and vegetation requirements. Landscaping and vegetation make a difference in mitigating the impacts of natural hazards. Trees break the force of the wind and stabilize the soil. Wetlands absorb much of the overflow from stream channels. Fire-resistant vegetation can retard the spread of wildfires toward vulnerable buildings. Planners can use landscaping requirements to preserve or enhance the protection such natural features afford. These requirements may be part of site plan reviews or a separate set of zoning regulations and environmental performance standards.

Landscaping requirements for shoreline properties can be tailored to meet the special needs of dune system preservation and barrier island stability. (See Figure 5-3.) While this is typically handled through required setbacks measured in relation to an established reference point in a coastal setting, it is also important in connection with not permitting other disturbances of the natural dune system. Also, requiring the use of only native vegetation in coastal areas minimizes the possibility that high winds or flooding will uproot trees, causing damage from debris (Pilkey et al. 1980; Morris 1997).

Landscaping acquires special significance in relation to wildfire hazards because vegetation becomes a fuel that feeds the hazard that is threatening people and property. The Oakland case study in Chapter 11

Landscaping acquires special significance in relation to wildfire hazards because vegetation becomes a fuel that feeds the hazard that is threatening people and property.

Figure 5-3. Typical Dune Cross Section



helps to highlight some of the practical issues of vegetation and landscaping connected with wildfire hazards, which are also addressed in Chapter 7. They are among the most essential elements of any plan to address wildfire hazard mitigation. In this case, the most salient point concerns not so much the preservation of natural vegetation, although that is often important for other reasons, but maintaining some distance between buildings and the most flammable types of local vegetation, as well as trying to use more fire-resistant vegetation wherever possible (Olshansky 1996; Slaughter 1996, Ch. 16).

Nothing holds soil in place better than living plants, so it is little surprise that tree conservation, landscaping, and vegetation all play a major role in mitigating landslide hazards on steep slopes. Clearing and grading activities disturb this natural stability and accelerate erosion, leading to potentially catastrophic landslides under extreme circumstances, such as heavy rainfalls, seismic vibrations, or rapid snowmelt. In addition to the obvious landslide and mudslide problems, there is the potential for this runoff to cause or exacerbate flooding problems, particularly where steep bluffs rise above stream corridors.

Nothing holds soil in place better than living plants, so it is little surprise that tree conservation, landscaping, and vegetation all play a major role in mitigating landslide hazards on steep slopes. Clearing and grading activities disturb this natural stability and accelerate erosion, leading to potentially catastrophic landslides under extreme circumstances, such as heavy rainfalls, seismic vibrations, or rapid snowmelt.

Sherrard (1996) offers an overview of an approach to the management of riparian open space in Bellevue, Washington, which combines stream corridors, forested riparian hillsides, and residential subdivisions. The approach combines tree preservation and open space dedication requirements with municipal oversight of management plans for areas of common ownership through homeowners associations. The city adopted its sensitive areas ordinance in 1987 and updated it in 1996.

Tree conservation ordinances can address development problems in forested hillsides but may be less useful in other situations, where requirements for natural landscaping and protection of grassy vegetation may apply. As with so much else in this area, specific ordinance requirements must be built on a solid base of hazard identification and environmental research (Maryland Office of Planning 1993; Duerksen 1993).

Design review. The Oakland case study in Chapter 11 offers a prime example of the importance of design review with regard to wildfire hazards, particularly in a post-disaster context. The process of design review can be used to establish conformity with important criteria both for safety and aesthetic purposes. These commonly include building size, height and bulk, view protection, avoidance of fire-enhancing features such as overhangs and the use of wood shake or shingle roofs, attached downhill-side decks, and parking and loading facilities, among others. Boulder, Colorado, for instance, has outlawed the use of wood shake shingles. Local fire safety officials often can serve as good on-staff consultants concerning design details that enhance or detract from fire safety (Olshansky 1996).

For mitigation purposes, the focus of design review obviously varies with the nature of the hazard. Overhangs are undesirable, for instance, in coastal areas, though not for the same reasons as in wildfire zones. Rather, high

winds in hurricanes (and tornadoes, sometimes spawned by tropical cyclones) gain extra potency in tearing roofs off buildings because of the powerful leverage that overhangs afford. In fact, any insecurely fastened appendages, including porches, chimneys, exterior signs, lights, or doors, railings, and other adornments, may break loose and become airborne projectiles. In addition, buildings should be oriented to minimize the impact of the likely prevailing wind pattern and water flow in such storms, which for the most part is a known quantity. Although many of the best mitigation measures are related to building codes, design review plays a part in minimizing damage and danger, and there is, fortunately, a fair amount of research both already performed and underway to improve our understanding of wind-related impacts on the built environment (National Research Council 1993; FIA 1992; FIA/Hawaii 1993).

As a general matter, planners undoubtedly will be aware that, while important, hazard mitigation may not be the only, or even the primary, focus of design review following a disaster. As always, the process of post-disaster reconstruction offers an opportunity to reshape or to rationalize design compatibility in neighborhoods and commercial districts, and design review can be used to achieve aesthetic improvements that might take much longer under other circumstances. Arkadelphia, Arkansas, is a recent example of the use of design review within the context of a tornado overlay district, with the goal of developing a unified historical period appeal in the reconstruction of the central business district (Woodward-Clyde Associates 1997a).

Building codes. Planners generally have little direct influence over building codes, which for the most part are adopted at the state level and enforced by local building departments. Burby, May, and Paterson (1998) surveyed code enforcement practices and found inadequate compliance to be a major obstacle to the effective implementation of planning and development programs. They also found what they called a facilitative model of compliance, which concentrates on working cooperatively with regulated firms and individuals, to be more effective in producing results than a systematic model that concentrates on the deterrent effect of strict enforcement. Of course, the two approaches are not totally incompatible, but largely depend on emphasis, and a facilitative strategy can be just as aggressive as one of throwing the book at violators. The authors attribute their findings in part to the fact that compliance is often a matter of interpretation rather than one of obeying clear-cut rules. At the same time, Burby and French (1998) examined property losses in suburban jurisdictions from the Northridge Earthquake and found lower losses where communities had expended more effort on enforcing the seismic provisions of the Uniform Building Code.

Planners are not directly responsible for building codes, but they do have varying degrees of influence over the quality of enforcement, with more likelihood of successful interaction with building officials in jurisdictions where planning and building functions are consolidated in a single department. That consolidation means that a single agency administrator is overseeing both functions and can help to coordinate policy. In smaller jurisdictions, even without such consolidation, the more informal collegiality of a small municipal staff may also facilitate communication and coordination about areas of concern to planners.

In any event, it is important to see planning controls and building codes as complementary and compatible mitigation and reconstruction tools and not as tools that are in any way competing with each other as priorities in the disaster planning context. A comprehensive approach to hazard mitigation and sound post-disaster planning will emphasize each set of controls in its

As always, the process of post-disaster reconstruction offers an opportunity to reshape or to rationalize design compatibility in neighborhoods and commercial districts, and design review can be used to achieve aesthetic improvements that might take much longer under other circumstances.

In any event, it is important to see planning controls and building codes as complementary and compatible mitigation and reconstruction tools and not as tools that are in any way competing with each other as priorities in the disaster planning context. A comprehensive approach to hazard mitigation and sound post-disaster planning will emphasize each set of controls in its own place and seek to achieve useful synergies wherever each can strengthen the gains that the other produces.

own place and seek to achieve useful synergies wherever each can strengthen the gains that the other produces. For example, making a building both structurally wind-resistant and siting it so as to minimize exterior wind impacts (for example, by putting it behind dunes and tree cover that will brake wind speeds) enhances the efficacy of both structural and locational approaches to mitigation. Using stricter building codes in more hazardous areas is another way of integrating planning and building code concerns. Planners can be effective advocates for the enactment of building codes that exceed model codes and NFIP.

Although questions were raised about enforcement following the devastation of Hurricane Andrew, where one-fourth of the \$16 billion in insured losses were attributed to code violations (Burby, May, and Paterson 1998), the South Florida building code is especially geared to building wind resistance into the design of buildings in order to sustain hurricane wind damage. Ongoing wind research is expanding our knowledge of wind-resistant building qualities and is worth investigation. Planners at least would benefit from an understanding of the role and effectiveness of those codes in an overall strategy for wind hazard mitigation. (For more information, see National Research Council (1993) and Structural Engineers Association of Hawaii (1992).)

Construction techniques also can minimize obstructions to the flow of high-velocity waves in coastal high-hazard areas through construction on pilings and limiting the use of below-deck areas for carports and patios (FIA 1993c). This is congruent with NFIP regulations.

Building with fire-resistant materials, especially avoiding wood-shake roofs and broad overhangs, is the essential change needed for adaptation to the wildland/urban interface. One approach is to specify the performance criteria for such buildings while leaving the choice of building materials to builders to demonstrate their own creativity and the viability of alternative materials if they wish to work in the interface environment.

Building with fire-resistant materials, especially avoiding wood-shake roofs and broad overhangs, is the essential change needed for adaptation to the wildland/urban interface. One approach is to specify the performance criteria for such buildings while leaving the choice of building materials to builders to demonstrate their own creativity and the viability of alternative materials if they wish to work in the interface environment.

Seismic safety is an important premise for building code requirements in seismically active locations. While building codes, based on models developed by the three national model code organizations, are generally adopted at the state level and consigned to local enforcement, states do not always require local adoption of seismic safety provisions. One major issue in such codes is the feasibility of retroactively requiring retrofitting in existing buildings because of the potential cost implications. The balance between cost and safety considerations is one that must be decided locally based on the age and quality of the existing building stock and the public's willingness to adopt measures to ameliorate undesirable impacts on housing affordability. However, the National Earthquake Hazards Reduction Program (NEHRP) has developed useful documentation on this point. Based on studies performed on behalf of FEMA, the cost to rehabilitate existing buildings to meet the NEHRP recommended provisions is approximately \$20 per square foot. The cost to incorporate seismic strengthening in constructing new buildings to meet NEHRP-recommended provisions is approximately 5 percent of the structural cost of the building, equating to 1 to 2 percent of the total cost (FEMA 1993b, 1995g).

The whole issue of building codes takes on special significance because, to date, they have played a much larger role in earthquake hazard mitigation than have land-use regulations. The job of the building code with regard to seismic hazards is to reduce the likelihood of foundation failure and to heighten structural stability against lateral acceleration forces (BSSC 1990).

Special floodproofing techniques and materials can more easily be mandated for new construction in flood hazard areas, and FEMA has already published a series of technical bulletins as guides for compliance with such construction requirements (FIA 1993a-c). The requirements in the technical guides are those of NFIP; more stringent local codes would take precedence. FEMA has also sought the inclusion of flood-resistant construction standards into the three model building codes as well as the standards of the American Society of Civil Engineers (ASCE), which has incorporated provisions for the determination of flood loads and flood load combinations into ASCE 7-95, "Minimum Design Loads for Buildings and Other Structures," and a newer "Flood Resistant Design and Construction Standard," which can be incorporated into the building codes directly or by reference. FEMA partially funded this effort by ASCE to ensure the standard would meet or exceed NFIP minimum requirements.

Financial Tools

The growing costs of natural disasters was highlighted in Chapter 1 in explaining taxpayers' concerns that governmental responses to disasters become smarter and not simply more generous. Fixing what becomes broken in a disaster often requires substantial and, sometimes, huge financial resources. A host of federal programs now exist in whole or in part to respond to those needs, and identifying priorities for targeting those resources is a major task not only for federal grant makers but also for local and state governments, which both apply for and expend the funds available. This section is designed to identify specific uses for disaster funds and the issues planners must address in order to use them as wisely and efficiently as possible.

Florida, through its Resource Identification Strategy (RIS), is helping local governments obtain vital planning and technical assistance to strengthen their communities against the impacts of natural disasters. The Florida Department of Community Affairs has partnered with the Florida Public Affairs Center at Florida State University to develop RIS, which includes an online database (www.state.fl.us/comaff/hcd/fccr/ris) with information on historical and potential funding sources for disaster mitigation, disaster recovery, and long-term redevelopment projects. For readers of this document, Appendix C provides a directory of federal disaster assistance sources.

Targeting of Community Development Block Grant (CDBG) and other grant funds. Where should the grant money go for rebuilding the community? Planners can help advance the effectiveness of local hazard mitigation policy by redirecting portions of their community's CDBG funds as the nonfederal match for federal HMGP money and doing so in a way that enhances strategic objectives in the local post-disaster plan. This strategy has continued to be pursued very effectively in facilitating many of the buyouts in Midwest communities in the aftermath of the 1993 floods. Among them were Rhineland and Arnold, Missouri.

CDBG, Small Business Administration (SBA), and Economic Development Administration (EDA) programs and funds may be applied toward rebuilding communities' economies after disasters. All three agencies incorporate and promote mitigation strategies into resources being applied to disaster-stricken areas. It is important to note, however, that these agencies do not have specific post-disaster funds available as FEMA and other agencies do under Stafford Act authorization. Communities must therefore either tap into their pre-existing block grant funds or seek agency program funds appropriated by Congress annually.

In limited cases, however, Congress may grant supplemental funding to the U.S. Department of Housing and Urban Development (HUD) or EDA

Where should the grant money go for rebuilding the community? Planners can help advance the effectiveness of local hazard mitigation policy by redirecting portions of their community's CDBG funds as the nonfederal match for federal HMGP money and doing so in a way that enhances strategic objectives in the local post-disaster plan.

after a major disaster for specific recovery needs. Such funding to HUD augments the CDBG and Home Investment Partnerships (HOME) programs, and comes from Disaster Recovery Initiative (DRI) grants. HUD's formula "considers disaster recovery needs not met by other Federal disaster programs." Communities, in addition to having significant unmet recovery needs, must also be able to carry out a disaster recovery program. Most such communities, according to HUD, are already receiving allocations of CDBG or HOME funds. The communities receiving DRI funds also must award at least half the money for "activities that benefit low- and moderate-income persons." They may use the funds for recovery efforts involving housing, economic development, infrastructure, and prevention of further damage, so long as this does not duplicate funding already available from FEMA, SBA, and the U.S. Army Corps of Engineers. Before they can receive DRI funds, however, eligible local governments must develop and submit an Action Plan for Disaster Recovery describing the intended uses of the funds. (See the HUD web site at www.hud.gov/progdesc/disaster.html.)

One major fear of homeowners considering relocation from a floodplain or other hazard zone is that they may not find adequate or equivalent housing elsewhere. Particularly for low-income families, including those living in manufactured housing, these concerns are legitimate.

Relocation assistance. One major fear of homeowners considering relocation from a floodplain or other hazard zone is that they may not find adequate or equivalent housing elsewhere. Particularly for low-income families, including those living in manufactured housing, these concerns are legitimate. Special issues affecting minorities may also be a factor in some communities (see Perry, Greene, and Mushcatel 1983). These issues often include the treatment of rental housing and the relocation of tenants, and may introduce serious questions of environmental justice into the post-disaster recovery agenda. Effective acquisition and carefully targeted use of relocation assistance can persuade many of these people that the move is in their own long-term best interest and may be less painful than they thought. A planning department that gains a reputation for easing this aspect of a wrenching decision can garner valuable public acceptance of long-term hazard mitigation goals.

Special taxing or assessment districts. One way to send a market signal to developers and home buyers alike is to establish the principle that special services, such as those most likely to be used in an emergency by people living in hazard-prone areas, must be supported through special fees, taxes, or assessments in the area affected. The concept is akin to that commonly applied in other districts receiving special services or benefits and allows the community to establish the differential costs for those choosing to live or buy property in such areas. One example is the Lee County, Florida, All Hazards Protection District and its associated fund (Brower, Beatley, and Blatt 1987, Ch. 5).

California, in Division 17 of its Public Resources Code, enacted enabling legislation for a similar device called Geologic Hazard Abatement Districts (GHADs). Local governments may establish special assessment districts in the area of known geologic hazards and collect fees from property owners to finance repairs from landslides and implement geologic hazard mitigation measures. The local legislative body creating a GHAD may serve as its board of directors. While their use has not yet become widespread, these districts exist in some jurisdictions, such as Contra Costa County. The first two Contra Costa County GHADs were formed by the county and a subdivider prior to lot sale and development (Tyler 1995).

Tax increment financing (TIF). The underlying concept of a TIF district is somewhat opposite of a benefit assessment district, where additional taxes are levied to support additional services. A TIF district establishes a current base level of taxation determined by existing property values and assigns additional increments resulting from increases in future valuations to a

special fund used to pay for infrastructure improvements within the district. In other words, the planned improvements are expected to increase property values, and those increased values, when they materialize, produce additional property tax revenues that underwrite the cost of the improvements. In a neighborhood or business district badly devastated by a natural disaster, a TIF district can be an effective mechanism for financing the reconstruction of essential infrastructure ranging from new street lights to aesthetic changes in street and sidewalk design intended to draw new business to an area undergoing substantial redevelopment. TIFs invariably have some time limit applied to their existence, so that eventually the improvements return greater tax revenues to the larger community once the mission of redevelopment has been accomplished.

Many states have statutes authorizing the use of this differential taxing device. One interesting wrinkle regarding the use of TIF districts for post-disaster redevelopment, however, is that Alaska's TIF legislation specifically limits its use to earthquake recovery purposes.

Impact fees. Impact fees are a broader application of the concept behind benefit assessment districts. The idea is to make new development pay the costs of infrastructure expansion within the local jurisdiction. Typically, these fees have been used to underwrite the expansion of or addition to schools, libraries, fire and police stations, sewer and water services, and any number of other necessary public facilities. Their legality varies widely depending on state enabling legislation and the degree of freedom local governments have to craft their own revenue enhancement schemes. Consequently, planning departments considering impact fees as a growth control measure must check the applicable state legislation, if there is any. One difference from benefit assessments is that impact fees are not tied to the value enhancement of individual properties but, instead, are tied to the impact that those properties have on the overall level of need for particular facilities or services.

In a post-disaster context, one interesting example of the use of impact fees again comes from Lee County, Florida, where, in 1993, the county's department of public services proposed the creation of an emergency public shelter impact fee. The idea was to use the impact fee on new development to fund the development of adequate shelters to house those likely to be fleeing from highly hazardous areas during a hurricane. The study documenting the proposal details evacuation lead times, the numbers of people likely to need shelter services, and other relevant details in calculating the size of the fee needed to support the necessary services. Although the proposal was never enacted in Lee County, this innovative idea could well have applicability in highly flood-prone riverine areas as well as in coastal zones.

Differential taxation. Differential taxation does not enhance the local government's revenue stream directly or for clear post-disaster purposes. It is a long-term measure aimed at discouraging development in areas that the local government would prefer to see remain as some type of open space. It has been used extensively by states as a technique for lowering the effective cost of retaining forest or farmland by taxing such lands at their current use value, rather than the value at which the market might appraise them for other purposes, such as residential development. Where a local government seeks to retain undeveloped land in that state in a hazardous area, this may be an appropriate tool, although its use is likely to be heavily dependent on state legislation. One problem that is sometimes identified in literature on this type of taxing is that owners often are induced to retain the land only while there is a marginal benefit that outweighs the profits of selling or developing. For that reason, local governments may wish to enhance the effectiveness of such taxing with the use of a device called "existing use zoning" by Humbach

In a neighborhood or business district badly devastated by a natural disaster, a TIF district can be an effective mechanism for financing the reconstruction of essential infrastructure ranging from new street lights to aesthetic changes in street and sidewalk design intended to draw new business to an area undergoing substantial redevelopment.

(1992). This device avoids the problem of takings in relation to a landowner's development expectations simply by creating a category of existing use that is applied to land that is still currently used for forestry or agricultural purposes, thus allowing the owner to retain the value that he or she currently enjoys from the use to which the property is already put. Coupling this zoning device with differential taxation would remove most of the incentives for entertaining development proposals by making clear that a developer would have to seek to rezone the property before the land could acquire any anticipated additional value. If most surrounding land were in the same category, rezoning would become particularly difficult.

Urban renewal or redevelopment funds. Planning redevelopment projects can be every bit as complex and idiosyncratic as the individual communities that undertake them, each of which has its own special distribution of manufacturing and service businesses, employment base, business district infrastructure and character, and business retention prospects. Moreover, redevelopment projects are generally not under the direct control of planning departments but are administered by separately established redevelopment agencies upon which state legislation has bestowed powers of eminent domain for purposes of land assembly and redevelopment. It is essential that such entities understand and participate in mitigation plans and plans for post-disaster recovery and reconstruction, so that redevelopment goals and projects will not conflict with local government mitigation and recovery objectives, especially if the redevelopment districts are pre-identified as being in hazard-prone areas.

Planners need to take the initiative before a disaster strikes to collaborate with local redevelopment officials to determine what authority they may have to use the redevelopment agency as a funding source for post-disaster reconstruction purposes.

Because redevelopment funds represent an excellent potential source of money for rebuilding damaged areas, particularly in central business districts or pre-existing blighted areas, planners need to take the initiative before a disaster strikes to collaborate with local redevelopment officials to determine what authority they may have to use the redevelopment agency as a funding source for post-disaster reconstruction purposes.

Florida and California have both produced and commissioned guides and model plans to address the special problems involved in post-disaster redevelopment efforts (TBRPC 1994; Governor's Office of Emergency Services 1993, Chs. 29-30). While it is impossible here to detail the variations among 50 states in their redevelopment enabling legislation, it is interesting to consider California law because of the special attention that state has paid to post-earthquake recovery as an aspect of local redevelopment authority. As California's Seismic Safety Commission (1994a) notes, "Redevelopment agencies throughout the state have used their authority extensively to subsidize seismic retrofitting of unsafe structures and to assist with post-earthquake recovery." One interesting early example is that of Santa Rosa, which suffered a mild earthquake in 1969, in which no buildings collapsed, but many in the downtown were damaged. Santa Rosa expanded its existing redevelopment district to include the central business district and used its federal contribution of \$5 million to acquire and clear some properties for a major regional shopping center. More importantly, the city over the next two years developed and adopted a resolution requiring a preliminary inspection (at city expense) of all buildings built before 1958 and setting up a program for upgrading such buildings to meet newer seismic retrofit standards (William Spangle and Associates 1980).

The passage in 1994 of California Assembly Bill 1290, which changed the definition of blighted areas, facilitated the inclusion of disaster-stricken properties so that redevelopment authorities could use their funds for mitigation. At the time, 375 redevelopment agencies in the state were overseeing 665 redevelopment project areas, many involving older down-



Department of Housing and Redevelopment, City of Santa Rosa

towns whose buildings are more vulnerable because they were built prior to the adoption of modern seismic building code standards. The seismic commission's Compendium of Background Reports for the Northridge Earthquake cites several examples of both:

- the use of tax-increment financing to subsidize seismic hazard mitigation, largely to retrofit unreinforced masonry buildings (Culver City; Fullerton; City of Orange); and
- assistance in post-earthquake recovery, such as subsidizing repair of damaged structures, alleviating hazardous conditions (including through demolition), and providing relocation and temporary housing assistance to property owners and residents (Coalinga, Whittier, and Santa Cruz, the last being detailed in the case study in Chapter 12).

One interesting feature of California redevelopment legislation, adopted in 1964 to address tsunami damage in Crescent City after the Alaska earthquake, is the Community Redevelopment Financial Assistance and Disaster Project Law (California Health and Safety Code, Section 34000 et seq.), known popularly as the "disaster law." Its importance lies in its provisions for expedited plan adoption if the proposed redevelopment area is certified by the governor as in need of assistance and the president has declared it a disaster area. The three cities cited above have all used this measure to speed the process of adopting plans and implementing post-disaster redevelopment projects (William Spangle and Associates 1991).

Following an earthquake in 1969, Santa Rosa, California, undertook redevelopment of downtown buildings. The inset photo shows retrofit buildings and the cleared site for a new mall in 1979; the photo below shows the completed mall in 1986.

An interesting local plan for redevelopment emerged out of the devastated town of Homestead, Florida, after Hurricane Andrew. The local redevelopment agency, Homestead Economic and Rebuilding Organization (HERO), was created in the aftermath of the disaster to help rebuild a community that lost 8,000 jobs when the Homestead Air Force Base was virtually destroyed. The business community devastation was nearly as massive. Nevertheless, despite losing the presence of major league baseball for spring training, Homestead built a Grand Prix auto racing track, new housing, and a park.

Because Homestead is a smaller city (population 26,000) with a spotty planning history prior to Andrew, this attempt constitutes a potentially interesting example for other communities of similar size (Enterprise/Homestead Planning/Action Team and City of Homestead 1993; City of Homestead-Enterprise/Homestead and HERO 1993). Local or regional planners may also wish to consider the desirability of at least having in place contingency plans for the efficient post-disaster formation of such a redevelopment authority where none already exists.

Public mortgage lending subsidies and policies. Many cities and states have programs to subsidize interest rates or provide other breaks for low-income and first-time home buyers or to encourage redevelopment in blighted areas. Examples of the latter group include sweat equity and homesteading programs that allow willing buyers to acquire and rehabilitate blighted properties at little or no cost in order to put them back on the tax rolls and revitalize the community. Reexamining the policies that guide these programs with an eye to achieving hazard mitigation in the bargain is a way to leverage these public subsidies to prevent future disaster damage.

Transfer of development rights. One way of reducing density in hazardous areas is to allow property owners to sell or transfer their development rights to developers of property in other, nonhazardous areas of the community. This technique is applicable across all hazard categories if properly framed to define the boundaries of the transferring and receiving areas and the circumstances under which rights may be transferred. The technique has been used in several locations around the U.S., including Montgomery County, Maryland, where it is part of a program for protecting farmland. Using it in a natural hazards context is simply a change of purpose, but a valid one. This technique might be especially useful in the aftermath of a natural disaster as a means of persuading some landowners to redevelop outside the most heavily stricken areas. Fortunately, planners considering such options have several good resources in the planning literature to guide their thinking and steer them past any legal pitfalls (Maryland Office of Planning 1995a; Roddewig and Inghram 1987; Bredin 1998).

Scottsdale, Arizona, uses density transfers tied specifically to hazardous conditions as well as the protection of natural resources in its Environmentally Sensitive Lands Ordinance, adopted in 1991. The provisions allow transfers from areas with slopes that are unstable or exceed 25 percent, or areas appearing on the city's special features map (Olshansky 1996, Appendix C).

TDR programs require some land-use sophistication on the part of the jurisdiction managing the program. The administration of the program can take several forms. One extreme is simply to designate the sending and receiving areas and the allowable density rights in each and otherwise let the market operate within those parameters. The other end of the spectrum occurs when the jurisdiction itself serves as the broker, buying and selling land development rights. This allows greater control over prices and procedures but requires more direct oversight and staff expense. Variations on these themes involve more limited interventions based on particular policy considerations of the local government and its comprehensive plan. In any case, the local planning

department must develop a substantial knowledge base concerning local market conditions and trends in order to operate an effective program that achieves comprehensive plan objectives. (See also Brower, Beatley, and Blatt (1987, pp. 133-36) and Roddewig and Inghram (1987).)

Management Tools

Coordination with neighboring jurisdictions. Beyond mutual aid agreements, discussed in Chapter 3, lie a host of potential devices for cooperation on natural hazards problems, many of which get far less attention than they deserve. Floodplain management is one area that is overly ripe for regional cooperation between neighboring municipalities, and one that can yield substantial dividends even in smaller watersheds. Despite the frequent competition between neighboring communities in large metropolitan areas, Glassford (1993) offers an intriguing contrary example of a successful cooperative agreement among seven southern Chicago suburbs in the case of Butterfield Creek. Formed in 1983, the Butterfield Creek Steering Committee (BCSC) first engaged the U.S. Soil Conservation Service (now the Natural Resources Conservation Service) and the Illinois Department of Transportation's Division of Water Resources to study flooding problems and learned that 100-year flood levels in some locations were as much as 2.5 feet higher than existing FIRMs indicated, and that the problem could get worse with further development upstream in natural storage areas.

By November 1990, BCSC had reviewed local ordinances and published its own Butterfield Creek Model Floodplain and Stormwater Management Code. The model code strengthens detention requirements, requires effective soil erosion and sediment control, encourages natural drainage practices like swales and vegetative filters, and limits many uses in the floodway. One example of implementing the last point is a sunken baseball diamond in Flossmoor, which doubles as a catch basin to retain and dissipate flood waters without damaging nearby properties. What the BCSC model demonstrates above all is the value of local leadership in establishing the basis for cooperation on natural hazards that cross municipal boundaries in a metropolitan area.

Training programs. Because the whole arena of emergency management and planning for post-disaster recovery and reconstruction involves so much technical and procedural knowledge, FEMA and state emergency management agencies have made available a number of training tools for use by local government officials. These include technical assistance available from FEMA regional offices (see Appendix D), FEMA manuals and guides for mitigation and disaster planning, and the programs of FEMA's Emergency Management Institute (EMI) in Emmitsburg, Maryland. Specifically relevant to training for post-disaster recovery are three tabletop mitigation and recovery exercises, which provide earthquake, flood, and hurricane recovery scenarios. The facilitator's guide for these exercises is available on the Internet at www.fema.gov/priv/g398.htm. This allows local officials to decide whether to stage the exercise themselves or engage their state hazard mitigation officer to do so.

Geographic Information Systems (GISs) and the Global Positioning System (GPS). Few planning concerns lend themselves better to the use of modern computer technology than natural hazards. GIS combines mapping and database features to perform data storage and computation functions that were measurably more complex prior to the advent of this technology, which continues to improve constantly, like virtually all software innovations. Properly maintained, GIS can enable planners to access more information more quickly and make better informed, more sophisticated land-use decisions than would have seemed possible just a generation ago.

Beyond mutual aid agreements lie a host of potential devices for cooperation on natural hazards problems, many of which get far less attention than they deserve. Floodplain management is one area that is overly ripe for regional cooperation between neighboring municipalities, and one that can yield substantial dividends even in smaller watersheds.

Few planning concerns lend themselves better to the use of modern computer technology than natural hazards. GIS combines mapping and database features to perform data storage and computation functions that were measurably more complex prior to the advent of this technology, which continues to improve constantly, like virtually all software innovations.

GIS has come increasingly into its own as an essential post-disaster tool with some of the more recent disasters, including the Northridge earthquake (Topping 1994). Topping has developed a useful list of data layers relevant to disaster needs. (See sidebar.) However, for cost reasons among others, GIS will seldom if ever be used only for disaster planning purposes, and generally has served more than planning purposes when purchased, installed, and maintained by local governments. GIS systems are complex multipurpose tools that can help local officials coordinate and integrate data concerning a wide variety of land-use concerns, including infrastructure, housing, natural resources and hazards, zoning, and commercial and industrial activities. In short, the versatility of GIS mirrors the complexity of the issues planners will face in managing post-disaster recovery and reconstruction. In making the leap into the use of GIS, however, a local government should understand the commitment it must make in terms of time and personnel to maintain the database that will allow planners and other decision makers to realize the system's potential utility (Monmonier 1997).

GPS technology is increasingly being used to complement GIS in post-disaster damage assessments. In rural areas, for example, it is particularly valuable in establishing the location of damaged properties for disaster assistance and mitigation planning purposes.

Soil stability ratings. Accessing good soil data is a necessary prelude to the development of the regulatory tools in a hillside development ordinance. Local government planners can turn to the U.S. Geological Survey (USGS) for information, much of which is increasingly available through the USGS World Wide Web site on the Internet (www.usgs.gov), and to the Natural Resources Conservation Service. Preparatory to a site plan or subdivision review, however, it would be wise to require a geologic site investigation (see below) to develop adequate data for decision making (Olshansky 1996).

Soil and water conservation districts also provide soil reports on rezonings and subdivision proposals. Communities should take these sources of information seriously, although many currently do not.

Geologic studies. The standard method for ensuring the geologic suitability of a site for development is to require the completion of a geologic, or geotechnical, site investigation prior to review. In most cases, the applicant is required to hire the engineering geologist who prepares the study. The study may then be reviewed, depending on the circumstances and the requirements of local ordinances, by the local planning agency, an outside geologist hired by the jurisdiction, and/or by a staff geologist working either in the planning department or in some other division of local government (for example, public works). The local regulations should specify the level of detail and the specific types of supporting information desired in the study, including maps. Figure 5-4 illustrates the differentiation spelled out in the regulations for Santa Clara County, California (Tyler 1995).

This tool can be linked to zoning inasmuch as those areas required to have this review would have to lie within certain zoning categories where the hazard identification process outlined in Chapters 3 and 4 has shown that there are special problems.

Salt Lake County, Utah, which faces serious seismic safety problems along the Wasatch Front as well as slope stability problems in the nearby mountains, enacted its Natural Hazards Ordinance (Salt Lake County Zoning Ordinance Chapter 19.75) in 1989. Any applicant "requesting development on a parcel of land within a natural hazards study area" must submit a natural hazards report by an engineering geologist, or in the case of snow avalanche hazard, by a experienced avalanche expert. The report

GPS technology is increasingly being used to complement GIS in post-disaster damage assessments. In rural areas, for example, it is particularly valuable in establishing the location of damaged properties for disaster assistance and mitigation planning purposes.

Initial GIS Data Layers Useful to Response and Recovery

PREDEVELOPED DATA LAYERS

- congressional district boundaries
- state assembly and senate district boundaries
- metropolitan planning area boundaries
- county boundaries
- city boundaries
- local community and council district boundaries and areas
- special district boundaries
- school district boundaries
- ZIP code and postal place name boundaries and areas
- redevelopment area boundaries
- Census block group characteristics, including household size, owner-renter occupancy, income, age, ethnicity, and language data
- type of unit: single-family detached, multifamily attached, *number of floors**
- type of structure: wood-frame, URM, reinforced concrete, etc.
- manufactured housing parks
- freeways, interchanges, and ramps
- arterial and local streets with address ranges and street names
- dirt roads and four-wheel drive trails
- railroads, surface rail transit lines, and stations
- international, regional, and general aviation airports
- flood hazard areas and stream beds
- areas subject to liquefaction, strong ground motion, and seismically induced landslides
- Alquist-Priolo Study Zones areas (California)
- potential dam and tsunami inundation areas
- fire hazard areas
- areas subject to slumping, ground failure, and debris flows
- existing land-use polygons and areas
- unreinforced masonry (URM) buildings
- historical buildings
- public and private schools and areas
- hospitals, including type, number of beds
- emergency medical centers
- parks, including buildings and areas
- community centers
- police and fire stations
- nuclear and conventional power plant locations
- major oil and gas pipeline and storage tank locations
- powerline, waterline, and dam locations
- digital elevation models (DEMs), topography, slope, aspect
- hazardous materials, chemical, and ordinance storage sites

INCIDENT-SPECIFIC DATABASE ITEMS

- road closures and rerouting
- building damage by address and assessor's parcel number
- infrastructure damage location and extent by facility type
- shaking intensities
- ground motion, including horizontal and vertical displacement
- areas of ground rupture, liquefaction, landsliding
- areas flooded at crest
- tsunami high water line and areas
- burned areas
- *location of shelters**
- *location of temporary housing**
- Disaster Assistance Center and service center locations
- individual assistance applicants
- public assistance applicants
- hazard mitigation analytic maps

* Items in italics were added to the original source list for purposes of this PAS Report.

Source: Kenneth C. Topping, *OES GIS Strategic Plan*, Circulation Draft, prepared for Office of Emergency Services, State of California.

Figure 5-4. Hazard Zones and Investigation Requirements
Summarized from Santa Clara County, California, Relative Seismic Stability Map

	HAZARDS	INVESTIGATION REQUIREMENTS
RED	Areas of high potential for liquefaction, lateral spreading, differential settlement, fault rupture, earthquake-induced landslides, tsunamis, and flooding.	Site investigations mandatory unless detailed information permits waiver.
YELLOW	Area of moderate potential for liquefaction, lateral spreading, and earthquake-induced landslides.	Site investigations required unless waived by county.
GREEN	Area with low potential for liquefaction, lateral spreading, and earthquake-induced landslides.	Site investigation not automatically required; may be required by county on the basis of detailed information.

Source: Tyler (1995)

Planners and planning departments are perennially faced with the need to improve public understanding of the goals of the planning process and the means of achieving them. Natural hazards are among the more complex issues requiring elucidation in this regard, but the stakes are high, and as has been discussed with regard to multiobjective management, other actors on the local political scene are likely both to be informed about some of the issues and to have a stake in advancing the cause of hazard mitigation and sustainable post-disaster recovery and reconstruction.

must include a detailed site map (i.e., one inch equal to 200 feet), with delineation of recommended setback distances and locations for structures. (See Figure 5-5.) While many jurisdictions contract with an independent geotechnical expert for review of the adequacy of such studies, Salt Lake County is the only county in Utah to retain its own staff geologist within the planning department. One significant advantage of this arrangement, where the work load is sufficient to make it cost-effective, is that a staff geologist can over time develop a much stronger working knowledge of the local environment than can an outside expert.

Public education. Planners and planning departments are perennially faced with the need to improve public understanding of the goals of the planning process and the means of achieving them. Natural hazards are among the more complex issues requiring elucidation in this regard, but the stakes are high, and as has been discussed with regard to multiobjective management, other actors on the local political scene are likely both to be informed about some of the issues and to have a stake in advancing the cause of hazard mitigation and sustainable post-disaster recovery and reconstruction. However, the best time to initiate the public education is unquestionably during the pre-disaster period. Even though it may be easier and vitally necessary to get people's attention after a disaster, the message will be more effective if the groundwork for disseminating it has been laid beforehand.

Examples of good pre-disaster public education campaigns by local government, especially those involving planning departments, abound in each hazard category. While these may be developed locally and independently, sometimes they are coordinated with other entities, including the American Red Cross, which produces its own public education resources. One of the most common subjects is floodproofing, often including the use of technical open houses and other hands-on means of conveying information to homeowners (U.S. Army Corps of Engineers 1994; FEMA 1986). Glassford (1993) notes that this technique was particularly effective in reaching homeowners after flooding incidents along Butterfield Creek in the south Chicago suburbs. In addition, Florida's Department of Community Affairs (n.d.) has supported education efforts about hurricanes and other coastal hazards. USGS (n.d.) has produced public education materials concerning

earthquakes customized to individual regions of the country, such as the Bay Area and southern Alaska. FEMA (1993a) has also produced some general purpose booklets for public consumption that local officials can use, as well as providing a good deal of public education material on its World Wide Web site (www.fema.gov).

The value of public education in helping to build informed consensus behind an effective plan for post-disaster recovery and reconstruction, or an effective long-term plan for hazard mitigation, should be obvious from the foregoing discussion in Chapter 4. An informed public is a potential ally planners can ill afford to forego if they wish to address disaster issues in a serious manner.

A MODEL RECOVERY AND RECONSTRUCTION ORDINANCE

The model recovery and reconstruction ordinance that follows these introductory paragraphs is based on the principles established elsewhere in this PAS Report. It provides basic elements of a comprehensive ordinance establishing a recovery organization and authorizing a variety of pre- and post-event planning and regulatory powers and procedures related to disaster recovery and reconstruction. Designed to be adopted in advance of

Figure 5-5. Special Study Area Report Requirements, Salt Lake County, Utah

Land Use (Type of Facility)	IS A SITE-SPECIFIC NATURAL HAZARDS REPORT REQUIRED PRIOR TO APPROVAL?			
	Liquefaction Potential High and Moderate	Very Low and Low	Surface Fault Rupture Special Study Area	Avalanche Path Special Study Area
Critical facilities (essential and hazardous facilities, and special occupancy structures)	Yes	Yes	Yes	Yes
Industrial and commercial buildings (more than 2 stories or less than 5,000 square feet)	Yes	No	Yes	Yes
Multifamily residential structures (4 or more units per acre, and all other industrial and commercial)	Yes	No	Yes	Yes
Residential subdivisions	Yes	No	Yes	Yes
Residential single lots and multifamily dwellings (less than 4 units per acre)	No	No	Yes	Yes

Source: Salt Lake County, Utah, Zoning Ordinance, Chapter 19.75

a major disaster, it can also be quickly adapted to post-disaster conditions if it has not been adopted before the disaster.

Unlike ordinary planning ordinances, this ordinance requires involvement by many other departments within the city or county government organization under the guidance and leadership of the city manager, county administrative officer, or equivalent position. Some of the actions called for

by this ordinance require direct involvement of the planning department, although frequently it will be acting in concert with other departments. Having an inherently interdepartmental focus, this ordinance structures a model process that has generic value. Due to widely ranging circumstances, however, the content may vary considerably.

The essential concepts of this ordinance include: the establishment of a recovery organization before a major disaster to prepare a pre-event plan; the adoption of that plan and this ordinance by the governing body before a major disaster occurs; and the use of the recovery plan and organization to efficiently and wisely guide post-disaster recovery and reconstruction activity. The recovery organization may be constructed differently from place to place, but the idea is to create an ongoing organization integrated with, but extending beyond, any existing emergency operations organization.

Although an existing emergency operations organization may serve as a useful base from which to fashion a recovery organization, there are certain fundamental differences in function that make it preferable to establish a recovery organization that operates parallel to the emergency response organization. Continuity of the recovery organization and expediting the rebuilding processes for which it is responsible become very important.

Although an existing emergency operations organization may serve as a useful base from which to fashion a recovery organization, there are certain fundamental differences in function that make it preferable to establish a recovery organization that operates parallel to the emergency response organization. Continuity of the recovery organization and expediting the rebuilding processes for which it is responsible become very important.

1. Local government emergency response organizations tend to focus on emergency preparedness and response operations. Strongly oriented toward police and fire functions, during "peace-time" they characteristically handle routine local emergencies and undertake training and preparedness for disaster response operations. Typically, recovery and reconstruction functions do not fall within their purview, although this is beginning to change in some jurisdictions.
2. Some powers reflected by this ordinance are activated by the declaration of a local emergency. However, these powers are characteristically broader than emergency response powers because the latter do not include property, building, land-use, and development regulations, or the public hearing process.
3. Certain regulatory powers authorized by this ordinance are identified for initial implementation during the time in which a declaration of local emergency is in effect. However, such powers tend to be extended for much longer periods of time. Although a declared emergency may not be terminated for months after the end of emergency response operations, complete implementation of rebuilding processes often takes years.

In short, this is an emerging area of disaster management practice that crosses over into city planning, redevelopment, and building. Much of the thinking and implementation for the processes identified in this ordinance have only emerged within professional literature or practice within the past decade. Although some form of ad hoc recovery organization is created with every major disaster, such arrangements tend to exist for the peak rebuilding period and then are disbanded. As yet, very few local jurisdictions have formally created recovery organizations in advance of a disaster or maintained them continuously afterwards.

This ordinance structures many processes that tend to take place anyway after a major disaster without forethought or knowledge of available options. It provides organizational and procedural dimensions that can accelerate thinking and planning needed in advance of a disaster to recover and rebuild more wisely and efficiently than would happen were such preparation not to occur. It captures the broadest possible range of pre-event and post-disaster activities that interact with urban planning and development,

recognizing that not all provisions may be germane to circumstances within individual communities.

There is little established practice of record to use as a point of departure. Few ordinances in use by local jurisdictions deal with such a broad scope of recovery functions. Those which have been adopted tend to cover a more limited range of elements, such as rebuilding, permitting, and nonconforming use procedures. With the upswing in major disasters in the last several years, however, substantial experimentation is taking place, and more communication is occurring regarding outcomes of various recovery strategies.

These processes will inevitably lead to revisions of the ideas reflected here. Therefore, this ordinance should be considered a framework for flexible application of pre-event and post-event procedures that can be modified to fit emerging ideas as well as local conditions. Although a separate ordinance is not essential to the performance of many functions, the value of adopting a recovery ordinance is in providing clear policy guidance in advance for dealing with contingencies as well as an overall rationale in case of legal challenge.

The following ordinance language is interspersed with italicized commentaries that provide alternatives or amplification. Commentaries sometimes identify areas for possible modification or explain reasons why certain provisions are included. Commentary has been omitted for sections that are self-explanatory or unlikely to require change.

Certain conventions have been included throughout the model that will require change by some local governments. Specifically, terms that are bracketed are generic and need to be replaced with specific local titles. These terms include name of jurisdiction, the name of the appropriate local legislative body (e.g., the city council), and equivalents for state emergency management agency, recovery task force, and other committees, agencies, legislation, and plans. The numbering system is designed to reflect the structure of the ordinance content and may require adaptation to the numbering of local ordinances.

A MODEL RECOVERY AND RECONSTRUCTION ORDINANCE by Kenneth C. Topping, AICP

Chapter ____. Disaster Recovery and Reconstruction

Section 1. Authority

Section 2. Purposes

Section 3. Definitions

- 3.1 Damage Assessment Survey
- 3.2 Development Moratorium
- 3.3 Director
- 3.4 Disaster Recovery Centers (DRCs)
- 3.5 Disaster Field Office
- 3.6 Damage Survey Report (DSR)
- 3.7 Emergency
- 3.8 Event
- 3.9 Federal Response Plan (FRP)
- 3.10 Flood Insurance Rate Map (FIRM)
- 3.11 Hazard Mitigation Grant Program
- 3.12 Historic Building or Structure
- 3.13 Individual Assistance Program
- 3.14 In-Kind
- 3.15 Major Disaster
- 3.16 Interagency Hazard Mitigation Team

About the Author

Kenneth C. Topping, former consultant and City of Los Angeles planning director, is general manager for the Cambria Community Services District near the Hearst Castle on the Central Coast of California. He is also the author of Chapter 11 of this PAS Report, which documents the Oakland, California, wildfires of 1991.

- 3.17 Public Assistance Program
- 3.18 Reconstruction
- 3.19 Recovery
- 3.20 Recovery Organization
- 3.21 Recovery Plan
- 3.22 Recovery Strategy
- 3.23 Safety Element
- 3.24 Stafford Act

Section 4. Recovery Organization

- 4.1 Powers and Duties
- 4.2 Recovery Task Force
- 4.3 Operations and Meetings
- 4.4 Succession
- 4.5 Organization
- 4.6 Relation to Emergency Management Organization

Section 5. Recovery Plan

- 5.1 Recovery Plan Content
- 5.2 Coordination of Recovery Plan with FEMA and Other Agencies
- 5.3 Recovery Plan Adoption
- 5.4 Recovery Plan Implementation
- 5.5 Recovery Plan Training and Exercises
- 5.6 Recovery Plan Consultation with Citizens
- 5.7 Recovery Plan Amendments
- 5.8 Recovery Plan Coordination with Related (City, County) Plans

Section 6. General Provisions

- 6.1 Powers and Procedures
- 6.2 Post-Disaster Operations
- 6.3 Coordination with FEMA and Other Agencies
- 6.4 Consultation with Citizens

Section 7. Temporary Regulations

- 7.1 Duration
- 7.2 Damage Assessment
- 7.3 Development Moratorium
- 7.4 Debris Clearance
- 7.5 One-Stop Center for Permit Expediting
- 7.6 Temporary Use Permits
- 7.7 Temporary Repair Permits
- 7.8 Deferral of Fees for Reconstruction Permits
- 7.9 Nonconforming Buildings and Uses

Section 8. Demolition of Damaged Historic Buildings

- 8.1 Condemnation and Demolition
- 8.2 Notice of Condemnation
- 8.3 Request to FEMA to Demolish
- 8.4 Historic Building Demolitions Review

Section 9. Temporary and Permanent Housing

Section 10. Hazard Mitigation Program

- 10.1 Safety Element
- 10.2 Short-Term Action Program
- 10.3 Post-Disaster Actions
- 10.4 New Information

Section 11. Recovery and Reconstruction Strategy

- 11.1 Functions
- 11.2 Review

Section 12. Severability

WHEREAS, [jurisdiction name] is vulnerable to various natural hazards such as earthquakes, flooding, wildfires, and wind, resulting in major disasters causing substantial loss of life and property;

WHEREAS, [jurisdiction name] is authorized under state law to declare a state of local emergency and take actions necessary to ensure the public safety and well-being of its residents, visitors, business community, and property during and after such major disasters;

WHEREAS, it is essential to the well being of [jurisdiction name] to expedite recovery and reconstruction, mitigate hazardous conditions, and improve the community after such major disasters;

WHEREAS, disaster recovery and reconstruction can be facilitated by establishment of a recovery organization within [jurisdiction name] to plan, coordinate, and expedite recovery and long-term reconstruction activities;

WHEREAS, preparation of a pre-event plan for disaster recovery and reconstruction can help [jurisdiction name] organize to expedite recovery in advance of a major disaster and to identify and mitigate hazardous conditions, both before and after such a disaster;

WHEREAS, recovery can be expedited by pre-event adoption of an ordinance authorizing certain extraordinary governmental actions to be taken during the declared local emergency to expedite implementation of recovery and reconstruction measures identified in a pre-event plan;

WHEREAS, it is mutually beneficial to cooperatively plan relationships needed between [jurisdiction name] and other state and federal governmental authorities;

WHEREAS, it is informative and productive to consult with representatives of business, industry and citizens' organizations regarding the most suitable and helpful approaches to disaster recovery and reconstruction;

The [name of legislative body] does hereby ordain:

SECTION 1. AUTHORITY

This ordinance is adopted by the [name of legislative body] acting under authority of the [authorizing legislation], [state emergency management act *or* equivalent], and all applicable federal laws and regulations.

SECTION 2. PURPOSES

It is the intent of the [name of legislative body] under this chapter to:

- authorize creation of an organization to plan and prepare in advance of a major disaster for orderly and expeditious post-disaster recovery and to direct and coordinate recovery and reconstruction activities;
- direct the preparation of a pre-event plan for post-disaster recovery and reconstruction to be updated on a continuing basis;
- authorize in advance of a major disaster the exercise of certain planning and regulatory powers related to disaster recovery and reconstruction to be implemented upon declaration of a local emergency;
- identify means by which [jurisdiction name] will take cooperative action with other governmental entities in expediting recovery; and implement means by which [jurisdiction name] will consult with and assist citizens, businesses, and community organizations during the planning and implementation of recovery and reconstruction procedures.

SECTION 3. DEFINITIONS

As used in this ordinance, the following definitions shall apply:

- 3.1 damage assessment survey.** A field survey to determine levels of damage for structures and identify the condition of structures.
- 3.2 development moratorium.** A temporary hold, for a defined period of time, on the issuance of building permits, approval of land-use applications or other permits and entitlements related to the use, development, redevelopment, repair, and occupancy of private property in the interests of protection of life and property.
- 3.3 Director.** The director of the [recovery organization] or an authorized representative.
- 3.4 Disaster Field Office (DFO).** A center established by FEMA for coordinating disaster response and recovery operations, staffed by representatives of federal, state, and local agencies as identified in the Federal Response Plan (FRP) and determined by disaster circumstances.

- 3.5 **Disaster Recovery Centers (DRCs).** A multi-agency center organized by FEMA for coordinating assistance to disaster victims.
- 3.6 **Damage Survey Report (DSR).** A claim by a local jurisdiction for financial reimbursement for repair or replacement of a public facility damaged in a major disaster, as authorized under the Stafford Act and related federal regulations, plans, and policies.
- 3.7 **emergency.** A local emergency, as defined by the Municipal Code, which has been declared by the [legislative authority] for a specific disaster and has not been terminated.
- 3.8 **event.** Any natural occurrence that results in the declaration of a state of emergency and shall include earthquakes, fires, floods, wind storms, hurricanes, etc.
- 3.9 **Federal Response Plan (FRP).** A plan to coordinate efforts of the government in providing response to natural disasters, technological emergencies, and other incidents requiring federal assistance under the Stafford Act in an expeditious manner.
- 3.10 **Flood Insurance Rate Map (FIRM).** An official map of the community, on which the Federal Insurance Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.
- 3.11 **Hazard Mitigation Grant Program.** A federal program that assists states and local communities in implementing long-term hazard mitigation measures following a major disaster declaration.
- 3.12 **historic building or structure.** Any building or structure listed or eligible for listing on the National Register of Historic Places, as specified by federal regulation, the state register of historic places or points of interest, or a local register of historic places, and any buildings and structures having historic significance within a recognized historic district.
- 3.13 **in-kind.** The same as the prior building or structure in size, height and shape, type of construction, number of units, general location, and appearance.
- 3.14 **Interagency Hazard Mitigation Team.** A team of representatives from FEMA, other federal agencies, state emergency management agencies, and related state and federal agencies, formed to identify, evaluate, and report on post-disaster mitigation needs. [Note: Not all states employ the use of this team.]
- 3.15 **major disaster.** Any natural catastrophe (including any [hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought]), or, regardless of cause, any fire, flood, or explosion, which in the determination of the President of the United States causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of states, jurisdictions, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.
- 3.16 **reconstruction.** The rebuilding of permanent replacement housing, construction of large-scale public or private facilities badly damaged or destroyed in a major disaster, addition of major community improvements, and full restoration of a healthy economy.
- 3.17 **recovery.** The process by which most of private and public buildings and structures not severely damaged or destroyed in a major disaster are repaired and most public and commercial services are restored to normal.
- 3.18 **recovery organization.** An interdepartmental organization that coordinates [jurisdiction name] staff actions in planning and implementing disaster recovery and reconstruction functions. [Note: "Recovery organization" is a generic term. Other locally chosen names (e.g., The Municipal Disaster Recovery Commission) can, of course, be substituted.]
- 3.19 **recovery plan.** A pre-event plan for post-disaster recovery and reconstruction, composed of policies, plans, implementation actions, and designated responsibilities related to expeditious and orderly post-disaster recovery and rebuilding, with an emphasis on mitigation.

- 3.20 recovery strategy.** A post-disaster strategic program identifying and prioritizing major actions contemplated or under way regarding such essential recovery functions as business resumption, economic reinvestment, industrial recovery, housing replacement, infrastructure restoration, and potential sources of financing to support these functions.
- 3.21 safety element.** An element of the comprehensive, long-term general plan for the physical development of a community that addresses protection of the community from unreasonable risks associated with the effects of earthquakes, landslides, flooding, wildland and urban fires, wind, coastal erosion, and other natural and technological disasters.
- 3.22 Stafford Act.** The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended).

SECTION 4. [RECOVERY ORGANIZATION]

There is hereby created the [recovery organization] for the purpose of coordinating [jurisdiction name] actions in planning and implementing disaster recovery and reconstruction activities.

- 4.1 Powers and duties.** The [recovery organization] shall have such powers as enable it to carry out the purposes, provisions, and procedures of this chapter, as identified in this chapter.
- 4.2 [Recovery Task Force].** The [recovery organization] shall include a [recovery task force or locally chosen term] comprised of the following officers and members:
- a. The [title of the chief executive officer (e.g., the mayor)] who shall be Chair;
 - b. The [title of deputy chief executive officer (e.g., city manager or county or town equivalent)] who shall be Director and Vice-Chair;
 - c. The [title of the next ranking executive officer (e.g., assistant city manager)] who shall be Deputy Director, and who shall act as Vice-Chair in the absence of the Vice-Chair;
 - d. The [title of the jurisdiction's legal adviser] who shall be Legal Adviser;
 - e. Other members, including the [list the titles of other interested jurisdiction officials, which might include the chief building official, chief engineer, the director of community development or planning, the fire chief, the emergency management coordinator, the general services director, the historic preservation commission director, the police chief, the director of public works, and the director of utilities], together with representatives from such other departments and offices as may be deemed necessary by the Chair or Director for effective operation.

Commentary. The formal structure of a recovery organization will vary from community to community. The important thing is to include representatives from agencies and organizations so that the broadest array of functions that may have a direct or indirect role in recovery and reconstruction can be addressed. Also, formal leadership may vary by size and structure of local governmental organization. In a big-city environment, presence and availability of the mayor or a deputy mayor may be important from a leadership standpoint, even though recovery in many instances is largely a staff-driven process. On the other hand, in a typical council-manager form of government, inclusion of the mayor may not be very useful. The intent here is to provide a communications connection with the appropriate legislative body as well as a ceremonial function.

- 4.3 Operations and Meetings.** The Director shall have responsibility for [recovery organization] operations. When an emergency declaration is not in force, the [recovery task force] shall meet monthly or more frequently, upon call of the Chair or Director. After a declaration of an emergency, and for the duration of that declared emergency period, the [recovery task force] shall meet daily or as frequently as determined by the Director.

Commentary. The overall concept here is for the city manager to run the recovery task force operations on behalf of the city council, reserving the presence of the mayor for those times when policy matters are being discussed or at critical junctures following a major disaster. In actuality, the city manager inevitably becomes the pivotal party for informing and advising the city council on recovery matters, interpreting council policy and coordinating staff functions.

- 4.4 Succession.** In the absence of the Director, the Assistant Director shall serve as Acting Director and shall be empowered to carry out the duties and responsibilities of the Director. The Director shall name a succession of department managers to carry on the duties of the Director and Assistant Director, and to serve as Acting Director in the event of the unavailability of the Director and Assistant Director.
- 4.5 Organization.** The Recovery Task Force may create such standing or ad hoc committees as determined necessary by the Director.
- 4.6 Relation to [emergency management organization].** The [recovery organization] shall work in concert with the [emergency management organization] that has interrelated functions and similar membership.

Commentary. As noted in the introductory paragraphs, there are certain fundamental differences in function that make it preferable to establish a recovery organization that can operate parallel to the emergency response organization. However, because of the inherent linkage of emergency preparedness and response with recovery, reconstruction, and hazard mitigation functions, a close relationship must be continuously maintained. For many purposes, these overlapping organizations can meet and work jointly. The value of having a separate recovery organization is best recognized when hard-core building, planning, redevelopment, and economic recovery issues require extended attention during the pre-event planning phase or during the long months and years it is likely to take to fully rebuild.

SECTION 5. RECOVERY PLAN

Before a major disaster, the [recovery task force] shall prepare a pre-event plan for post-disaster recovery and reconstruction, referred to as the recovery plan, which shall be comprised of pre-event and post-disaster policies, plans, implementation actions, and designated responsibilities related to expeditious and orderly post-disaster recovery and rebuilding, and will incorporate hazard mitigation in all elements of the plan.

- 5.1 Recovery Plan Content.** The recovery plan shall address policies, implementation actions and designated responsibilities for such subjects as business resumption, damage assessment, demolitions, debris removal and storage, expedited repair permitting, fiscal reserves, hazards evaluation, hazard mitigation, historical buildings, illegal buildings and uses, moratorium procedures, nonconforming buildings and uses, rebuilding plans, redevelopment procedures, relation to emergency response plan and comprehensive general plan, restoration of infrastructure, restoration of standard operating procedures, temporary and replacement housing, and such other subjects as may be appropriate to expeditious and wise recovery.
- 5.2 Coordination of Recovery Plan with County and Regional Plans, FEMA, and Other Agencies.** The recovery plan shall identify relationships of planned recovery actions with those of adjacent communities and state, federal, or mutual aid agencies involved in disaster recovery and reconstruction, including but not limited to the Federal Emergency Management Agency (FEMA), the American Red Cross, the Department of Housing and Urban Development (HUD), the Small Business Administration (SBA), the Environmental Protection Administration (EPA), the Department of Transportation (DOT), the [state emergency management agency or equivalent], and other entities that may provide assistance in the event of a major disaster. The Director shall distribute a draft copy of the plan to the [state emergency management agency or equivalent] for review in sufficient time for comment prior to action on the recovery plan by the [local legislative body].

Commentary. In contrast to most local emergency management organizations, FEMA and the state emergency management agency have substantial recovery and reconstruction responsibilities. FEMA is a significant source of funds made available by Congress under the Stafford Act for rebuilding public facilities. Because the state emergency management agency is an important point of coordination between localities and FEMA, it is important to solicit from that agency as much advance information as can be obtained regarding post-disaster procedures essential to recovery and reconstruction. For example, cities and counties should become fully informed through communication with their state emergency management agency about Damage Survey Report (DSR) and Hazard Mitigation Grant Program (HMGP) procedures before

disaster strikes. Because recovery issues often affect jurisdictions outside the immediate disaster area, the recovery plan should be coordinated with recovery planning activities of adjacent communities and regional entities.

- 5.3 Recovery Plan Adoption.** Following formulation, the recovery plan shall be transmitted to the [local legislative body] for review and approval. The [local legislative body] shall hold one or more public hearings to receive comments from the public on the recovery plan. Following one or more public hearings, the [local legislative body] may adopt the recovery plan by resolution, including any modifications deemed appropriate, or transmit the plan back to the [recovery task force] for further modification prior to final action.

Commentary. Governing board adoption of this ordinance together with the pre-event plan is extremely important to its successful post-disaster implementation. The city council needs to become comfortable with the concept of pre-event plan and ordinance adoption in order to be supportive of greater than normal delegation of decisions to staff, which may be necessary during post-disaster recovery operations. If council adoption is not possible immediately because of the press of other business, look for opportunities to bring the plan and ordinance forward, such as when a catastrophic disaster has struck in another jurisdiction.

- 5.4 Recovery Plan Implementation.** The Director and [recovery task force] shall be responsible for implementation of the plan both before and after a major disaster, as applicable. Before a declaration of emergency, the Director shall prepare and submit reports annually, or more frequently as necessary, to fully advise the [local legislative body] on the progress of preparation or implementation of the recovery plan. After a declaration of emergency in a major disaster, the Director shall report to the [local legislative body] as often as necessary on implementation actions taken in the post-disaster setting, identify policy and procedural issues, and receive direction and authorization to proceed with plan modifications necessitated by specific circumstances.

- 5.5 Recovery Plan Training and Exercises.** The [recovery task force] shall organize and conduct periodic training and exercises annually, or more often as necessary, in order to develop, convey, and update the contents of the recovery plan. Such training and exercises will be conducted in coordination with similar training and exercises related to the emergency operations plan.

Commentary. Clearly, training and exercises are functions which should happen on a joint, ongoing basis with the city's emergency management organization. For greatest value, training and exercises should include careful attention to critical relationships between early post-disaster emergency response and recovery actions that affect long-term reconstruction, such as street closings and reopenings, demolitions, debris removal, damage assessment, and hazards evaluation. FEMA has developed tabletop exercises for use by communities about early recovery for earthquakes, flood, and hurricane scenarios. See Appendix C for point of contact.

- 5.6 Recovery Plan Consultation with Citizens.** The [recovery task force] shall schedule and conduct community meetings, periodically convene advisory committees comprised of representatives of homeowner, business, and community organizations, or implement such other means as to provide information and receive input from members of the public regarding preparation, adoption, or amendment of the recovery plan.

- 5.7 Recovery Plan Amendments.** During implementation of the recovery plan, the Director and the [recovery task force] shall address key issues, strategies and information bearing on the orderly maintenance and periodic revision of the plan. In preparing modifications to the plan, the [recovery task force] shall consult with City departments, business, and community organizations and other government entities to obtain information pertinent to possible recovery plan amendments.

- 5.8 Recovery Plan Coordination with Related Plans.** The recovery plan shall be prepared in coordination with related elements of the [comprehensive general plan] and [emergency operations plan], or such other plans as may be pertinent. Such related plan elements shall be periodically amended by the [local legislative body] to be consistent with key provisions of the recovery plan, and vice versa.

SECTION 6. GENERAL PROVISIONS

The following general provisions shall be applicable to implementation of this chapter following a major disaster:

- 6.1 Powers and Procedures.** Following a declaration of local emergency in a major disaster and while such declaration is in force, the Director and the [recovery task force] shall have authority to exercise powers and procedures authorized by this chapter, subject to extension, modification, or replacement of all or portions of these provisions by separate ordinances adopted by the [local legislative body].
- 6.2 Post-Disaster Operations.** The Director shall direct and control post-disaster recovery and reconstruction operations, including but not limited to the following:
 - a. Activate and deploy damage assessment teams to identify damaged structures and to determine further actions that should be taken regarding such structures;
 - b. Activate and deploy hazards evaluation teams to locate and determine the severity of natural or technological hazards that may influence the location, timing, and procedures for repair and rebuilding processes;
 - c. Maintain liaison with the [jurisdiction name] [emergency operations organization] and other public and private entities, such as FEMA, the American Red Cross, and the [state emergency management agency *or* equivalent] in providing necessary information on damaged and destroyed buildings or infrastructure, natural and technological hazards, street and utility restoration priorities, temporary housing needs and similar recovery concerns;
 - d. Establish “one-stop” field offices located in or near impacted areas where appropriate, staffed by trained personnel from appropriate departments, to provide information about repair and rebuilding procedures, issue repair and reconstruction permits, and provide information and support services on such matters as business resumption, industrial recovery, and temporary and permanent housing;
 - e. Activate streamlined procedures to expedite repair and rebuilding of properties damaged or destroyed in the disaster;
 - f. Establish a moratorium subject to [local legislative body] ratification, as provided under Section 7.3;
 - g. Recommend to the [local legislative body] and other appropriate entities necessary actions for reconstruction of damaged infrastructure;
 - h. Prepare plans and proposals for action by the [local legislative body] for redevelopment projects, redesign of previously established projects or other appropriate special measures addressing reconstruction of heavily damaged areas;
 - i. Formulate proposals for action by the [local legislative body] to amend the [comprehensive general plan *or* equivalent], [emergency operations plan], and other relevant plans, programs, and regulations in response to new needs generated by the disaster;
 - j. Such other recovery and reconstruction activities identified in the recovery plan or by this chapter, or as deemed by the Director as necessary to public health, safety, and well-being.
- 6.3 Coordination with FEMA and Other Agencies.** The Director and the [recovery task force] shall coordinate recovery and reconstruction actions with those of state, federal, or mutual aid agencies involved in disaster response and recovery, including but not limited to the Federal Emergency Management Agency (FEMA), the American Red Cross, the Department of Housing and Urban Development (HUD), the Small Business Administration (SBA), the [state emergency management agency *or* equivalent] and other entities that provide assistance in the event of a major disaster. Intergovernmental coordination tasks including but not limited to the following:
 - a. Assign trained personnel to provide information and logistical support to the FEMA Disaster Field Office;

- b. Supply personnel to provide information support for FEMA Disaster Recovery Centers (DRCs);
- c. Participate in damage assessment surveys conducted in cooperation with FEMA and other entities;
- d. Participate in the development of hazard mitigation strategies with the Interagency Hazard Mitigation Team (when activated) with FEMA and other entities;
- e. Cooperate in the joint establishment with other agencies of one-stop service centers for issuance of repair and reconstruction options and permits, business resumption support, counseling regarding temporary and permanent housing, and other information regarding support services available from various governmental and private entities;
- f. Coordinate within city government the preparation and submission of supporting documentation for Damage Survey Reports (DSRs) to FEMA;
- g. Determine whether damaged structures and units are within floodplains identified on Flood Insurance Rate Maps (FIRMs) and whether substantial damage has occurred;
- h. Implement such other coordination tasks as may be required under the specific circumstances of the disaster.

Commentary. To provide direction for handling of emergency response and recovery in relation to major disasters, Congress has enacted the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended). A substantial portion of the Stafford Act is devoted to the means by which federal funds are distributed to persons, businesses, local governments, and state governments for disaster response and recovery. For most communities, this is an important means by which disaster losses can be compensated, at least in part. Although insurance can be instrumental in personal or business loss recovery for major hurricane, flood, and fire disaster damage, it has little value for compensation from losses incurred from disasters for which insurance is too costly or difficult to obtain, such as for earthquake damage, and no value for circumstances for which there is no insurance. Some of the federal assistance is in the form of grants and loans, involving not only FEMA but also other agencies, such as HUD and SBA. The federal government has become increasingly interested in promoting more effective means of coordinating post-disaster victim services as well as mitigating hazards having to do with land use and building construction. Consequently, federal assistance to localities in many instances is contingent upon coordination of local, state, and federal recovery and hazard mitigation policies and practices. In other words, as with many other forms of more traditional assistance, the community may find it necessary to adjust its policies in order to receive federal post-disaster assistance.

6.4 Consultation with Citizens. The Director and the [recovery task force] shall schedule and conduct community meetings, convene ad hoc advisory committees comprised of representatives of business and community organizations, or implement such other means as to provide information and receive input from members of the public regarding measures undertaken under the authority of this chapter.

Commentary. One of the critical components in establishing a relatively successful relationship between local government and disaster victim organizations after the Oakland, California, firestorm was the series of weekly meetings held in the affected area by the assistant city manager. Direct outreach to the community should be established in advance of a major disaster through neighborhood safety or similar programs conducted by fire and law enforcement officials, ideally in conjunction with preparation of a pre-event plan. Following a major disaster, proactive outreach is critical to establishing a two-way flow of information, without which controversy inherent in post-disaster settings can become severe.

SECTION 7. TEMPORARY REGULATIONS

The Director shall have the authority to administer the provisions of this section temporarily modifying provisions of the [municipal code or equivalent] dealing with building and occupancy permits, demolition permits, and restrictions on the use, development or occupancy of private property, provided that such action, in the opinion of the Director, is reasonably justifiable for protection of life and property, mitigation of hazardous conditions, avoidance of undue displacement of households or businesses, or prompt restoration of public infrastructure.

Commentary. The following temporary regulations are at the heart of the recovery process. Although existing state law or city ordinances may already authorize some of these functions, it is preferable to have a single source for locally adopted ordinances that, among other things, identifies regulatory functions related to post-disaster recovery, clearly places responsibility for implementation, and provides a coordinated rationale for city intervention in case of challenge. Among the components of these temporary regulations are provisions dealing with duration, damage assessment, development moratoria, debris clearance, permit expediting, temporary uses and repairs, deferral of fees, nonconforming buildings and uses, condemnation and demolition, and temporary and permanent housing. Each of these components needs careful examination and, as appropriate, adjustment based on local policies and conditions. Pre-event adoption of this ordinance (adjusted to take into account local circumstances) provides a solid basis for initial post-disaster action and legitimizes the policies established as part of the planning process. It is not possible to anticipate the exact character, magnitude, and distribution of damage from a major disaster. Pre-adopted regulations, however, provide a basis for more efficient action that is substantially less subject to policy reversals and other uncertainties typically found in cities that have not prepared in this manner.

7.1 Duration. The provisions of this section shall be in effect for a period of six months from the date of a local emergency declaration following a major disaster or until termination of a state of local emergency, whichever occurs later, or until these provisions are extended, modified, replaced by new provisions, or terminated, in whole or in part, by action of the [local legislative body] through separate ordinances.

Commentary. This provision allows for flexibility in the duration of application of the temporary regulations, so that any portion can be terminated, modified, or extended depending upon local circumstances. It also reflects a recognition that temporary regulations may be in effect for an extended period of time beyond either termination of the local emergency or passage of the six-month period. Depending on the nature and scale of the disaster, such as an earthquake, temporary provisions may be in effect for several years after the disaster.

7.2 Damage Assessment. The Director of the [recovery team] or an authorized representative shall direct damage assessment teams having authority to conduct field surveys of damaged structures and post placards designating the condition of such structures as follows:

- a. A placard indicating “Inspected—Lawful Occupancy Permitted” is to be posted on any building in which no apparent structural hazard has been found. This does not mean there are not other forms of damage that may temporarily affect occupancy.

Commentary. This is commonly known as the “green tag” placard.

- b. A placard indicating “Restricted Use” is to be posted on any building in which damage has resulted in some form of restriction to continued occupancy. The individual posting this placard shall note in general terms the type of damage encountered and shall clearly and concisely note the restrictions on continued occupancy.

Commentary. This is commonly known as the “yellow tag” placard.

- c. A placard indicating “Unsafe - Do Not Enter or Occupy” is to be posted on any building that has been damaged to the extent that continued occupancy poses a threat to life safety. Buildings posted with this placard shall not be entered under any circumstances except as authorized in writing by the department that posted the building or by authorized members of damage assessment teams. The individual posting this placard shall note in general terms the type of damage encountered. This placard is not to be considered a demolition order.

Commentary. This is commonly known as the “red tag” placard.

- d. This chapter and section number, the name of the department, its address, and phone number shall be permanently affixed to each placard.
- e. Once a placard has been attached to a building, it shall not be removed, altered or covered until done so by an authorized representative of [jurisdiction name] or upon written notification from [jurisdiction name]. Failure to comply with this prohibition will be considered a misdemeanor punishable by a \$300 fine.

Commentary. *Damage assessment and the placement of placards identifying whether buildings are safe or unsafe to occupy are two functions having perhaps the most profound effects on life, property, and community recovery than any other within the post-disaster decision and action sequence towards which the provisions of these temporary regulations are directed. Damage assessment is undertaken by various entities following a major disaster, usually the city, state, and FEMA.*

There is at least a twofold purpose for these inspections. One is to determine the degree of structural damage of each building and notify the public about the relative safety of entry and occupancy. This has been a longstanding duty under local government public health and safety responsibilities with which building departments are usually very familiar. The other is to quickly estimate the approximate replacement costs of damaged buildings and other property in order to inform the state and federal governments of whether a federal declaration is warranted. Another concurrent purpose of placarding is to identify potential substantially damaged buildings. This is essential in floodplains to ensure that the home is built according to NFIP requirements (elevated); nonresidential buildings can be floodproofed or elevated if substantially damaged.

The most important element of all these concerns is the establishment of standard identification of structural damage both in gross general terms reflected in the red-, yellow-, and green-tag placard systems, as well as in the details recorded on the placards for each building. This ordinance reflects only the standard placard system, leaving to the building professionals the means by which such determinations are made and recorded in detail. The source of the language for the placard system in this model ordinance is a publication by the California Governor's Office of Emergency Services, Model Ordinances for Post-Disaster Recovery and Reconstruction. The procedures used to make these basic safety distinctions in the California model ordinance are based on detailed post-disaster inspection methods described by the Applied Technology Council in ATC-20, Procedures for Postearthquake Safety Evaluation of Buildings, and in the State of California's publication, Post-Disaster Safety Assessment Plan. While somewhat oriented toward structural damage from earthquakes due to California's known seismicity, the placard system is adaptable to other disasters. For additional references regarding damage assessment safety notifications, the reader is referred to the International Conference of Building Officials, Southern Building Code Congress International, and Building Officials and Code Administrators International.

7.3 Development Moratorium. The Director shall have the authority to establish a moratorium on the issuance of building permits, approval of land-use applications or other permits and entitlements related to the use, development, and occupancy of private property authorized under other chapters and sections of the [pertinent legislation] and related ordinances, provided that, in the opinion of the Director, such action is reasonably justifiable for protection of life and property and subject to the following:

- a. *Posting.* Notice of the moratorium shall be posted in a public place and shall clearly identify the boundaries of the area in which a moratorium is in effect as well as the exact nature of the development permits or entitlements that are temporarily held in abeyance.
- a. *Duration.* The moratorium shall be in effect subject to review by the [local legislative body] at the earliest possible time, but no later than 90 days, at which time the [local legislative body] shall take action to extend, modify, or terminate such moratorium by separate ordinance.

Commentary. *After disasters around the world, the prevailing sentiment often is to act quickly to replicate pre-disaster building patterns. In many instances, this sentiment prevails as policy despite the presence of a severe natural hazard condition, thus reinforcing the chances of repeating the disaster. The most notable example has been the rebuilding of homes in the Turnagain Heights area on land severely deformed by a landslide in the 9+ Magnitude 1964 Anchorage earthquake.*

To prevent or lessen the chances of repetition of the disaster, it may be necessary for a city to interrupt and forestall repair and rebuilding long enough to assess rebuilding options and/or to determine effective means of mitigation. The city may wish to establish an emergency moratorium on issuance of repair and rebuilding permits or on land-use approvals in areas where severely hazardous conditions are identified. The hazard may be newly detected, as in a post-earthquake circumstance where the pattern of damage or ground deformation may indicate the need for geologic studies to clearly identify such hazards as landslides, liquefaction, or fault rupture. On the other hand, the hazardous condition may be a well-known cause of prior damaging disasters, as in the Oakland Hills firestorm area, which had a long history of previous fires, or communities affected by the 1993 Midwestern floods where prior flood control and floodproofing efforts were proven ineffective.

A moratorium on development may be important for a city to undertake from the standpoint of enlightened public policy. However, since such action may be extremely controversial and unpopular, it is important to lay the groundwork with the community in advance, if possible. This subsection provides prior authorization through adoption of this ordinance before a major disaster, whereby city staff can act expeditiously in a post-disaster setting to forestall premature issuance of permits in areas shown to be hazardous. Such action is necessarily subject to local legislative review, ratification, modification, or termination.

7.4 Debris Clearance. The Director shall have the authority to remove from public rights-of-way debris and rubble, trees, damaged or destroyed cars, trailers, equipment, and other private property, without notice to owners, provided that in the opinion of the Director such action is reasonably justifiable for protection of life and property, provision of emergency evacuation, assurance of firefighting or ambulance access, mitigation of otherwise hazardous conditions, or restoration of public infrastructure. The Director shall also have the authority to secure emergency waivers of environmental regulations from state and federal authorities and to call upon outside support from such agencies for debris clearance, hazardous materials spills, and restoration of ground access.

Commentary. Although clearance of privately owned debris is routinely considered a function of local government, it can become very controversial where owners take the position that such property is salvageable and has value (e.g., used brick after an earthquake). Pre-event adoption of such a provision reinforces the expectation that debris clearance functions will be carried out decisively, thus minimizing a problem otherwise compounded by city hesitation or ambiguity of intention. The U.S. Army Corps of Engineers has the lead under the Federal Response Plan for ensuring resources for local emergency and long-term debris clearance. FEMA and the state emergency management agency determine priorities for the entire disaster area.

7.5 One-Stop Center for Permit Expediting. The Director shall establish a one-stop center, staffed by representatives of pertinent departments, for the purpose of establishing and implementing streamlined permit processing to expedite repair and reconstruction of buildings, and to provide information support for provision of temporary housing and encouragement of business resumption and industrial recovery. The Director shall establish such center and procedures in coordination with other governmental entities that may provide services and support, such as FEMA, SBA, HUD, or the [state emergency management agency or equivalent].

Commentary. One-stop permit centers have become more common with recent major disasters, often combining the presence of multiple agencies to provide better coordination of information that disaster victims may need in order to rebuild. A prime example was the Community Restoration and Development Center established by Oakland, California, shortly after the 1991 firestorm and operated until mid-1994 with financial support from FEMA. Benefits to be gained for establishing a special one-stop center include not only accelerated review but also integration of information and permitting functions. Setting up a team of specialists working exclusively on repair and rebuilding permit issues has the added advantage of insulating normal development review from disruption by the recovery process and vice versa.

7.6 Temporary Use Permits. The Director shall have the authority to issue permits in any residential, commercial, industrial, or other zone for the temporary use of property that will aid in the immediate restoration of an area adversely impacted by a major disaster, subject to the following provisions:

- a. *Critical response facilities.* Any police, fire, emergency medical, or emergency communications facility that will aid in the immediate restoration of the area may be permitted in any zone for the duration of the declared emergency;
- b. *Other temporary uses.* Temporary use permits may be issued in any zone, with conditions, as necessary, provided written findings are made establishing a factual basis that the proposed temporary use:
 1. will not be detrimental to the immediate neighborhood;
 2. will not adversely affect the [comprehensive general plan or any applicable specific plan]; and
 3. will contribute in a positive fashion to the reconstruction and recovery of areas adversely impacted by the disaster.

Temporary use permits may be issued for a period of one year following the declaration of local emergency and may be extended for an additional year, to a maximum of two years from the declaration of emergency, provided such findings are determined to be still applicable by the end of the first year. If, during the first or the second year, substantial evidence contradicting one or more of the required findings comes to the attention of the Director, the temporary use permit shall be revoked.

Commentary. Most zoning ordinances have no provisions for temporary use of property following a disaster. A few allow temporary placement of mobile units or manufactured housing on residentially zoned sites pending reconstruction of a residence. Time limits vary, but are usually for a two-year period. After a major disaster, special latitude may be needed, however, to support various recovery needs. Care must be taken not to set precedents that will erode or destroy a pre-existing pattern of zoning that the city may wish to protect.

The language within this section is modeled after provisions of the Los Angeles recovery ordinance adopted after the Northridge earthquake, Temporary Regulations Relating to Land Use Approvals for Properties Damaged in a Local Emergency. That ordinance is geared toward the needs of a large and diverse city. Smaller communities may wish to restrict temporary uses to those already allowed by the zone in which they are located, limiting the provision to temporary structures, such as tents, domes, or mobile units.

7.7 Temporary Repair Permits. Following a disaster, temporary emergency repairs to secure structures and property damaged in the disaster against further damage or to protect adjoining structures or property may be made without fee or permit where such repairs are not already exempt under other chapters of the [pertinent legislation]. The building official must be notified of such repairs within 10 working days, and regular permits with fees may then be required.

Commentary. This provision is specifically written for repairs that may not be exempt under standard building code permit exemptions but which are justifiable from a public health and safety standpoint to avoid further damage to property after a disaster. It is modeled after a provision of a post-disaster rebuilding ordinance adopted in 1992 by the County of San Bernardino shortly after the Landers-Big Bear earthquake. Written before the earthquake, the ordinance was based on a pre-event study, *Post-Disaster Rebuilding Ordinance and Procedures*, which included a survey of top managers and elected officials regarding various post-disaster rebuilding provisions, such as for nonconforming buildings and uses. Because of the pre-event involvement of top managers and elected officials, it was adopted after the earthquake with no controversy.

7.8 Deferral of Fees for Reconstruction Permits. Except for temporary repairs issued under provisions of this chapter, all other repairs, restoration, and reconstruction of buildings damaged or destroyed in the disaster shall be approved through permit under the provisions of other chapters of this code. Fees for such repair and reconstruction permits may be deferred until issuance of certificates of occupancy.

Commentary. Pressure to waive or defer processing fees frequently arises after a disaster when victims are unsure of their sources of financing for rebuilding. It is inadvisable to succumb to pressures to waive fees entirely due to the need for cost recovery for disaster-related services at a time when there may be substantial uncertainties in revenue flows. Also, it is helpful to buy time to determine the degree to which sources other than the victims may help offset fee costs. For example, sometimes insurance will cover the cost of processing fees. Also, such costs have been covered by FEMA. Deferral of fees until occupancy permit issuance provides time in which such alternate sources can be worked out, without sacrificing the basic revenue flow to the city treasury. This provision is modeled after similar language in the Los Angeles temporary regulations.

7.9 Nonconforming Buildings and Uses. Buildings damaged or destroyed in the disaster that are legally nonconforming as to use, yards, height, number of stories, lot area, floor area, residential density, parking, or other provisions of the [pertinent local legislation] may be repaired and reconstructed in-kind, provided that:

- a. the building is damaged in such a manner that the structural strength or stability of the building is appreciably lessened by the disaster and is less than the minimum requirements of the [pertinent local legislation] for a new building;

- b. the cost of repair is greater than 50 percent of the replacement cost of the building;
- c. all structural, plumbing, electrical, and related requirements of the [pertinent local legislation] are met at current standards;
- d. all natural hazard mitigation requirements of the [pertinent local legislation] are met;
- e. reestablishment of the use or building is in conformance with the National Flood Insurance Program requirements and procedures;
- f. the building is reconstructed to the same configuration, floor area, height, and occupancy as the original building or structure, except where this conflicts with National Flood Insurance Program (NFIP) provisions;
- g. no portion of the building or structure encroaches into an area planned for widening or extension of existing or future streets as determined by the comprehensive general plan or applicable specific plan; and
- h. repair or reconstruction shall commence within two years of the date of the declaration of local emergency in a major disaster and shall be completed within two years of the date on which permits are issued.

Nothing herein shall be interpreted as authorizing the continuation of a nonconforming use beyond the time limits set forth under other sections of the [pertinent local legislation] that were applicable to the site prior to the disaster.

Commentary. No issue can be more vexing to planners than whether to encourage reestablishment of nonconforming uses and buildings after a major disaster. Planners have sought for decades to write strict provisions in zoning ordinances designed to gradually eliminate nonconforming uses or buildings as they were abandoned, changed owners, or were damaged by fire, wind, or water. The latter provisions normally prohibit reestablishment of nonconforming uses and buildings where damage exceeds a certain percentage of replacement cost, most often 50 percent. This approach is logical, orderly, and normally equitable when weighing community interests balanced with those of the property owner. However, the thinking behind such provisions has been geared to incremental adjustments or termination of such uses over time, not to sudden catastrophic circumstances forcing attention to disposition of such uses as a class at a single point in time.

In theory, disasters represent an opportunity to upgrade conditions, such as parking deficiencies attributable to the nonconforming status of a building or use. More fundamentally, disasters are seen as an opportunity to eliminate uses that conflict with the prevailing pattern in a neighborhood but which remain because of legal nonconforming status (e.g., scattered industrial uses in a residentially zoned neighborhood). In reality, however, after a major disaster, local governments are normally beset by severe pressures from property owners and other community interests to reestablish the previous development pattern exactly as it previously existed, including nonconforming buildings and uses. Moreover, such pressures extend beyond the demand to reestablish nonconforming buildings or uses to include waiver of current building, plumbing, and electrical code provisions to the standards in place at the time of construction. From a risk management, liability exposure, or public safety standpoint, acquiescence to the reduction of standards in the face of a known hazard can be seen as clearly unacceptable by the local legislative body. However, zoning provisions hindering reestablishment of nonconforming buildings and uses tend to be more arguable and are more likely to be modified by the local legislative body under extreme pressures of the moment to restore the prior status quo.

In recognition of such pressures, this model ordinance language offers a straightforward trade-off that allows reestablishment of a nonconforming use or building in turn for strict adherence to structural, plumbing, electrical code, and related hazard mitigation requirements. The language assumes the existence of a commonly found provision in the pertinent local legislation (e.g., the municipal code) authorizing repair or reestablishment of a nonconforming use or building where damage is less than 50 percent of the replacement cost. It also assumes that the building was substantially weakened by the disaster and is below present code requirements.

This compromise approach recognizes that its application may require the unwelcome decision to accept continuation of disorderly land-use patterns, unless a solution can be found through redevelopment or rezoning. Instead, it places a high value on life safety.

It is important to note that the language of these provisions includes important limitations that tend to limit the economic incentive to reestablish the nonconforming use or building.

- 1) *It does not extend any previously stipulated life of the nonconforming use—an important disincentive if the costs of replacement cannot be offset by insurance, FEMA assistance, SBA loans, or other sources of financial support.*
- 2) *It does not allow the extent of nonconformance to be increased over what existed prior to the disaster, thwarting another common pressure.*
- 3) *It requires strict adherence to existing structural, plumbing, electrical, and other requirements of the local code as well as any street setbacks stipulated within the comprehensive plan circulation element and related ordinances. This may be especially costly from a structural standpoint, for example, when replacing previously unreinforced masonry buildings after a devastating earthquake.*
- 4) *It recognizes that compliance with existing local hazard mitigation requirements may be needed, especially in cases involving increased on-site hazards because of fault rupture, landsliding, coastal erosion, or severe flooding where upgrading to current structural, plumbing, and electrical code requirements isn't enough. Compliance with the latter provision may also be sufficiently costly to discourage reestablishment of the use or other nonconforming feature.*

The relative importance of post-disaster reestablishment of nonconforming uses and buildings may vary greatly from jurisdiction to jurisdiction. Therefore, the most useful time to assess this aspect of post-disaster recovery is before a major disaster, in the course of pre-event planning. Education of the local legislative body in advance can help lessen post-disaster tendencies to compromise critical hazard mitigation and public safety requirements, notwithstanding the outcome on nonconforming use and building requirements.

SECTION 8. DEMOLITION OF DAMAGED HISTORIC BUILDINGS

The Director shall have authority to order the condemnation and demolition of buildings and structures damaged in the disaster under the standard provisions of the [pertinent local legislation], except as otherwise indicated below:

- 8.1 **Condemnation and Demolition.** Within [a number determined by the local government] days after the disaster, the building official shall notify the State Historic Preservation Officer that one of the following actions will be taken with respect to any building or structure determined by the building official to represent an imminent hazard to public health and safety or to pose an imminent threat to the public right of way:
 - a. Where possible, within reasonable limits as determined by the building official, the building or structure shall be braced or shored in such a manner as to mitigate the hazard to public health and safety or the hazard to the public right of way;
 - b. Whenever bracing or shoring is determined not to be reasonable, the building official shall cause the building or structure to be condemned and immediately demolished. Such condemnation and demolition shall be performed in the interest of public health and safety without a condemnation hearing as otherwise required by the [pertinent local legislation]. Prior to commencing demolition, the building official shall photographically record the entire building or structure.
- 8.2 **Notice of Condemnation.** If, after the specified time frame noted in Subsection 8.1 of this chapter and less than 30 days after the disaster, a historic building or structure is determined by the building official to represent a hazard to the health and safety of the public or to pose a threat to the public right-of-way, the building official shall duly notify the building owner of the intent to proceed with a condemnation hearing within [a number determined by the local government] business days of the notice in accordance with [pertinent provisions of the local legislation]; the building official shall also notify FEMA, in accordance with the National Historic Preservation Act of 1966, as amended, of the intent to hold a condemnation hearing.
- 8.3 **Request to FEMA for Approval to Demolish.** Within 30 days after the disaster, for any historic building or structure which the building official and the owner have agreed to demolish, the building official shall submit to FEMA, in accordance with the National Historic Preservation Act of 1966, as amended, a request for approval to demolish. Such request shall include all substantiating data.

- 8.4 Historic Building Demolition Review.** If, after 30 days from the event, the building official and the owner of a historic building or structure agree that the building or structure should be demolished, such action will be subject to the review process established by the National Historic Preservation Act of 1966, as amended.

Commentary. One of the more difficult aspects of post-disaster response and recovery in older communities is the existence of damaged historically significant structures. Since these can be very old, measures needed to make them structurally sound may be more difficult and costly and complicated than normal. Because of the emotion frequently attached to this issue and the often widely conflicting views, community controversy can erupt when a badly damaged historical structure is subject to demolition. Therefore, it is wise to have language already in place to guide the planning and building officials involved.

Because of problems with seemingly premature or unjustifiable demolition of historic structures in previous disasters, the National Historic Preservation Act of 1966, as amended, identifies steps that must be taken by a jurisdiction or owner to mitigate public health and safety hazards resulting from disaster-caused damage when using federal funding. The intent is to establish predictable rules by which proposed demolitions, except in extreme cases of danger to the public, can be reviewed by state and federal officials in order to provide time to identify options for preservation of a damaged historic building or structure. The review process is also intended to discourage hasty demolition action by local officials when such action may not be justified.

The preceding language is adapted from California's Model Ordinances for Post-Disaster Recovery and Reconstruction. This language supplements provisions of the Uniform Code for the Abatement of Dangerous Buildings by providing specific time frames and actions for abatement of hazards created by damage to historic buildings. The important element of local judgment here is the establishment of a specific time frame for declaring a structure an imminent hazard to public health and safety justifying immediate demolition without a condemnation hearing. Such time frames are generally from three to five days, though sometimes stretched to ten days. After the established time frame, the threat may no longer be justified as imminent and, therefore, the remaining procedures kick in.

SECTION 9. TEMPORARY AND PERMANENT HOUSING

The Director shall assign staff to work with FEMA, SBA, HUD, the [state emergency management agency or equivalent], and other appropriate governmental and private entities to identify special programs by which provisions can be made for temporary or permanent replacement housing that will help avoid undue displacement of people and businesses. Such programs may include deployment of manufactured housing and manufactured housing developments under the temporary use permit procedures provided in Section 7 of this chapter, use of SBA loans, and available Section 8 and Community Development Block Grant funds to offset repair and replacement housing costs, and other initiatives appropriate to the conditions found after a major disaster.

Commentary. The issue of post-disaster temporary and permanent replacement housing has grown to one of critical dimensions in the San Francisco area since the Loma Prieta earthquake. After that earthquake, many displaced low-income occupants of damaged or destroyed housing simply disappeared—a common pattern following many disasters. Relatively little real progress has been made since then in finding effective ways by which to handle this issue on a broad scale. For example, after the Northridge earthquake, HUD became active immediately in attempting to assist localities in dealing with housing issues. Available resources were insufficient to cover the cost of much of the replacement housing needed. Housing issues were extremely complex. Low- and moderate-income rental housing replacement problems were somewhat alleviated by the existence of a high rate of apartment vacancies. However, recession-generated housing devaluation combined with substantial damage costs altered loan-to-value ratios to uneconomical levels. Repairs of single-family and multifamily buildings dragged out for many months due to lending, engineering, and permitting problems. As a consequence, some middle-income households simply walked away from mortgages. The most visible evidence of earthquake-induced housing impacts were the large condominium and apartment complexes that remained in a fenced-off, unrepaired state until financing and repairs began to catch up two years later.

For these reasons, this section is essentially a placeholder for language that should be made more specific on the basis of a pre-event plan for post-disaster recovery and reconstruction that takes into account the level of local housing vulnerability. For example, a community with a long history of flooding may have developed temporary shelter arrangements, such as in school gymnasiums, sufficient for short-term displacement. If there are no other

hazards present, that community may not need to consider replacement housing. Whereas a community in an earthquake hazard area with a large portion of its housing inventory in unreinforced masonry (URM) construction should consider both temporary shelters and interim housing, such as some form of manufactured housing, with the expectation that several years will be needed for replacement housing to be built.

A great deal more research is needed to find satisfactory solutions for prompt, efficient provision of both interim and replacement housing. Clearly, the magnitude of the Northridge housing problems caught public- and private-sector institutions off-guard. Little is yet understood regarding issues like the most effective means for dealing with damaged condominiums or the effect of the secondary mortgage market on housing repair and replacement. With downsizing of federal budgets in future years, this issue will become more critical since levels of support could be diminished.

SECTION 10. HAZARD MITIGATION PROGRAM

Prior to a major disaster, the Director shall establish a comprehensive hazard mitigation program that includes both long-term and short-term components.

10.1 Safety Element. The long-term component shall be prepared and adopted by resolution of the [local legislative body] as the safety or natural hazards element of the [comprehensive general plan] for the purpose of enhancing long-term safety against future disasters. The safety element shall identify and map the presence, location, extent, and severity of natural hazards, such as:

- a. severe flooding;
- b. wildland and urban fires;
- c. seismic hazards such as ground shaking and deformation, fault rupture, liquefaction, tsunamis, and dam failure;
- d. slope instability, mudslides, landslides, and subsidence;
- e. coastal erosion;
- f. hurricanes and other high winds;
- g. technological hazards, such as oil spills, natural gas leakage and fires, hazardous and toxic materials contamination, and nuclear power plant and radiological accidents.

The safety element shall determine and assess the community's vulnerability to such known hazards and shall propose measures to be taken both before and after a major disaster to mitigate such hazards. It shall contain linkages between its own provisions and those of other [comprehensive plan elements or equivalent] including, but not limited to, [land use, transportation, housing, economic development, and historic preservation, and any other pertinent element] so that development and infrastructure decisions will incorporate considerations of natural hazards.

Commentary. Although California may be viewed by some citizens in other parts of the country as perhaps atypical when considering lifestyles, ideas, the arts, or politics, it nevertheless has been the source of much forward-looking planning legislation and has recently become the site of a series of major natural disasters from which important post-disaster response and recovery lessons are being learned. One of the far-seeing components of planning legislation in California is the mandatory general plan safety element, which became a requirement after the 1971 Sylmar earthquake. Now, more than 20 years after the passage of that legislation, virtually all California cities have adopted safety elements as part of their comprehensive general plans, and many have implemented them in one specific way or another, which has helped mitigate recognized hazards.

The safety element concept can be adapted for use in many other states to help localities deal more directly with significant local hazards. Its great value is the establishment of safety considerations at the policy level and the development of hazard mapping that can serve as an undergirding for specific regulations. The discussion in Chapter 3 of natural hazards element requirements in state planning enabling legislation provides background data on the application of this concept across the country, including its use for coastal hazards in Florida, North Carolina, and Georgia. These elements can be helpful in providing greater legal defensibility of regulations establishing substantial restrictions on the use of portions of properties subject to a natural hazard, such as landslides, flooding, or beach erosion. Such considerations are important in taking into account issues related to the taking of private property in light of recent Supreme Court decisions.

There is a growing body of knowledge about the nature of many of the hazards identified in this language, yet there remains a need for further research on how to integrate this knowledge in planning practice. A need exists for more definitive guidelines on how to mitigate many of these hazards through community design and site layout. For instance, with respect to wind, it was found on the Island of Kauai following Hurricane Iniki that homes placed along the windward edge of bluffs suffered greater damage than homes that were set back. It was also found that directional placement of roof overhangs in relation to prevailing direction of storm winds was important to the degree of damage. Such practical community design knowledge on wind effects should be extended and integrated with research on other hazards. Much needed is research material providing guidance on mitigation through community design for all natural hazards.

10.2 Short-Term Action Program. A short-term hazard mitigation program shall be included in the [recovery plan]. It shall be comprised of hazard mitigation program elements of highest priority for action, including preparation and adoption of separate ordinances dealing with specific hazard mitigation and abatement measures, as necessary. Such ordinances may require special site planning, land-use, and development restrictions or structural measures in areas affected by flooding, urban/wildland fire, wind, seismic, or other natural hazards, or remediation of known technological hazards, such as toxic contamination.

Commentary. This provision extends the safety element concept into the pre-event planning for post-disaster recovery and reconstruction process, identifying key measures that would have the most value for short-term implementation. Some of these measures, such as special ordinances related to floodplain management, may already be in place. The concept here is to look beyond measures that are in place to determine which others are critically needed and to move forward toward their implementation.

10.3 Post-Disaster Actions. Following a major disaster, the Director shall participate in developing a mitigation strategy as part of the [Interagency Hazard Mitigation Team or equivalent] with FEMA and other entities, as called for in Section 409 of the Stafford Act and related federal regulations. As appropriate, the Director may recommend to the [local legislative body] that the [jurisdiction] participate in the state's Hazard Mitigation Grant Program, authorized in Section 404 of the Stafford Act, in order to partially offset costs of recommended hazard mitigation measures.

Commentary. This provision acknowledges FEMA mitigation programs presently operating under the Stafford Act and corresponding federal regulations. FEMA has published guidelines relative to state implementation of these regulations.

10.4 New Information. As new information is obtained regarding the presence, location, extent, and severity of natural or technological hazards, or regarding new mitigation techniques, such information shall be made available to the public, and shall be incorporated as soon as practicably possible within the [comprehensive general plan safety element or equivalent] and the [recovery plan] through amendment.

SECTION 11. RECOVERY AND RECONSTRUCTION STRATEGY

At the earliest practicable time following the declaration of local emergency in a major disaster, the Director and the [recovery task force] shall prepare a strategic program for recovery and reconstruction based on the pre-disaster plan and its policies.

11.1 Functions. To be known as the recovery strategy, the proposed strategic program shall identify and prioritize major actions contemplated or under way regarding such essential functions as business resumption, economic reinvestment, industrial recovery, housing replacement, infrastructure restoration, and potential sources of financing to support these functions.

11.2 Review. The recovery strategy shall be forwarded to the [local legislative body] for review and approval following consultation with other governmental agencies and business and citizen representatives. The recovery strategy shall provide detailed information regarding proposed and ongoing implementation of initiatives necessary to the expeditious fulfillment of critical priorities and will identify amendment of any other plans, codes, or ordinances that might otherwise contradict or block strategic action. The Director shall periodically report to the [local legislative body] regarding progress toward implementation of the recovery strategy, together with any adjustments that may be called for by changing circumstances and conditions.

Commentary. The concept behind this provision is to structure the flow of local post-disaster recovery and reconstruction actions around a short-term strategy that extends the pre-event plan into greater detail at the earliest possible time after a major disaster. This may prove absolutely essential to the extent that damage conditions differ substantially from those anticipated as part of the pre-event plan. In any case, development of such a strategy in the early days of recovery has the special benefit of adding a proactive emphasis to the recovery process to counter the overwhelmingly reactive context. It can be updated as often as necessary as experience is gained and new issues emerge. It also has the added benefit of providing a source from which the pre-event recovery plan and related plans can later be readily updated.

SECTION 12. SEVERABILITY

If any provision of this chapter is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect the remaining provisions that can be implemented without the invalid provision, and, to this end, the provisions of this ordinance are declared to be severable.