|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Activity | Population mean (min) | Doer  mean (min)\* | Activity | Population mean (min) | Doer  mean (min)\* |
| Sleeping | 504 | 506 | Child care | 18 | 79 |
| Working | 194 | 424 | Active sports | 16 | 88 |
| Electronic media | 143 | 184 | Outdoor recreation | 11 | 134 |
| Travel | 109 | 118 | Cultural events | 10 | 143 |
| Eating | 89 | 93 | Errands | 8 | 41 |
| Socializing | 56 | 115 | Car repair | 6 | 48 |
| Personal care | 50 | 58 | Hobbies | 5 | 114 |
| Reading/writing | 48 | 104 | Bars/lounges | 4 | 101 |
| Education | 46 | 237 | Animal care | 3 | 33 |
| Cooking | 38 | 73 | Singing/dancing | 3 | 106 |
| House cleaning | 34 | 87 | Other | 2 | 29 |
| Shopping | 25 | 66 | Dry cleaners | 1 | 73 |
| Yard work | 20 | 111 | Services | 1 | 83 |

|  |  |  |  |
| --- | --- | --- | --- |
| Code | Activity | Code | Activity |
| 11 | Agriculture, Forestry, Fishing & Hunting | 53 | Real Estate & Rental & Leasing |
| 21 | Mining | 54 | Professional, Scientific, and Technical Services |
| 22 | Utilities | 55 | Management of Companies and Enterprises |
| 23 | Construction | 56 | Administrative and Support and Waste Management and Remediation Services |
| 31-33 | Manufacturing | 61 | Educational Services |
| 42 | Wholesale Trade | 62 | Health Care and Social Assistance |
| 44-45 | Retail Trade | 71 | Arts, Entertainment, and Recreation |
| 48-49 | Transportation & Warehousing | 72 | Accommodation and Food Services |
| 51 | Information | 81 | Other Services  (except Public Administration) |
| 52 | Finance and Insurance | 92 | Public Administration |

ine) until they find a temporary operating location. As Path B indicates, households and businesses need utilities such as water/wastewater, electric power, fuel, transportation, and telecommunications before they can resume normal operations. Finally, Path C is especially important because disaster assessment and a federal disaster declaration are preconditions for the federal financial aid that the most severely stricken communities need to support the restoration of public infrastructure and the recovery of households and businesses. To explain this figure more completely, the following sections examine household recovery, business recovery, infrastructure restoration, and the disaster declaration process.

### **Household Recovery**

There are three basic components to household recovery. These are housing recovery, employment recovery, and psychological recovery (Bolin & Trainer, 1978). All three of these components require resources to recover. However, households must invest time to obtain these resources. This includes time to find and purchase alternate shelter, clothing, food, furniture, and appliances to support daily living (Yelvington, 1997). Time is also needed to file insurance claims, apply for loans and grants, and search for jobs. The time required for these tasks is increased by multiple trips to obtain required documentation and understaffing of providers (Morrow, 1997). FEMA provides telephone registration, but its value was undercut by loss of telephone service after Hurricane Andrew. Moreover, there will be increased commuting time to work, shopping, and services if cars, street signs, traffic signals, and landmarks are destroyed and no public transit is available for weeks. Adding to the time burden is increased cost for many items due to supply scarcities. Finally, victims needed skill and self confidence to cope with the disaster assistance bureaucracy (Morrow, 1997).

**Figure 11-4.**The Recovery Management Process.

*Housing Recovery*

Households typically use four types of housing recovery following a disaster (Quarantelli, 1982a). The first type, *emergency shelter*, consists of unplanned and spontaneously sought locations that are intended only to provide protection from the elements, typically open yards and cars after earthquakes (Bolin & Stanford, 1991, 1998). The second type is *temporary shelter*, which includes food preparation and sleeping facilities that usually are sought from friends and relatives or are found in commercial lodging, although mass care facilities in school gymnasiums or church auditoriums are acceptable as a last resort. The third type is *temporary housing*, which allows victims to reestablish household routines in nonpreferred locations or structures. The last type is *permanent housing*, which reestablishes household routines in preferred locations and structures. The process of housing recovery can, in principle, be described as a stochastic process in which there is a specific probability that a household will move from one housing type to another in a given period of time (Coleman, 1964). This produces a table in which the rows indicate the current housing type, the columns indicate the housing type to which households move, and the cell values are the conditional probabilities of households moving from the row type to the column type (see Table 11-3). These conditional probabilities are represented by the mathematical notation P(*B*│*A*), where the symbol P (*X*) indicates the probability of event *X*, *A* is the housing type *from* which the household moves, *B* is the housing type *to* which it moves, and the vertical bar indicates that this is the probability of a household being in type *B*, *given that it previously was in type* *A*.

Unfortunately, none of the studies of housing recovery following disasters has yet estimated the transition probabilities associated with this process, but qualitative descriptions of the occupancy levels in each of Quarantelli’s four housing types suggests that two distinct transition probability matrices distinguish the first week after a major disaster from later time periods. After a disaster strikes, a substantial number of households are forced to seek emergency shelter (*ES*) and in the following days most of them remain in that type of housing. Thus, according to the hypothetical probabilities in the table, the probability of remaining in emergency shelter is P(*ES*│*ES*) = 0.6). However, a significant proportion of the households move on to temporary shelter (*TS*), making P(*TS*│*ES*) = 0.4. None of the households is expected to move directly from emergency shelter to temporary housing (*TH*) or permanent housing (*PH*), so P(*TH*│*ES*) = P(*PH*│*ES*) = 0.0. In addition, the vast majority of those in temporary shelter remain in that housing type, so P(*TS*│*TS*) = 0.9, but a small fraction of them move to temporary housing, so P(*TH*│*TS*) = 0.1. Similarly, the vast majority of those in temporary housing remain in that status [P(*TH*│*TH*) = 0.1], but a small fraction of them move to permanent housing [P(*PH*│*TH*) = 0.1]. A small fraction of those in permanent housing move from that status to emergency shelter or temporary shelter because of occupants’ fears about structural stability or because building inspections have determined that the structures are indeed unsafe.

**Table 11-3**. Hypothetical Daily Housing Status Transition Probabilities.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Week 1 | | | | Week 2 and beyond | | | |
| Emer-gency Shelter | Temp-orary Shelter | Temp-orary Housing | Perm-anent Housing | Emer-gency Shelter | Temp-orary Shelter | Temp-orary Housing | Perm-anent Housing |
| Emergency  Shelter | .60 | .40 | .00 | .00 | .50 | .50 | .00 | .00 |
| Temporary  Shelter | .00 | .90 | .10 | .00 | .00 | .90 | .10 | .00 |
| Temporary  Housing | .00 | .00 | .95 | .05 | .00 | .00 | .95 | .05 |
| Permanent  Housing | .03 | .05 | .00 | .92 | .00 | .00 | .00 | 1.00 |

According to these hypothetical probabilities, Weeks 2 and beyond differ from Week 1 in two respects. First, the rate at which households move from emergency shelter to temporary shelter is higher in Week 2 than in Week 1. Second, the rates at which households move from permanent housing to emergency shelter and temporary shelter is lower than in Week 1. These transition probabilities can be used to generate a distribution over time of the postdisaster housing status of the impact area population (see Figure 11-5).

This figure shows that the utilization of emergency shelter peaks on the day of the disaster and declines rapidly thereafter. However, this decrease in the utilization of emergency shelter does not produce immediate increases in occupancy rates for permanent shelter. Indeed, the proportion of the affected population in permanent shelter continues to decline because many households must move to this state through the two intermediate housing types. Thus, the transition probabilities in Table 11-3 result in the displaced population continuing to rise, reaching a delayed peak some days after impact. These results are generally consistent with Bolin’s (1993) finding that it took nine days for shelter occupancy to peak after the Whittier Narrows earthquake. Other support can be found in data from Hurricane Andrew. Yelvington (1997) reported that temporary shelters experienced increased demand as buildings were condemned by authorities or landlords begin reconstruction on damaged structures. On 4 September, 10 days after Hurricane Andrew, there were 41 people at Harris Field and 58 people at Florida City. Three days later the figures were 1125 and 467, respectively. By the end of September, there were more than 4000 people in four tent cities.

Sites for temporary shelter include homes of friends and relatives, commercial facilities such as hotels and motels, and mass care facilities such as Red Cross shelters. Lindell, et al. (2004) reported that during Hurricane Lili 3% of evacuees stayed in Red Cross shelters, 30% in hotels and motels, and 53% with friends and relatives. The percentage staying in shelters averages 15% but ranges from less than 1% to over 43% (Mileti, et al., 1992). The location where a household seeks temporary shelter is relatively predictable. Severity of damage and the availability of relatives nearby predict who stays with relatives, whereas income, homeownership, and availability of relatives nearby predicts who accepts relatives (Morrow, 1997). Moreover, kin networks are likely to seek temporary shelter together, especially if all relatives became victims because they lived so close together (Yelvington, 1997). Households with higher incomes who lack nearby friends and relatives with undamaged homes seek commercial facilities, whereas lower income households in such conditions are forced to accept mass care facilities.

**Figure 11-5.** Impact Area Residents’ Changes in Housing Status over Time.

Areas with large minority populations can pose problems for disaster assistance administrators because of their extended households (Bolin, 1993; Yelvington, 1997). Some are multigenerational (grandparents, parents, and children), whereas others are multinuclear kinship (linked by siblings) or multinuclear friendship (originating from the same town or province). These complex household structures create problems in identifying a single *head of household* to whom an assistance check can be issued. In addition to the normal reluctance to seek mass shelter and housing, some victims hesitate to approach authorities because they have no immigration documents (Yelvington, 1997).

Similarly, sites for temporary housing include homes of friends and relatives, commercial facilities such as rental houses and apartments, and mass facilities such as trailer parks. Some of these sites are in or near the stricken community, but others are hundreds or even thousands of miles away. Lack of alternative housing within an acceptable distance of jobs or peers led some households to leave the Miami area after Hurricane Andrew. The population loss was 18% in South Dade County, 33% in Florida City, and 31% in Homestead (Dash, Peacock & Morrow, 1997). Other households remained in severely damaged units—or even condemned units—without electric power or telephone service for months (Yelvington, 1997) or doubled up with relatives (Morrow, 1997).

The loss of housing in a disaster can be extremely problematic in a tight housing market. After Hurricane Andrew, housing availability dropped to 1.6% from 5.5% a year earlier. This shortage increased rents by 15-20%, which priced low income victims out of the market (Yelvington, 1997). Even when temporary housing can be found, the return to permanent housing can be long. In one working class neighborhood, the average length of displacement was 95 days and the percentage of returnees was still only 62% nearly a year after the disaster (Morrow, 1997).

Households encounter many problems during reconstruction, including high prices for repairs, poor quality work, and contract breaches (Bolin, 1993). The rebuilt structures do benefit from improved quality and hazard resistance (Bolin, 1993, indicates 50% of respondents reported this) and this is especially true for public housing (Morrow, 1997). However, few victims think the improvements are worth the inconvenience they experienced.

As noted in Chapter 6, lower income households tend to have higher hazard exposure because they live in more hazard prone locations. They also have higher physical vulnerability because they live in structures that were built according to older, less stringent building codes, used lower quality construction materials and methods, and have been less well maintained (Bolin & Bolton, 1986). Because lower income households have fewer resources on which to draw for recovery, they also take longer to return to permanent housing, sometimes remaining for extended periods of time in severely damaged homes (Girard & Peacock, 1997). Indeed, they sometimes are forced to accept as permanent what originally was intended as temporary housing (Peacock, et al., 1987). Consequently, there might still be low income households in temporary sheltering and temporary housing even after high income households all have relocated to permanent housing (Berke, et al., 1993; Rubin, et al., 1985).

*Employment Recovery*

Insurance coverage varies by hazard agent, with Bolin and Bolton (1986) reporting 86% coverage for a tornado and Bolin (1993) reporting 25% for an earthquake. Risk area residents are particularly likely to forego earthquake insurance because they consider premiums to be too high and deductibles too large (Palm, et al., 1990). Income, education, and occupational status all correlate with earthquake insurance purchase (Bolin, 1993).

Strategies for coping with uninsured losses include obtaining SBA or commercial loans, obtaining FEMA or NGO grants, withdrawing savings, and deciding not to replace damaged items (Bolin, 1993). SBA loans can be problematic because they involve long term debt that takes many years to repay (Bolin, 1993). FEMA grants require households to meet specific standards, including proof that they are indeed residents of the disaster impact area. However, there can be problems in registering people who evacuated or were rescued without identification (Yelvington, 1997). Relaxed standards seem humane but can allow the chronically homeless and out of area construction workers to obtain access to services intended only for disaster victims. In turn, resentment toward “freeloaders” can curtail services to victims.

Some households’ economic recovery takes place quickly, but others’ takes much longer. For example, the percentage of households reporting complete economic recovery after the Whittier earthquake was 50% at the end of the first year but 21% reported little of no recovery even at the end of four years (Bolin, 1993). Economic recovery was positively related to household income and negatively related to structural damage, household size, and the total number of moves (Bolin, 1993). In some cases, this is due to the loss of permanent jobs that are replaced only by temporary jobs in temporary shelter management, debris cleanup, and construction—or are not replaced at all (Yelvington, 1997).

There are systematic differences in the rate of economic recovery among ethnic groups. For example, Bolin and Bolton (1986) found that Black households (30%) lagged behind Whites (51%) in their return to preimpact economic conditions eight months after the 1982 Paris, Texas, tornado. However, the variables affecting economic recovery were relatively similar for Black and White families (see Figure 11-6). In both ethnic groups, economic recovery was negatively related to family size (larger families had lower levels of recovery), but positively related to socioeconomic status (SES—education, profession, and income), use of disaster assistance, insurance adequacy, and aid adequacy. In addition, Black household recovery was negatively related to primary group aid and the number of household moves. The direct effect of family size and SES on economic recovery was compounded by the indirect effects of these variables via their impacts on the use of disaster assistance, insurance adequacy, aid adequacy, and household moves. The variables that had positive direct effects on economic recovery (use of disaster assistance, insurance adequacy, aid adequacy) were negatively related to family size and positively related to SES. That is, larger households were less likely—and higher SES households were more likely—to use disaster assistance, have adequate insurance, or receive adequate aid. Moreover, these variables were positively related to family size and negatively related to SES. That is, larger households made more moves and higher SES households made fewer moves. The overall effect of this complex pattern of relationships is for large poor households to be doubly handicapped in their economic recovery.

**Figure 11-6.**Patterns of Household Economic Recovery.

Source: Bolin and Bolton (1986)

*Psychological Recovery*

Few victims develop major psychological problems from disaster impacts. Indeed, Gerrity and Flynn (1997, p. 108) proposed “the overarching principle of mental health services after disasters is that the recipients of services are normal people, responding normally, to a very abnormal situation.” Consequently, the vast majority of disaster victims experience mild psychological distress. For example, Bolin and Bolton (1986) found negative impacts such as upsets with storms (61%), time pressures (48%), lack of patience (38%), and strained family relationships (31%) after the Paris Texas tornado. However, victims also experienced positive impacts including strengthened family relationships (91%), decreased importance of material possessions (62%), and increased family happiness (23%). The data showed only minor differences between Blacks and Whites in the prevalence of psychosocial impacts.

Similarly, roughly 35% of affected households reported one or more symptoms of psychological distress attributable to the Whittier earthquake (Bolin, 1993). These included startle response (60%), sadness (38%), avoidant thinking (36%), vivid upsetting memories (33%), unexplained agitation (29%), social isolation (25%), bad dreams (20%), and sleep disturbances (15%). Degree of emotional recovery was positively related to age, male gender, previous disaster experience, social integration, and receipt of aid from primary groups.

Researchers have also examined public records in their search for psychological impacts of disasters. For example, Morrow’s (1997) examination of vital statistics (births, marriages, deaths, and divorce applications) had no significant long term trends due to Hurricane Andrew. However, domestic violence rates remained constant for about six months after the hurricane but increased about 50% for nearly two years after that. In all, only 12% of the households affected by Hurricane Andrew expressed a need for counseling (Morrow, 1997). After the Whittier earthquake, Disaster Assistance Centers referred only 5% of victims to mental health counseling (Bolin, 1993). The effects most of these victims have experienced are usually not debilitating but are, rather, part of the normal process of grieving people use to understand and assimilate important, traumatic events. Moreover, victims accumulate many minor and major frustrations throughout the disaster recovery. This is especially true for those who must interact repeatedly with public (governmental) and private (e.g., insurance companies) bureaucracies.

Nonetheless, there are especially vulnerable groups that might need extra attention if they show signs of long standing problems due to the disaster. It should be obvious that people with preexisting mental conditions are likely to need postdisaster psychological support. Moreover, victims who have witnessed the death or severe injury of loved ones should have professional psychological services available (Perry & Lindell, 1978). Single female heads of household experienced extremely high levels of stress in their relationships with significant others, children, and relatives and friends (Morrow, 1997). In a community where the schools were on half day sessions, children in one third of families displayed behavioral problems (Morrow, 1997). Moreover, approximately 50% of children displayed symptoms of moderate to severe PTSD after Hurricane Andrew (Vernberg, LaGreca, Silverman & Prinstein, 1996). Finally, professionals involved in particularly difficult search operations and medical personnel who handle extraordinary work loads during disaster periods might also benefit from postdisaster counseling.

In summary, the majority of victims and responders recover relatively quickly from the stress of disasters without psychological interventions. Those who suffer the greatest losses to their material resources (e.g., the destruction of their homes) and their social networks (e.g., spouses and other family members) are likely to experience the most psychological distress, but not necessarily an amount that is personally unmanageable. Thus, the appropriate strategy for psychological recovery by victims and first responders seems to be one of minimal intervention to provide information about sources of material support (for victims) and to facilitate optional involvement in social and emotional support groups (for victims and first responders).

*Sources of household recovery assistance*. Household recovery can also be defined in terms of the sources of assistance. Bolin and Trainer (1978) defined these sources as the family structure (stage in the family lifecycle) and resources (socioeconomic status), the kinship network (cohesiveness), and the community resource (financial, human, and material resources) and normative (beliefs about appropriate policies for distributing postdisaster aid) structure. The extent to which households rely on one or another of these sources of recovery assistance defines their mode of recovery as autonomous, kinship, or institutional—although few households actually rely on only one source.

Autonomous recovery depends on the household’s available human, material, and financial resources. Human resources are available to the extent the household members have come through the disaster alive, uninjured, and with a sense of optimism that they can recover. Household recovery also depends on the degree to which members can continue to derive generate incomefrom employment, rental of physical assets, or interest/dividends from financial assets. Moreover, household recovery depends on the degree to which material resources are available. This includes the extent to which its possessions—land, buildings, equipment, furniture, clothes, vehicles, crops, and animals—are undamaged or can be restored at reasonable expense. A household’s recovery also depends on the degree to which its financial resources are available. This includes an ability to withdraw savings quickly from banks, to quickly liquidate stocks and bonds at a fair price, and to receive adequate compensation from its insurer. In some cases, household recovery also depends on the degree to which creditors will accept delayed payments on financial liabilities such as loans, mortgages, and credit card debt. Finally, household recovery depends on the degree to which members can reduce consumption such as purchases of shelter, food, clothing, medical care, entertainment, and other goods and services).

Kinship recovery depends on the physical proximity of other nuclear families in the kin network, the closeness of the psychological ties within the network, the assets of the other families and, of course, the extent to which those families also suffered losses. Institutional recovery quite obviously depends on whether victims meet the qualification standards, usually documented residence in the impact area and proof of loss. However, institutional recovery depends more subtly on households’ ability to devote the time and effort required to travel to assistance centers and wait to process any applications, the availability of transportation and child care needed to free that time from other activities, and the ability to fill out the paperwork and cope with the impersonal bureaucratic requirements of the recovery system.

Some aspects of household recovery are relatively similar across ethnic groups, but others reveal distinct differences. For example, Table 11-4 shows Anglos, Blacks, and Hispanics experienced similar levels of frustration in coping with the challenges of living in damaged homes, job relocation, dealing with agencies, behavioral problems with children, and loss of household members. However, most of these commonalities were for relatively infrequently experienced problems (the ones listed at the bottom of the table). By contrast, there were significant differences in the experience of other problems, many of which were frequently experienced. For some problems, the Anglos reported the greatest frequency of frustration, whereas for other problems it was Hispanics experiencing the greatest frustrations. In general, Blacks had the highest level of frustration with more problems than either of the other two groups.

# Business Recovery

Several studies of the economic impacts of environmental disasters have examined the ways in which individual businesses prepare for, are disrupted by, and recover from these events. Dahlhamer and D’Souza (1997), Dahlhamer and Reshaur (1996), Drabek (1991c, 1995), Lindell and Perry (1998), Tierney (1997a, 1997b), Tierney and Dahlhamer (1998), and Whitney, et al. (2001) studied the adoption of hazard adjustment (hazard mitigation, emergency preparedness, and disaster recovery preparedness) measures for environmental hazards. These studies found older, larger (measured by the number of employees), and more financially stable businesses are more likely to adopt hazard adjustments, as are businesses in the manufacturing, professional services, and finance, insurance and real estate sectors.

These studies have found disasters disrupt business operations through a variety of mechanisms (Alesch, et al., 1993; Kroll, et al., 1990; Tierney, 1997b; Tierney & Nigg, 1995; Webb, et al., 2000). Direct physical damage to buildings, equipment, vehicles, and inventories has obvious effects on business operations. However, it might be less obvious that disruption of infrastructure such as water/sewer, electric power, fuel, transportation, and telecommunications frequently forces businesses to shut down in the aftermath of a disaster. For example, Tierney (1997b) reported that extensive lifeline service interruption after the 1993 Midwest floods caused a large number of business closures in Des Moines, Iowa, even though the physical damage was confined to a relatively small area.

**Table 11-4**. Household Recovery Problems, by Ethnic Group.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Problem Perceived To Be Large | Anglo | Black | Hispanic | Total |
| Dealing with mortgage companies about insurance money | 68 | 49 | 68 | 64\* |
| Dealing with building inspectors | 52 | 38 | 76 | 63\* |
| Living in damaged home | 59 | 63 | 59 | 60 |
| Neighborhood conditions | 55 | 60 | 39 | 47\* |
| Living in temporary quarters | 45 | 61 | 38 | 46\* |
| Dealing with insurance companies | 33 | 26 | 48 | 40\* |
| Dealing with contractors | 38 | 18 | 45 | 37\* |
| Unemployment | 11 | 29 | 30 | 25\* |
| Household finances | 14 | 40 | 20 | 22\* |
| Neighborhood crime | 34 | 23 | 16 | 22\* |
| Transportation | 2 | 28 | 17 | 16\* |
| Job relocation | 7 | 21 | 17 | 15 |
| Dealing with agencies | 11 | 20 | 13 | 15 |
| Behavioral problems with children | 19 | 18 | 10 | 14 |
| Family violence | 17 | 11 | 5 | 9\* |
| Gain of member(s) | 14 | 0 | 4 | 5\* |
| Loss of member(s) | 4 | 0 | 13 | 4 |

Source: Morrow (1997) Difference between highest and lowest percentage significant at p < .05.

Small businesses are more physically vulnerable because they are more likely than large businesses to be located in nonengineered buildings and are less likely to have the capacity to design and implement hazard management programs to reduce this physical vulnerability. Thus, in this respect, small businesses are equivalent to the most physically vulnerable households—ones that are poor, female headed, or members of ethnic minorities. At the same time as they face increased costs to repair structures and replace contents, these businesses also face reduced patronage if they must move far from their previous locations. Three years after the Whittier earthquake, 50% of destroyed commercial space and 100% of damaged commercial space had been replaced (Bolin, 1993). In the meantime, however, a number of businesses in the old central business district—predominantly located in unreinforced masonry structures—were forced to relocate. Because Whittier is located within the Los Angeles metropolitan area, local residents could readily obtain the goods and services they needed from undamaged businesses in adjacent communities. Thus, by the time the space is available for reoccupancy, it must be leased to new tenants because the old ones did not have the resources to wait that long.

Perhaps the least obvious effects of disaster impact are population dislocation, losses in discretionary income among those victims who remain in the impact area—which can weaken market demand for many products and services—and competitive pressure from large outside businesses. All of these indirect effects cause small local businesses to experience a high rate of failure in the aftermath of a disaster (Alesch & Holly, 1996; Alesch, Holly, Mittler & Nagy, 2001). Indeed, these factors can produce business failures long after the precipitating event, especially if the community was already in economic decline before the event (Bates & Peacock, 1993; Durkin, 1984; Webb, et al., 2002). Thus, businesses that were marginally profitable before a disaster strikes are more likely to close immediately after the event.

There also is variation among business sectors in their patterns of recovery. Whereas wholesale and retail businesses generally report experiencing significant sales losses, manufacturing and construction companies often show gains following a disaster (Durkin, 1984; Kroll, et al., 1990; Webb, et al., 2000). Moreover, businesses that serve a large (e.g. regional or international) market tend to recover more rapidly than those that only serve local markets (Webb, et al., 2002). Small businesses, in particular, have been found to experience more obstacles than large firms and chains in their attempts to regain their predisaster levels of operations. Compared to their large counterparts, small firms are more likely to depend primarily on neighborhood customers, lack the financial resources needed for recovery, and lack access to governmental recovery programs (Alesch & Holly, 1996; Alesch, et al., 2001; Dahlhamer & Tierney, 1998; Durkin, 1984; Kroll, et al., 1990). Thus, business sector and business size can be seen as indicators of operational vulnerability that are equivalent to the demographic indicators of social vulnerability in households.

Businesses’ hazard vulnerability explains the changes a disaster causes in businesses’ production, sales, and profits and, thus, the dynamics of business recovery. In particular, four cases can be used to illustrate firms’ variation in their postdisaster sales levels (Zhang, Lindell & Prater, 2004). According to Figure 11-7, gains and losses in sales (the vertical axis) over time (the horizontal axis) are defined by the area enclosed within the (vertical) disaster line, the (horizontal) predisaster sales level, and the (diagonal) recovery curve. Gains are represented by the size of the area above the predisaster sales level and losses are represented by the size of the area below the predisaster sales level (the shaded area in each panel).

**Figure 11-7**.Patterns of Business Sales Changes after Environmental Disasters.

Source: Zhang, et al. (2004)

The first case is defined by businesses in the impact area that have minimal hazard vulnerability. Such businesses—professional services are an example—experience only small decreases in sales after disaster impact and return quickly to their predisaster levels (Figure 11-7a). The second case consists of businesses that also are in the impact area, but have moderate vulnerability. Such businesses—large manufacturers, for example—experience a larger initial drop in their sales levels and their recovery takes a longer time (Figure 11-7b). Tourism oriented businesses may also suffer initial losses and take some time to recover to their prior level of profitability because they may be stigmatized in the aftermath of a disaster and can take several seasons to shed the image of danger and destruction.

By contrast, the third case consists of businesses that experience initial sales losses because they are inside (thus experiencing direct losses) or near (thus experiencing indirect losses) the impact area. However, they later experience an increase in demand for their products/services during disaster aftermath (Figure 11-7c). Recovery–related businesses in the building construction, construction materials, and hospitality (e.g., hotels and restaurants) industries exemplify a pattern in which an initial loss (e.g., due to minor damage or infrastructure disruption) is rapidly restored and followed by increased sales. The final case describes recovery related businesses that are just outside the impact area. Not only do they avoid any initial losses, but they also can take advantage of expanded demand in the disaster stricken community and reap gains in the aftermath of the disaster (Figure 11-7d).

Although the available data are limited, some of these principles are revealed in data from business recovery in two communities affected by Hurricane Andrew (Dash, et al., 1997). Homestead had a larger population, a higher per capita income, and a higher average home value than Florida City. Homestead was 42% Anglo and 35% Hispanic, whereas Florida City was 61% Black and 37% Hispanic. Even though Florida City is slightly farther from the point at which the hurricane eye made landfall, there was essentially no initial difference in the hurricane’s impact on the two city’s businesses. The overall commercial property loss after the hurricane was 29% in Homestead and 32% in Florida City. However, Table 11-5 describes the business impacts of the hurricane in terms of the changes in the number of businesses, number of employees, and sales volume in each of the industries operating in these cities.

Overall, there were significant differences in the two communities over the next year. For example, total sales volume declined 83% in Florida City but only 1.1% in Homestead. However, inspection of Table 11-5 reveals that there are distinct differences from one industry to another and the magnitude of the impact depends on whether one examines the change in the number of businesses, the number of employees, or sales volume. For example, Florida City shows dramatic declines for agriculture on all three indicators but no change or even modest increases in construction. By contrast, Homestead showed a slight increase in the number of agricultural businesses, but significant increases in the number of agricultural jobs and sales volume. Moreover, it experienced significant declines for all three indicators in construction—almost the opposite pattern of Florida City. These differences in business impacts indicate local authorities should carefully assess the businesses in their communities before a disaster strikes and monitor their economic viability in the disaster’s aftermath to determine if government intervention is needed.

# The Role of State and Federal Governments

State and federal agencies can play significant roles in disaster recovery, but the burden most frequently falls on local governments because only about 19% of all disasters receive state disaster declarations and 1% qualify for Presidential Disaster Declarations (PDDs). Thus, local governments should prepare to undertake a variety of functions during a disaster recovery process, understanding that they might not receive any aid from higher levels of government for minor disasters. The main factor affecting the level of involvement of state and federal government is the scope of the event. After a major disaster, a PDD opens a broad range of programs for relief and reconstruction. In such cases, the state plays a coordinating role, working with both federal and local governments. Moreover, disaster response might be mostly over before the PDD is granted, but federal assistance is certainly welcome when it finally arrives. The Recovery Function Annex of the National Response Plan of January 2003, available on the DHS Web site (www.dhs.gov/dhspublic/), lists 71 federal disaster recovery programs that are administered directly by the DHS or by dozens of other federal and volunteer organizations. The following discussion is not exhaustive, but gives an overview of some of the key programs.

**Table 11-5.**Changes in the Number of Businesses, Employees, and Sales Volume after Hurricane Andrew.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Businesses Change (%) | | Employees Change (%) | | Sales Volume Change (%) | |
| Industry | Florida City | Homestead | Florida City | Homestead | Florida City | Homestead |
| Agriculture | -71 | +4 | -92 | +74 | -93 | +66 |
| Construction | 0 | -20 | +12 | -20 | +12 | -59 |
| Manufacturing | 0 | -12 | -67 | -19 | -59 | -32 |
| Transportation/  communication | -50 | +9 | -100 | +4 | -26 | +51 |
| Wholesale trade | -60 | -4 | -50 | +6 | -84 | +57 |
| Retail trade | -64 | -2 | -84 | +16 | -84 | -5 |
| Finance/  insurance/real estate | -20 | 0 | -59 | -1 | -32 | -32 |
| Business services | -63 | +6 | -94 | -5 | -65 | -14 |
| Professional services | -45 | -3 | -73 | +16 | -69 | +1 |
| Public administration | -50 | +38 | -69 | +7 | n/a\* | n/a\* |

Source: Dash, et al. (1997), Sales volume is not applicable to public sector organizations.

The lead agency at the federal level is FEMA, renamed the Emergency Preparedness and Response Directorate when it was placed in the new Department of Homeland Security in 2002. Other federal agencies might be called upon when a PDD is granted, including the Small Business Administration, the US Army Corps of Engineers, the Department of Housing and Urban Development, the National Oceanographic and Atmospheric Administration, and the Economic Development Administration, among others. Each of these agencies funds specific disaster recovery programs.

The National Response Plan provides for the establishment of Disaster Field Offices (DFOs) in the vicinity of the disaster. Emergency Response Teams (ERTs) are located in the DFOs. These include an Operations Section that coordinates federal, state, and voluntary efforts. The ERT Operations Section has a Human Services Branch that is responsible for many tasks including needs assessment; establishment of Disaster Recovery Centers; initiation, coordination, and delivery of recovery programs authorized by the Stafford Act; and managing DHS and state grant programs. Finally, there is an Infrastructure Support Branch to facilitate restoration of public utilities and other infrastructure services. There is also a Deputy Field Coordinating Officer for Mitigation who coordinates with the Infrastructure Support Branch and otherwise promotes mitigation and preparedness activities.

The main types of programs providing recovery assistance are Individual Assistance, Infrastructure Support (formerly Public Assistance), and Hazard Mitigation Grant Program. Individual Assistance is available to households through the Temporary Housing Assistance program, Individual and Family Grants, Disaster Unemployment assistance, legal services, special tax considerations, and crisis counseling programs. Individuals and businesses can receive aid through the Small Business Administration Disaster Loans program, which can provide loans for repairs to housing and businesses, and also for operating expenses. In the past, many loan programs have been inaccessible to low income households, which tend to rent rather than own their housing. Thus, they failed to qualify for loans because of their low incomes and lack of collateral. The Individual and Family Grant Program was intended to fill the need for a program targeting those whose needs were not being met by the SBA loan program, private insurance, or NGO assistance. However, the amounts awarded tend to be small.

Public Assistance programs offered through the Infrastructure Support Branch are targeted at state and local governments, certain nonprofit organizations that provide emergency services, and Indian tribes. These programs provide funds for the repair or replacement of public facilities damaged by disaster. They may be classified as Emergency Work under Category A (Debris Removal) or Category B (Emergency Protective Measures) or Permanent Work, under Category C (Roads and Bridges), Category D (Water Control Facilities), Category E (Buildings and Equipment), Category F (Utilities), or Category G (Parks, Recreational Facilities, and Other Items).

Assistance provided under the Hazard Mitigation Grant Program has increased in importance since the passage of the Disaster Mitigation Act of 2000. This legislation requires local governments to identify potential mitigation measures that could be incorporated into the repair of damaged facilities in order to be eligible for pre- and postdisaster funding. This policy represents a significant shift from previous FEMA policies that inhibited the implementation of mitigation measures because repairs were only funded to the level of predisaster conditions. The recent shift is putting more emphasis on activities eligible under Section 406 of the Stafford Act, known as *406 mitigation.* These activities include hazard mapping, mitigation planning, development of building codes, development of training and public education programs, establishing Reconstruction Information Centers, and assisting communities to promote sustainable development.

State governments vary widely in the level of attention and resources they devote to planning for and implementing disaster recovery. Some states have established programs providing assistance to households and local governments for recovery from disasters that do not receive a PDD. In order to support these programs, some states have created state disaster funds and designated several state level departments to provide resources and expertise that are available during recovery. One example is a state planning or community development department, which can provide data or guidance on integration of sustainable development and recovery. Other examples are state environment departments, which might have coastal management programs or water quality programs, and state economic development agencies, which might administer Community Development Block Grants that can fund repairs to low income housing.

States can fund their programs through the creation of state disaster funds, but only about half of the states have done so. Typically, state legislatures have appropriated funds after disasters on the basis of need. Another type of disaster fund is a disaster trust fund, which creates revenue by dedicating a percentage of sales taxes or other revenues to the fund. For a more detailed discussion of federal and state disaster recovery programs, see Smith (2004).

**The Role of Hazard Insurance**

As noted in Chapter 7, hazard insurance is a preimpact recovery preparedness action. As such, it has the potential for completely replacing current programs of disaster relief. In addition, hazard insurance decreases government workload and expense after disasters by shifting part of the administrative burden for evaluating damage to insurance companies in the private sector. Finally, hazard insurance defines the terms of coverage in advance, thus reducing opportunities for politicians to increase benefits after disaster. The desire to appear to be generous creates a temptation to vote for “pork barrel” projects. The problem is that generous aid for uninsured victims angers those who had the foresight to purchase insurance in advance and, thus, provides a disincentive to purchase insurance in the future.

Unfortunately, the potential contribution of hazard insurance remains to be fully realized. There are many difficulties in developing and maintaining an actuarially sound hazard insurance program. The National Flood Insurance Program has made significant strides over the past 30 years, but it continues to require operational subsidies. One of the basic problems is that those who are most likely to purchase flood insurance are, in fact, those who are most likely to file claims (Kunreuther, 1998). This problem of *adverse selection* makes it impossible to sustain a market in private flood insurance. The federal government has tried to solve this problem by requiring flood insurance for structures located in the 100 year flood plain that are purchased with federally backed mortgages. Unfortunately, homeowners frequently allow their policies to lapse after the first year and the program has no effect on those who purchase their homes without a mortgage or have paid off their mortgages. Consequently, some homes are rebuilt soon after a disaster because their owners have high quality insurance coverage, whereas other homes take much longer because they are only partially insured. In some cases, the homeowners lack *any* insurance because they cannot afford quality insurance or were denied access to it because of “redlining” (Peacock & Girard, 1997).

In addition to these institutional problems, there are cognitive obstacles to developing a comprehensive hazard insurance program. Building on earlier hazards research (see Burton, et al., 1993, for a summary) and psychological research on judgment and decisionmaking (see Slovic, et al., 1974, for an early statement and Baron, 2000, or Gilovich, Griffin & Kahneman, 2002, for more recent summaries), researchers have identified numerous logical deficiencies in the ways people process information in laboratory studies of risk.

One important issue concerns what economists call moral hazard and psychologists refer to as a felt lack of personal responsibility for protection. The concept of moral hazard/felt responsibility for personal protection has important policy implications because the Interagency Floodplain Management Review Committee (1994) report concluded federal disaster relief policy creates this condition by relieving households of the responsibility for providing their own disaster recovery resources. This might be a significant reason why only 20% of structures affected by the 1993 Mississippi floods were insured. However, there appears to be no data on the extent to which households explicitly consider the availability of disaster relief in making decisions about whether to purchase hazard insurance and adopt other hazard adjustments.

**Non Governmental Organizations and Community Based Organizations**

The role of NGOs such as the American Red Cross, Salvation Army, and Mennonite Disaster Service is widely publicized and the role of CBOs such as local churches and service organizations is increasingly recognized. These organizations provide housing, food, clothing, medicine, and financial assistance to disaster victims. In most cases, the *existing* government social service agencies are supplemented by NGOs that *expand* their membership to perform the tasks they are expected to perform during disaster recovery (Dynes, 1970). By contrast, existing CBOs typically *extend* themselves beyond their normal tasks to perform novel activities. In addition, there are situations in which existing, expanding, and extending organizations cannot successfully meet the recovery needs of disaster victims. In such cases, government agencies, NGOs, and CBOs form an *Unmet Needs Committee,* which is an *emergent* organization that is designed to serve those whose needs are not being addressed by existing programs.

In some cases, the need for such emergent organizations arises from political organization and activism by population segments that believe they are being neglected (Morrow & Peacock, 1997; Phillips, 1993a). Local authorities should anticipate recovery demands, plan for an *Unmet Needs Committee,* and communicate its existence throughout the community. When emergent organizations do arise, they can be incorporated into the ongoing recovery management process in order to learn from their knowledge about the unmet needs and ensure that there is an equitable distribution of disaster recovery resources. For a more detailed discussion of NGO activities in disaster recovery, see Smith (2004).

# Local Government Recovery Functions

After a disaster, local government needs to perform many tasks very quickly, and many of these must be performed simultaneously. It is therefore critical to plan for disaster recovery, as well as for disaster response (Schwab, et al., 1998). The line between emergency response and disaster recovery is not clear because some sectors of the community might be in response mode while others are moving into recovery, and some organizations will be carrying on both types of activity at the same time. This means that there will be little time to plan for disaster recovery once the emergency response has begun. By planning for recovery before disaster strikes, resources can be allocated more effectively and efficiently, increasing the probability of a rapid and full recovery. The following discussion is based on the concept of preimpact planning for disaster recovery because a lack of planning will delay decisions about the allocation of recovery resources and the procedures by which they will be used. A lack of preimpact planning can also increase the probability of conflicts arising due to competition over scarce resources during the recovery period.

The previous sections of this chapter have described the tasks that households and businesses perform during disaster recovery and the resources they use to implement this recovery. When households and businesses lack the knowledge of how to recover or the resources needed to recover, government can provide assistance. Local government must also perform specific tasks during disaster recovery, some of which involve restoring services it performed before the disaster (e.g., providing functioning roads, street lights and signs, and traffic control devices). In addition, local government must rebuild any critical facilities (e.g., police and fire stations) that were damaged or destroyed. Finally, local government has a heightened need to perform its regulatory functions regarding land use and building construction. These two functions require rapid action under conditions of a greatly multiplied workload, so special provisions are required to expedite the procedures for reviewing and approving the (re)development of private property.

In approaching the task of preimpact recovery planning, a community must overcome three major misconceptions about disaster recovery. The first misconception is that the entire recovery effort can be improvised after the emergency response is complete. In fact, a timely and effective disaster recovery requires a significant amount of data collection and planning that will delay the recovery if they are postponed until after the emergency response is over. It is important to recognize that the disaster response phase’s uncertainty and urgency about human safety has been replaced by households’ and businesses’ urgency to return to normal patterns of functioning and government agencies’ uncertainty about how to organize the community to accomplish this.

The second misconception is that there will be ample time to collect data and plan the recovery during the emergency response. It is true that some recovery relevant data must be collected during the emergency response. However, an assessment of “lessons learned” from the disaster impact should be used to guide a recovery process that has been designed before the disaster strikes. Finally, the third misconception is that the objective of disaster recovery should be to restore the community to the conditions that existed before the disaster. As noted earlier, this will simply reproduce the community’s existing disaster vulnerability.

In many ways, the process of preparedness for disaster recovery is quite similar to the process of preparedness for emergency response. Thus, the community should establish a Recovery/Mitigation Committee before disaster strikes that will establish a vision of community disaster recovery and articulate the basic strategies that will be implemented before and after disaster impact. In addition, the committee should assign each recovery function to a specific organization, develop a Recovery Operations Plan (ROP), and acquire any necessary resources to implement it. Finally, the committee should conduct the training and tabletop exercises needed to ensure the ROP can be implemented effectively.

*The Recovery/Mitigation Committee*

The LEMC’s Recovery/Mitigation Committee can be an important part of an effective, rapid disaster recovery process. As noted in Chapter 3, this committee should be established before a disaster during the preimpact recovery planning process. Personnel should be designated to serve on this committee, including a chairperson and a lead agency, usually the local planning department. The jurisdiction’s Chief Administrative Officer, usually the city mayor or the county executive, should publish a planning directive, and the Recovery/Mitigation Committee chairperson should establish a planning schedule. Many government agencies should participate in the Recovery/Mitigation Committee, including the directors of the local planning, building, public works, engineering, parks and recreation, economic development, finance, housing, and social services departments, as well as the jurisdiction’s PIO (Schwab, et al., 1998). In addition, there should be representatives from local utility companies, other local business organizations, religious and charitable organizations, and representatives of neighborhood associations.

The Recovery/Mitigation Committee should examine the findings from the community HVA to identify the locations having the highest levels of hazard exposure, physical vulnerability, and social vulnerability. The committee should begin to work with the rest of the community, and especially with those at greatest risk, to formulate a vision of the disaster recovery it intends to implement.

Next, the committee should develop an ROP that integrates the likely disaster impacts, community goals, and public and private sector capabilities within the community. In addition, the ROP should identify external sources of assistance (federal, state, NGO), recognize their loan/grant requirements, and integrate these into a comprehensive program of disaster assistance. The committee should also develop a financial plan for responding to the disaster. Bolin (1993) reported that city revenues from a heavily damaged central business district were 5% of total revenues before the earthquake, declined sharply in the year after the earthquake, and took about four years to return to previous level. This clearly affects the jurisdiction’s tax revenues.

Moreover, the committee should establish agreements with NGOs and CBOs (especially local churches, neighborhood associations, and other citizens’ groups) for support in disaster recovery because these organizations provide financial and in-kind support, as well as legal and technical assistance. After a disaster strikes, the Recovery/Mitigation Committee should ensure that organizations respond within the scope of their responsibilities to implement the ROP.

*Envisioning a Community Recovery Strategy*

The Recovery/Mitigation Committee needs to work with the community before and after a disaster to articulate a vision of community disaster recovery. The recovery process needs to strike a balance between corporate centered and community based economic development (Bingham, 2000). According to a *corporate centered economic development*, usually advocated by the local business community, government provides resources such as land and money to the private sector to invest without any restrictions. This market based strategy tends to produce results that are good in aggregate but produces an inequitable recovery. By contrast, *community based economic development* involves active participation by government to ensure that the benefits of recovery will also be shared by economically disadvantaged segments of the community.

The short term recovery following a major disaster can generate an economic boom as state and federal money flows into the community to reconstruct damaged buildings and infrastructure. These funds are used to pay for construction materials and the construction workforce and, to the extent that the materials and labor are acquired locally, they generate local revenues. In addition, the building suppliers hire additional workers and these, along with the construction workers, spend their wages on places to live, food to eat, and entertainment. Unless there are undamaged communities within commuting distance that can compete for this money, it will all be spent within the community.

Communities must also consider the long term economic consequences of disaster recovery. What will happen after the reconstruction boom is over? They can attract new businesses if they have a skilled labor pool and good schools—especially colleges whose faculty and students can support knowledge based industries. Other assets include low crime rates, low cost of living, good housing, and environmental amenities such as mountains, rivers, or lakes (Blakely, 2000). A community can also enhance its economic base if it can attract businesses that are compatible with the ones that are already there. Such firms can be identified by asking existing firms to identify their suppliers and distributors. These new firms might be attracted by the newer buildings and enhanced infrastructure that has been produced during disaster reconstruction.

If a disaster stricken community does not already have such assets, they can invest in four fundamental components of economic development—locality development, business development, human resources development, and community development. *Locality development* enhances a community’s existing physical assets by improving roads or establishing parks on river and lakefronts. *Business development* involves efforts to retain existing businesses or attract new ones. Although it is not easy, this can be accomplished working with businesses to identify their critical needs. In some cases, this might involve establishing a business incubator that allows startup companies to obtain low cost space and share meetings rooms. *Human resources development* expands the skilled workforce, possibly through customized worker training. Finally, *community development* utilizes NGOs, CBOs, and local firms that will hire current residents of the community whose household incomes are below the poverty level. For example, a comprehensive program for developing small businesses, affordable housing, community health clinics, and inexpensive child care can help to eliminate some of what new businesses might consider to be one of the risks of relocating to the community.

*Developing a Recovery Operations Plan*

As was the case with emergency response, the demands of disaster recovery imply that specific functions be performed. Table 11-6 identifies four principal disaster recovery functions—disaster assessment, short term recovery, long term reconstruction, and recovery management. The recovery phase’s disaster assessment function should be integrated with the emergency response phase’s emergency assessment function in identifying the physical impacts of the disaster. Short term recovery focuses on the immediate tasks of securing the impact area, housing victims, and establishing conditions under which households and businesses can begin the process of recovery. Long term reconstruction actually implements the reconstruction of the disaster impact area and manages the disaster’s psychological, demographic, economic, and political impacts. Finally, recovery management monitors the performance of the disaster assessment, short term recovery, and long term reconstruction functions. It also ensures they are coordinated and provides the resources needed to accomplish them. The following section describes each of these functions in greater detail.

**Table 11-6**.Disaster Recovery Functions.

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

*Disaster Assessment*

Disaster assessment includes both physical and social impact assessment. Physical impact assessment, which is usually called *damage assessment*, must address residential, commercial, and industrial buildings. In addition, there is a need to conduct damage assessment for infrastructure such as water, sewer, electric power, fuel, transportation, and telecommunications systems. Finally, damage assessment also must address critical facilities such as hospitals, police stations, and fire stations. In addition, there is a need for social impact assessment, usually called victims’ needs assessment to assure that the available recovery programs are meeting victims’ needs. Finally, “lessons learned” examines the disaster’s physical and social impacts to identify ways in which the mitigation actions can be taken to reduce the community’s hazard vulnerability.

*Damage assessment*. There are three basic types of damage assessment (FEMA, 1995c). The first type, *rapid assessment*, is usually conducted during the emergency response, preferably within the first 24 hours (Schwab, et al., 1998). The purpose of rapid assessment is to identify the areas affected by the disaster and the approximate magnitude of the disaster’s physical impacts. It is especially important to assess the need for lifesaving activities very quickly, so rapid assessment should be completed within one to three hours after disaster impact. In turn, this allows emergency managers to determine where there are collapsed buildings requiring search and rescue operations and whether there is a potential for secondary impacts such as hazmat releases after an earthquake. Rapid assessment also provides information about the status of infrastructure and critical facilities, as well as whether there is likely to be a need for assistance from other local jurisdictions or other levels of government. A rapid assessment is performed by available police, fire, and public works personnel—both on shift and recalled to duty—to conduct assessments in predetermined geographic sectors of the community. Supplementary data can be provided for a rapid assessment from the private sector organizations that own or operate lifelines and critical facilities.

The second type of assessment is the *preliminary damage assessment*, which is designed to produce counts of destroyed, severely damaged, moderately damaged, and slightly damaged structures. This level of assessment should be completed within a 3-4 days, depending on the size and accessibility of the impact area and the number and prior training of the damage assessment teams. The data from the preliminary damage assessment are used to support requests for state and federal disaster declarations. A preliminary damage assessment is performed by having local government personnel perform *windshield surveys* by driving along all of the streets in the impact area (as the name suggests, they do not get out of their cars). Inspectors tally counts of damaged structures, with residential structures being classified by income levels and structural categories (single family, mobile home, multifamily residential structures). Buildings can then be tagged red, yellow, or green depending on the level of damage and occupant safety, with red tagged buildings being unsuitable for occupancy. A preliminary damage assessment should also include estimates of percentages of households with insurance coverage because this will affect the speed with which affected individuals and communities are able to replace their housing.

Finally, a *site assessment* is meant to produce detailed estimates of the cost to repair or replace each affected structure. This information is used to support requests for federal assistance to the owners of the damaged property. It includes estimates of losses to residential properties in order to understand both the level of need for temporary shelter and temporary housing and for repair assistance. Losses to commercial and industrial structures are assessed in order to understand the level of need for repair assistance and economic injury assistance. Losses to public property must be assessed in order for the community to apply for repair assistance. Site assessments require technically trained personnel such as architects, structural engineers, and building inspectors for multistory structures such as apartment buildings. These personnel can usually be drawn from city staff, but additional personnel might be recruited from other local organizations or obtained from outside the community (e.g., through mutual aid agreements with other jurisdictions or memoranda of agreement with professional societies). Skilled construction professionals can be supplemented by volunteers who can conduct site assessments for most single family residences if they have been trained in the use of well designed checklists. A site assessment might take weeks to complete, depending on the size and accessibility of the impact area as well as the number and training level of the assessment personnel. These methods of damage assessment can be compared to the procedures of cost estimation that are used in routine construction projects, as shown in Table 11-7.

**Table 11-7**. Types of Postdisaster Damage Assessments.

|  |  |
| --- | --- |
| Damage Assessment | Routine Construction Cost Estimation |
| Rapid Damage Assessment |  |
| Preliminary Damage Assessment |  |
| Site Assessment | Preliminary Cost Estimate |
|  | Detailed Cost Estimate |

In preparing for the necessary damage assessments, staff from local government departments should be assigned to Damage Assessment Teams (DATs). Their numbers should be augmented as needed by staff from local private sector organizations and neighboring jurisdictions through memoranda of agreement (MOAs) or other contractual arrangements. All DAT members should be trained in a common assessment procedure in order to speed up the process and generate results that are comparable across all DATs within the jurisdiction.

*Victims’ needs assessment*. The effects of disasters are not confined to physical damage. In addition, affected communities must assess the needs of those individuals and groups who have lost property, been injured, or lost family members. This procedure, called a *victims’ needs assessment*, should begin during the preimpact recovery planning process. The first step is to identify the community’s vulnerable segments, which may be defined as specific locations and neighborhoods, or types of households and businesses. The local jurisdiction should assign staff to Victims’ Needs Assessment Teams (VNATs) and supplement them with staff from other organizations. These supplementary staff should be assigned by contract with NGOs and CBOs and trained together with the government staff in methods of victims’ needs assessment.

The need for public assistance to finance household and business recovery is inversely related to the savings rate. That is, the lower the savings rate, the higher the need for public assistance. Unfortunately, the savings rate in the US has been extremely low for the past decade, so the VNATs should be prepared to find large numbers of households and businesses needing recovery assistance. In addition to housing needs, VNATs should also be prepared to identify households’ needs for employment and other economic assistance (e.g., food, clothing, and other basic needs), as well as their psychological needs. If they are given adequate preimpact training, VNAT team members will be knowledgeable about the availability of local, state, federal, and NGO disaster recovery programs. In turn, this will enable them to accurately diagnose victims’ needs and refer them to the appropriate recovery programs.

*“Lessons learned”*. Unless the Recovery/Mitigation Committee establishes evaluation procedures, few lessons are likely to be learned and applied to improving the community’s resilience. Therefore, it should establish a “Lessons Learned” subcommittee, procedures for studying the event, and a well defined scope for its report. The recovery team should use the damage assessment as an opportunity to determine what are the ways, if any, that the jurisdiction should modify its land use plan, building code, and other community operations in the light of the disaster impact. Other issues to be considered should include infrastructure location and replacement, the capital improvements program, and the provisions of the ROP itself. The delivery date of the report should be set fairly early in the recovery process, perhaps 30 days after the disaster, so its recommendations can be incorporated into the recovery process. This should be an adequate amount of time to collect data, deliberate the implications, and make recommendations for policy revision if the jurisdiction has declared a 30 day moratorium on reconstruction.

*Short Term Recovery*

*Impact area security and reentry.* First, there is a need to maintain security in the impact area to ensure residents do not return before it is safe to do so and also to protect vulnerable property from the threat of looting. Addressing these issues requires jurisdictions to develop procedures for residents’ reentry. Unfortunately, there is little research on ending evacuations to guide the planning process (Stallings, 1991), but there is anecdotal evidence of problems that have arisen after disasters. The available evidence indicates a need to provide for temporary reentry to remove essential items (e.g., clothing and medications) and permanent reentry for continuous habitation. In both cases, hazardous conditions must have abated sufficiently to allow people to enter safely. In some cases, hazard abatement might include the demolition of severely damaged buildings and the removal of heavy debris. In addition, proper identification listing a local address is needed to ensure only residents or authorized reconstruction personnel are allowed to enter. Finally, a jurisdiction must establish basic habitability criteria, such as the restoration of transportation and sewer systems. It is possible to allow people to return before electric power is available because some people have their own generators, but the criteria should be established ahead of time. If the disaster has had a regional impact, reentry should be coordinated with neighboring jurisdictions.

*Temporary population shelter/housing*. As indicated in the discussion of households’ housing recovery, victims first find temporary shelter in the homes of friends and relatives, commercial facilities such hotels and motels, or mass care facilities such as auditoriums and gymnasiums. The evidence is clear that the majority of evacuees prefer the homes of friends and relatives. Among those whose friends and relatives are either too far away or are themselves victims, the more affluent choose commercial facilities and the poor—usually 10-25% of the evacuees—stay in mass care facilities (Mileti, et al., 1992).

Mass care facilities must accommodate differences due to age (elderly and children), ethnicity, and physical limitations (e.g., mobility). Such facilities make it difficult to accommodate household differences in such behaviors as personal sanitation, privacy, child rearing, and hours and loudness of social interaction. They also place increased demands on time for other tasks, which reduces time for child care, resulting in loss of control over children. Lack of personal space and privacy consistently generate ethnic and class tensions among those in mass shelters and closely spaced semiprivate shelters such as tents (Yelvington, 1997). Operation of mass care facilities can be especially complex after major disasters in urban areas. In such cases, there will be a need for a large contingent of local multilingual volunteers to assist in multiethnic communities and enough people to provide continued staffing for a long duration displacement. Emergency managers can expect thousands of volunteers in first few weeks, but there are likely to be dramatic drops in volunteerism after the second week (Yelvington, 1997). Crowding and stress make it important to maintain transparency in making decisions about facility operation and to establish procedures for coping with predisaster homeless, construction workers, and others who do not qualify for shelter and housing (Bolin, 1993).

The incentives for moving from temporary shelter to temporary housing should be obvious. “Doubling up” with friends and relatives eventually causes friction in interpersonal relationships, commercial facilities are a drain on family finances, and mass care facilities are crowded, noisy, and lack the privacy to which people are accustomed. When the number of displaced households is less than the vacancy rate for affordable housing within commuting time of jobs, the existing housing market can accommodate the relocation. To the degree that there are few vacancies, the rental rates are high, or the commuting time is excessive (either because of the travel distance or because crowded routes decrease average driving speed), government is likely to be called upon to increase the stock of temporary housing by bringing in mobile homes.

The ROP should recognize that the need for temporary housing increases in importance as the size of the socially vulnerable population increases, especially when there is a limited amount of affordable housing outside the impact area. The number of displaced households will be compounded by those evicted from undamaged homes because they lost their jobs and could not make rental or mortgage payments. In a major urban area struck by a large scope disaster, this could be thousands of mobile homes. Where will these be located—on victims’ lots (utilities already installed, maintains neighborhood integrity, allows supervision of reconstruction) or in mobile home parks? If trailer parks are established, local officials should try to reduce social friction by locating people within kin and friendship networks to the greatest extent possible.

*Temporary business operation*. Just as households need temporary housing, so too do businesses need temporary operating locations when their normal locations have been severely damaged or destroyed. Many small businesses have customers who are loyal enough to travel an extra distance, but loyalty does have its limits. Consequently, government might need to permit the establishment of temporary business operations in parking lots or other open spaces that are close to the displaced businesses’ normal locations. The ROP should also identify sites for temporary housing and temporary business operations, which may be needed for as much as a year (and even longer in some cases).

*Infrastructure restoration*. There are often many households and businesses that cannot resume normal functioning simply because of the lack of potable water, sewer, electric power, fuel, telecommunications, or transportation—not because of damage to their homes or places of business. Consequently, there is a need to inspect and repair any damage to pipelines and power lines, as well as streets, bridges, street signs, and street lights. In addition to returning these households and businesses to normal functioning, restoration of infrastructure to these areas also provides places where emergency workers and construction crews can live while they are rebuilding the structures that have been damaged or destroyed. On the other hand, generating a rapid economic recovery might suggest a different set of priorities—emphasizing the restoration of infrastructure for the area’s dominant export industries. Thus, there are likely to be conflicting priorities and few easy decisions. Consequently, priorities must be established in the preimpact recovery plan with links to the damage assessment procedures that allow the recovery managers to adapt the predetermined infrastructure restoration priorities to the needs of each specific situation.

*Critical facility operation*. It should be quite obvious that there will be a need to quickly repair critical facilities such as hospitals, police stations, and fire stations. However, a community’s public infrastructure is also served by other critical facilities such as water treatment plants, transit bus barns, public works equipment yards, and government offices. There is also privately operated infrastructure that includes electric power stations, television and radio facilities (both stations and broadcast towers), and telephone switching facilities. An inventory of these facilities should be available from the hazard/vulnerability analysis.

*Debris management*. Most of the natural disasters, and explosions among the technological disasters, can destroy a substantial number of structures. In turn, this can produce an enormous amount of debris that must be removed. Debris management should designate temporary sites for sorting recyclable from nonrecyclable materials, with the latter being moved to permanent sites for disposal. Debris management is complicated in situations where evidence must be gathered in a systematic manner as in investigations of accidents (e.g., National Transportation Safety Board investigations of airline crashes or train derailments) or when the site is be considered a possible crime scene (e.g., the bombing of the Murrah Federal building Oklahoma City). In such cases, debris removal is likely to be delayed, so temporary sorting sites will be needed to separate out material evidence from useless debris. Ultimately, a catastrophic event such as the World Trade Center collapse or Hurricane Katrina can produce millions of tons of debris that can overwhelm landfill capacity.

*Emergency demolition*. It is likely that some structures will be damaged severely enough to pose a threat of collapse, so procedures are needed to rapidly assess their stability and determine if they should be reinforced and rebuilt or demolished. This assessment clearly requires competent structural engineering assistance, but historic preservationists should also be consulted if the building has cultural significance (Donaldson, 1998). Indeed, historic structures should be surveyed and inventoried before disaster strikes and postimpact damage assessment procedures should be developed to avoid unnecessary demolition of damaged historic structures (Kariotis, 1998; Kimmelman, 1998). The ROP should establish policies that include criteria for emergency demolition of severely damaged structures and adequate notification for owners who might have evacuated. In addition, the implementing procedures should contain samples of the contracts to be signed with demolition companies. These contracts require the involvement of the jurisdiction’s legal counsel to ensure the administrative process respects personal property rights.

*Repair permitting*. The ROP should contain criteria for determining which structures will be eligible for reoccupancy based upon the percent damage to the different elements of the building—foundation, wall, and roof systems, exterior walls, interior walls, floors and flooring materials, plumbing, electrical systems, HVAC systems. The large number of requests for building repair permits following a disaster can overwhelm a local code enforcement department (Schwab, et al., 1998). In preparation for this eventuality, the permit office staff should be augmented with staff from other jurisdictions and the private sector as needed. In addition, the ROP should establish an emergency permitting process that includes 10 day moratorium on minor repairs and a 30 day moratorium on permits for substantial repairs involving 50% or more of the preimpact property assessment. This allows time for the city to acquire enough staff to evaluate the properties and areas involved and establish policies for improving the building stock as needed. Of course, exemptions may be needed for reconstruction of critical facilities. The process should be streamlined as much as possible by, for example, placing permit staff in a DAC. The streamlined process should be continued for a limited time period, often 90 days after impact, that has been defined in the ROP. Local jurisdictions should consider deferring application fees during this period.

ROPs for urban areas should anticipate the possibility of developers purchasing many damaged single family residences in the expectation of replacing them with apartment buildings. To avoid this problem, one city established a five month moratorium on applications for construction of new apartments. It also established restrictions on new buildings to ensure a Design Review Board could exclude building designs that were incompatible with the character of the neighborhoods in which they were to be constructed.

*Donations management*. Major disasters frequently produce an outpouring of material (rather than financial) assistance from households and businesses outside the impact area. There is usually a substantial amount of useful material in these donations, but there also is a substantial amount of junk. Dynes (1970) and others have listed donations such as women’s formal gowns, parkas (after summer disasters in the South), outdated medicines, and other items that impede the recovery by diverting personnel to the task of sorting through the donations. Even useful items must be sorted. For example, donated clothing must be sorted by category, gender appropriateness, and size. It is common for victims to reject food donations because these items are incompatible with local tastes and to refuse specific types of temporary housing because the buildings are incompatible with local cultural preferences or climatic conditions. Another problem with donations is that an influx of useful material resources precludes the need to buy from local