



Shelters should be located near employment centers, when possible

- *Management is key to an effective housing reconstruction program (Kreimer, 1990).* The lead institution should have broad representation (or access to key disciplines), should have close links with the community and the beneficiary groups, should pursue a concerted outreach strategy to reach the disaster victims; should have direct links with the leadership of the municipality or national government; and should ensure that banks or financial institutions be given the responsibility of managing the financial aspects of the housing reconstruction program. In short, successful housing programs are, in all instances, well managed.
- *Relocation of disaster victims should be avoided, when possible.* There is a temptation to rapidly decentralize after a disaster and relocate displaced families to temporary shelters on the periphery of the damaged area(s). Invariably, these solutions meet with partial success at best, but usually failure. After the 1972 Managua, Nicaragua earthquake, the government attempted to build a new city approximately 15 kilometers from downtown Managua. Many of the families drifted back to the capital; many of the new dwellings were abandoned.
- *Earthquakes will compound existing housing problems; yet lead to new opportunities for collaboration.* Disasters magnify existing problems - poverty, the homeless, a shortage of basic services to support the community. Yet, as demonstrated in Santa Cruz and elsewhere, an earthquake can also galvanize local action, and bring together varied groups - volunteers, non-government organizations, professional groups, business associations, and others - to work together on housing reconstruction issues.

- *The housing reconstruction process is very political.* Unfortunately, the victims that need the help the most - the poor and elderly - are among those that have the least amount of political clout. Advocacy groups play an important role in housing reconstruction, and should be a part of the housing recovery planning team or task force.
- *Issues involving the acquisition, tenure, and use of land are critical.* Among the first steps in the housing reconstruction process is to quickly acquire land and to address problems related to land tenure. Difficulties in acquiring land has delayed several reconstruction efforts, including Guatemala (1976) and Managua (1972). In Popayan, Colombia, on the other hand, government acquisition of land for the resettlement of homeless earthquake victims was a central feature of the Popayan Earthquake Reconstruction Project.
- *Housing reconstruction must be carried out as a phased process.* The proper sequence of activities is important. When populations are resettled, land acquisition and minimum infrastructure development (roads and utilities) must be in place. For self-help projects, building materials must be delivered to coincide with the arrival of the new occupants. One of the chief bottlenecks in a housing reconstruction program is the lack of suitable building materials.
- *Housing solutions should be appropriate to the needs of the occupants.* Housing is more than shelter from the elements; there is an underlying social and cultural fabric that needs to be considered. Structural solutions may be inappropriate, housing units may be difficult to replicate, maintenance of the housing units may be problematic. These and other issues need to be considered when rebuilding a community, and in designing an appropriate housing solution for the displaced populations.

Agricultural Recovery

While attention has traditionally focused on urban related problems and issues after an earthquake, rural populations also experience social and economic dislocation. Damages to a nation's rural infrastructure - roads, bridges, water, and power - can have a major impact on the distribution system for goods and services. Housing and employment shortages may lead to migration to urban centers, exacerbating the problems of providing basic services in these areas. The World Bank (Kreimer, 1990) has identified the following lessons learned about agricultural and rural recovery after a major disaster.

- *Include prevention in sectoral projects.* Measures to reduce or mitigate the effects of earthquakes and other hazards should be included in sectoral planning. Agricultural disaster awareness and prevention should be introduced into the curriculums of schools and vocational training centers in rural areas.
- *Inadequate attention to the agriculture sector and rural populations after an earthquake or other natural disaster can have serious repercussions.* The agriculture sector may eventually recover, but meanwhile the disaster may lead to mass migration, deforestation, the neglect of maintenance to the region's infrastructure, and other actions that may prove to be very costly in the long term. A balanced approach is needed; if rural housing is needed after an earthquake, measures must be taken to ensure that agricultural productivity does not decline rapidly.

- *Damage assessment must take into account the side effects of agricultural disasters* If an earthquake occurs in a region that is experiencing a drought or pestilence, a chain-reaction could be set off. Crop losses could lead to migration; migration can produce major health problems; abandoned villages and infrastructure can increase vulnerability to the next disaster.
- *Reconstruction projects should be kept at an appropriate scale.* As in housing and other sectors, the key to agricultural recovery is a strong institution that is capable of effectively managing the program. Attempts to combine agricultural recovery with agrarian reform, new housing, or other broad based initiatives usually leads to limited successes. Agricultural recovery should be focused.

Popayan Recovery: The Role of the Coffee Growers

The 1983 Popayan, Colombia earthquake caused major problems in the Department of Cauca (Southwest region; population of approximately 700,000). The rural areas experienced a significant loss of housing, disruption to water and electric power supply, and considerable damages to the school systems in this part of the country.

Cauca is an important coffee growing region. The Federation of Coffee Growers and other private enterprises assumed an activist role in the recovery and reconstruction process. Significant quantities of building materials and supplies were furnished by the Federation to assist in the self-help construction of housing, schools, health clinics, and the repair of roads and rural water supply networks. The Coffee Association, meanwhile, brought in engineering expertise from other regions of the country to form a "Coffee Emergency Unit." This brigade of expertise contributed not only to the repair of coffee processing facilities, but also to the repair and reconstruction of housing, schools, and the rural infrastructure. The activist role of the Coffee Association was key to the recovery of the Cauca region.

Earthquake Reconstruction: Opportunities for Improvement

The final section returns to the underlying theme of the Guide - that post-disaster rehabilitation and reconstruction can be used as an opportunity to improve the safety of the built environment, and in the process improve the standard of living of the population

The aftermath of an earthquake affords unprecedented opportunities for upgrading the seismic safety of not only buildings, but the lifeline systems that support the daily routines of the population, at home and at the workplace. Damage assessment is the first in determining effective measures to minimizing the impacts of future disasters. More precisely, the post-disaster period can be used to identify the "weak links" in the built environment, in effect, "what cause the damages?"

Reconstruction projects typically turn to the municipality's building codes to identify factors that contributed to the building and lifelines failures that accompany a major earthquake. Construction techniques and materials are important factors, as is the location of the buildings and the quality of the soil on which the structure is built. Land-use planning can be a valuable tool in regulating development in vulnerable sites.

Introducing new building regulations and technologies requires a well-organized education and training program if earthquake mitigation programs are to be effective. Training technical personnel and the population at large in earthquake-