



FIGURE 7.3 Tents for refugees from the landslide/flood zone, placed in the town square of Quijos.

make temporary shelters near their damaged homes. Several of the smaller towns became locations for tent camps that housed evacuees from the landslide area who had nowhere else to go, or who preferred to remain near their landholdings (Figure 7.3). An Italian emergency medical response team established a field hospital in Baeza immediately after the disaster, which they later donated to the community.

THE EMERGENCY PERIOD IN THE SIERRA

The damage caused in the communities N of Quito was characteristic of what most typically happens in an earthquake event like that of March 5. Damage patterns were related to the distribution of buildings with certain characteristics of construction design and quality, with some variation depending on the type of soil and the orientation of the structures in relation to the epicenter.

The most extensive damage in the Sierra occurred to houses constructed of adobe bricks or *tapia* (mud poured into molds and then sun-dried in place to form walls), and particularly to those constructed according to traditional building practices in the rural areas. Consequently, the bulk of the house-

holds directly affected were those in the lowest income class. These households typically were located in the more marginal barrios of the larger towns or in the predominantly Indian villages and rural settlements. To some extent, other types of houses and public buildings also were damaged, particularly those constructed in the 19th century or with improper construction practices.

For the most part, the houses did not collapse outright, although there may have been failure of a wall or two, or the collapse of a portion of a roof. No deaths were reported as a result of building collapse. However, the houses that were damaged were greatly weakened, and many collapsed later or were purposely demolished.

Many schools were damaged or destroyed because they had been constructed in the same manner as the houses. A much smaller proportion of community health-center facilities sustained major damage, since these were more likely to be newer buildings than were the schools. In some instances, the health centers served as public shelters in the first week or so.

Although tremors had been felt on occasion in the Sierra in past years, none has jolted the area with the intensity of those occurring on March 5. We were told that residents of the villages exhibited extreme fear. Many engaged in fervent prayer, because they viewed the event as punishment for sinful behavior. However, these typically were secondhand reports, making it difficult to determine whether they were accurate descriptions of the villagers' behavior or whether the behavior of a few individuals was being attributed to the rural population as a whole in order to underscore the local impact of the event.

Health-center patients in Imbabura Province were screened for symptoms of mental health problems 10 to 12 weeks after the earthquakes. Although the data were not yet analyzed as of June 1987, the preliminary impression of researchers at the Ministerio de Salud Pública, División Nacional de Salud Mental (Ministry of Health, National Division of Mental Health) was that about 25 percent of the victims interviewed exhibited emotional problems, to a great degree related to the earthquakes.

After the earthquakes, many people chose to sleep outside their homes for several weeks, even though the weather turned rainy and cold the day after the tremors. This rational adaptation is common in areas hit by damaging earthquakes. As in other earthquake situations, the vulnerability of many of the dwellings was apparent, even without deaths having occurred, and mild aftershocks could be felt for many weeks, creating doubt about whether or not the worst had yet happened. Even people whose homes were not damaged were reported to have slept outside their houses for some time.

More than 1,000 tents were eventually supplied to families in the affected area in the Sierra. Some families slept in public buildings, such as health centers, until other shelter could be prepared. Many other families

improvised shelters near their damaged dwellings, using plastic sheeting provided to victims by assistance agencies.

Some tent camps for refugees were established; in other instances, tents or shelters made of plastic sheeting were placed on private lots adjacent to damaged dwellings. Emergency-period activities and distribution of relief goods most commonly were coordinated by the provincial staff of the Defensa Civil de Ecuador (Ecuadorian Civil Defense), although various observers noted that the organization was not as yet very skilled in such activities. Within a few days after the disaster, there was some distribution of clothing and food, but these activities were of short duration, and done in many instances without any systematic attempts to identify who were victims and who were not. The aid distribution was handled differently in different locations; for example, in some places the distribution involved only Civil Defense, at others a priest or minister. It was apparent that most of the disaster-assistance activities during the emergency period were conducted in the more urbanized areas.

Three refugee camps were established on the periphery of Ibarra, the largest city in Imbabura Province, providing temporary housing for residents whose homes were destroyed. These camps apparently were established and maintained under the direction of a local physician, who donated his time to this effort and to tending to the health needs of victims for the first month after the disaster. The tents came from outside Ecuador and were distributed by Civil Defense to the local Red Cross chapter to establish the camp. This physician, working with Red Cross emergency medical assistants (*socorristas*) he was training, planned and established the camp and the procedures for feeding the refugees and maintaining sanitary conditions. The National Guard handled discipline and security. The physician remarked that he knew there were books available from international organizations to guide in the establishment of refugee camps, but he had great difficulty in obtaining them quickly enough to be of any use. He eventually obtained some by going to Quito and paying for them himself, but this was after most of the initial work had been done to establish the camp.

Little mention was made of injuries suffered in the earthquakes. However, the physician in Ibarra noted that respiratory diseases were common among the persons who lived in the tent camp or who had been living outside their damaged houses in the rain and cold.

Mention was made by some of disruption of tourism in the Sierra. Locals observed that the number of tourists visiting Indian markets near Cayambe and Ibarra diminished somewhat after the earthquakes, but only for a short time. Also, one person noted that some people believed that the tourism bureau had made efforts to minimize reports of damage from the region, so as to minimize economic consequences to resorts and mar-

kets. The concern was expressed that by minimizing reports of damage, the chance for the area to receive available and necessary disaster assistance was in turn affected. This dilemma has been noted in other disasters and warrants further study in future disasters.

EMERGING LONG-TERM IMPACTS

When considering the longer-term impacts that seemed to be emerging in the communities visited, it is important to recognize the overall economic context in which these were occurring. Although the opening of the Amazonian oil fields many years before had given an important boost to the economy of the country, Ecuador had at the same time become very dependent on oil revenues. Thus, when oil prices fell in 1986, the annual economic growth of the country dropped to below 2 percent, a large fiscal deficit was incurred, and the trade surplus fell (ECLAC, 1987, p. 2).

Including the anticipated 6-month curtailment in oil production while the Trans-Ecuadorian pipeline was being repaired, the total cost to the country was estimated soon after the disaster to be about \$1 billion (ECLAC, 1987, p. 26). At about the same time as the March 5 earthquakes and resulting landslides, widespread flooding (unrelated to the earthquakes) occurred in the vicinity of Guayaquil (Figure 1.1); considerable infrastructure was damaged by all of these catastrophes, placing additional demands on the national budget. The reconstruction needs created by the disasters only added to Ecuador's already serious economic difficulties, and rather specific financial strategies were needed to try to deal with the situation.

Under the circumstances, recovery projects designed to help generate local currency are important to consider. National and international strategies for doing this have not been examined in this quick reconnaissance study but, where implemented, warrant evaluation as to their effectiveness and transferability into other postdisaster settings.

To the people in the affected communities, who had already begun to feel the consequences to their pocketbooks of the national economic problems before the earthquake, there was some skepticism that the economic problems and national austerity measures attributed to the earthquake did indeed originate with it. It is difficult to say which of the economic problems evident at the community level after the disaster might have been experienced even without an earthquake, as the national government grappled with its longer-term problems. The natural disasters certainly exacerbated the situation.

The earthquake damage had affected for the most part persons who already were experiencing difficult economic circumstances. Much of the damage occurred in rural areas that had very limited infrastructure and were lacking in basic services even before the earthquake. Thus, the mingling of

reconstruction issues and development issues could be expected. For example, one demonstration of dissatisfaction with the progress of disaster recovery was covered in the Quito newspapers in June (Hoy, June 16, 1987; El Comercio, June 17, 1987). The reports described a contingent of local government officials and residents marching to Quito from the capital of Napo Province to ask for additional reconstruction assistance; however, the request was more general than for just things that would allow reconstruction of the disaster-stricken communities to predisastrer conditions. Here again, no in-depth analysis was attempted of this aspect of the recovery process, but the relationship between reconstruction and development is a topic of interest for designing disaster assistance in developing countries (Bates, 1982; Cuny, 1983).

Increased prices for staples were part of the overall economic changes that individuals reported in all parts of the disaster area. Gasoline was rationed for a short time after the earthquakes. The price of gasoline increased by about 80 percent at the time, and was still at that level in June 1987. This in turn affected bus fares and the costs of transportation for agricultural produce and other goods. The price of cooking fuel used in urban areas also increased. People reported that the price of some, but not all, food items increased. There also was a shortage of sugar beginning in June, but this was attributed to actions on the part of the sugar producers in order to raise prices.

Many people indicated skepticism about the reasons for the price increases and said that the earthquake was being used as a pretext for the government to institute economic measures it had planned to take anyway. However, the fact that the nation could not meet even its own internal petroleum needs after the pipeline breakage cannot be ignored in relation to increases in fuel prices.

RECOVERY PROGRAMS AND IMPACTS IN THE ORIENTE

By mid-June 1987, little had been accomplished in the way of reconstruction in Baeza and the other communities along the road toward the Salado River bridge. The people in Baeza who had been dislocated from their homes were for the most part either living in shelters on their property or sharing homes with relatives. Some people had apparently left the area, but we were told that many people in Baeza had government jobs and thus their incomes had not been affected, even though they may have had housing problems. It is likely that the restaurant and hotel business had slowed somewhat with the reduced traffic along the Baeza-Lago Agrio highway.

The tent hospital that the Italian medical team had donated was being operated by the Ecuadorian Ministry of Health, in order to provide free

health care that had not previously been available in the area. There was a private Catholic hospital in Baeza as well. The tent hospital was staffed with two nurses who lived in Baeza and two doctors who commuted from Quito. The plan was to eventually move the health facility into a permanent building. One of the nurses noted that the main malady they were treating was scabies, which was rampant in the households that had been living in tents for the last 3 months.

A housing loan program offered by the Banco Ecuatoriano de la Vivienda (Ecuadorian Housing Bank) was just being started in the Oriente as of the middle of June 1987. The plan was to have four technical representatives of the bank. These representatives would visit residents, offer loans, and give technical advice on construction. In addition, there would be four social workers, who would check on the families' abilities to qualify for the loans, and would help them find solutions for any financial problems that might arise later. (This loan program is discussed further in the next section.)

In the town of El Chaco (Figures 1.1 and 4.3), we were told that Civil Defense officials were that same day giving out a bag of cement to each family having a damaged house, but few other details about the program were known. Several damaged buildings were evident in the community, but little visible construction or repair work was going on. However, it had been raining daily, which might account for the lack of such activity in the communities.

In talking to a few people in the towns of El Chaco and Quijos (on the Quijos River, 4 km downstream from El Chaco), it was evident that, in the communities with evacuee tent camps, there were three distinctions used for disaster victims: (1) people from other towns who lived in the camps, (2) people who lived in the town whose houses had been badly damaged or destroyed, and (3) people who had not suffered damage. Those in the last group had not received any type of disaster assistance, but often were impacted in some indirect way. Impacts reported included reduced income as a result of a voluntary reduction in agricultural production because it was not possible to transport the agricultural products to market, a reduction in income from food sales during the time that disaster victims were receiving free food, and reduced business in general because the destruction of the Trans-Ecuadorian highway east of the Salado River reduced the road traffic to that point, and many people had left the area to try to find employment opportunities elsewhere.

It was reported that the crews that had formerly operated the pumping stations along the pipeline had mostly left the area. However, there was a construction camp in the town of Quijos for the workers who were replacing the bridge across the Coca River at Lumbaquí (Figure 1.2). One person observed that these workers were paid very good salaries, but described the

consequences of this in negative terms because of the workers' disorderly behavior when off duty. However, there undoubtedly were some local benefits from having these jobs and salaries in the area.

Other comments were made by local residents about the relations between various groups, for example, between evacuees and residents, Catholics and Evangelists, victims and nonvictims, and people with money and people without. These comments suggest that further in-depth study might indicate that these communities have fairly low social cohesion. The different social character of people of the Oriente compared with those of the Sierra was mentioned by more than one observer.

In general, aside from the original indigenous inhabitants of the Oriente, who were not encountered during the visit to the disaster area, the populations in the towns and on the plantations were fairly recently arrived, and typically had left some other part of the country in order to seek economic opportunity as colonists to this area. Thus, these residents were not likely as yet to have long-term attachment to the land nor to have extensive and strong social ties to others in the area. One local storekeeper remarked that, right after the earthquake, the people had helped each other, but now things were "back to normal."

Another notable aspect of the earthquakes' effects on the Oriente was the impacts in Napo Province created by the loss of the Salado and Aguarico river bridges. First, the inaccessibility of the land along the approximately 67-km stretch of road between these two bridges created problems for the surviving farmers and plantation owners who had been evacuated from the area. Besides the washed-out bridges, the roads in the area between the bridges were blocked by landslides and by flood damage in many places, and the threat of further landsliding was high, making the area both difficult and very risky for resettlement at that time, even if it could be served by air or boat. Secondly, a large proportion of the 75,000 inhabitants of Napo Province were effectively cut off from the rest of Ecuador by the damage to the road between Baeza and Lago Agrio.

The effects on the inhabitants of the town of Lago Agrio (Figure 1.1) and of the areas to the N and E in Napo Province were for the most part indirect. There was little significant direct damage from the groundshaking of the earthquake in the eastern part of Napo Province. However, agricultural producers in the region suffered significant economic impacts as a result of not being able to transport their crops to market. For example, it was estimated that the postearthquake production losses from abandonment of land or lack of access to markets amounted to about \$7 million (ECLAC, 1987, pp. 18-19). This estimate was based on the assumption that land access would be reestablished by the end of June, which it was not. The main link with the rest of the country as of June 1987 was by air, a means of transportation that is too expensive for most agricultural products.

Without income from agriculture in the area, retailers and services in turn suffered from reduced business volume. People familiar with Lago Agrio prior to the earthquakes observed that the number of retail stalls on the main street had greatly declined, and also believed that people were leaving the area increasingly to look for work elsewhere.

An inquiry into the impacts on employment due to the drastic reduction in oil production revealed that the workers at the CEPE-*Texaco* installation near Lago Agrio figured little in the economy of the town, both before and after the earthquake. The CEPE-*Texaco* "camp" operated much like an offshore drilling rig, with workers sleeping in dormitories and eating in the company dining hall for several days at a time, and then being flown by the company back to their homes in Quito when the shift changed. The *Texaco* workers for the most part were shifted from production to maintenance work while the pipeline was being repaired.

With the exception of the indigenous groups, the settlers in the area are dependent on receiving food staples and gasoline from outside Napo. Also, major medical services and some kinds of business services can be obtained only in the larger cities elsewhere in the country. The airlink that existed in June 1987 was used mainly for passengers and for bringing in these staples. The air service was provided by the national airlines, and created considerable uncertainty for persons trying to use it to leave the area. There were only a few flights a day, despite the high demand for the service. The fare could be paid in advance, but seats could not be reserved; thus, hundreds of people stood in long lines for every flight out of the area, and they often could not get on a flight even after waiting a day or two.

One source indicated that products could be transported to and from eastern Napo region by motorized canoe up the Napo River, continuing to Lago Agrio by bus from the town of Coca (also known as Puerto Francisco de Orellana) (Figure 1.1). This apparently was the preferred means for bringing gasoline to the area, and could be used for taking products out. Another source suggested that considerable extortion was involved in getting transportation, air or water, for whatever products did leave the area.

The temporary lack of a road between Lago Agrio and Ecuador's other commercial centers made it difficult for many to maintain themselves economically while this condition existed. More importantly, there also was no specific information available to the inhabitants of the region as to when the road would be repaired. In fact, an alternative route (see Chapter 8) had been proposed and construction started, which if it were completed, would solve the problem of a transportation route for agricultural products, but also would have long-term implications for persons who owned land along the original route.

The question of whether the original road would be repaired or a new route established was not solved at the time of our visit to the disaster area.

Certainly, the existing route was located in a very hazardous area, which had been made even more hazardous by the earthquake-caused land-sliding. Although the road and the Trans-Ecuadorian oil pipeline parallel each other much of the way between Baeza and Lago Agrio, and some type of access road is necessary for pipeline maintenance, it was noted that only a minimal road was necessary to service the pipeline. Thus, road construction efforts undertaken by Texaco and CEPE (Corporación Estatal Petrolera Ecuatoriana), the national petroleum company that operates the pipeline, in order to obtain access to the pipeline, would not necessarily result in a road of the same size and quality as existed before the earthquakes.

Continued uncertainty about the timing and location of a road to Lago Agrio made it impossible for the inhabitants of this isolated region to make informed decisions about the best course of action to protect their own personal economic interests. For the most part, about the only option for most was to leave the area in order to survive economically. This also was not a particularly promising option if it meant abandoning one's parcel of land.

Another type of issue existed with respect to the question of access to landholdings along the Baeza-Lago Agrio road and access to Lago Agrio. First, some settlers (about 80 families) who had been farming in the landslide/flood zone had expressed interest in relocation. Among the reasons for their wanting to do this was that the former land was now ruined, or that they could not wait any longer to have land to work, or that they considered the area too hazardous to return to. However, there were difficulties in obtaining other land in the Oriente that could be made available to them. INCRAE (Instituto de Colonización y Reforma Agraria Ecuatoriana), the Ecuadorian colonization and agrarian reform agency, indicated that there were major problems to be solved, both for the families that were willing to stay in the disaster area to farm and for those who wanted to be relocated.

In order to obtain new land in northeastern Ecuador, progress needs to be made in agrarian reform. Whether families are returned to their pre-earthquake plantations or resettled onto new lands, resources are needed to provide the necessary infrastructure of roads, bridges, schools, health centers, and so forth. For either solution to be accomplished, several national-level agencies will have to work in concert to bring it about in a timely manner. Thus, at least 200 families who had farmed the land between the Salado and Aguarico River bridges remained in limbo about their futures 4 months after the earthquakes, many living without a permanent dwelling or income.

RECOVERY PROGRAMS AND IMPACTS IN THE SIERRA

In the Sierra, many families with badly damaged or demolished houses constructed simple shelters on their lots, and in June 1987 were preparing to rebuild their houses. Others reportedly had doubled up with relatives for

the short term until they could rebuild. Some of the housing construction activity was undertaken with technical supervision and some was not. Because there was no mechanism for condemning dangerous buildings, there also was concern that many families continued to live in houses that were even more vulnerable to future earthquakes than they had been before the earthquakes. The dilemma of reconstructing communities in a timely manner versus taking the time and resources to provide safer housing and other facilities has been observed in many other disasters (Haas and others, 1977; Bates, 1982).

The reconstruction period provides one of the best opportunities for upgrading housing and making it safer, because interest and awareness are high. In the damaged villages of northern Pichincha Province (Figure 4.1), the provincial office of Civil Defense coordinated housing reconstruction with the Ecuadorian Housing Bank and other groups. They developed a plan for the reconstruction that focused mainly on helping the poorest victims.

A map of the projects in Pichincha Province showed three different types of projects: (1) communities in which housing reconstruction was supported by Civil Defense, (2) communities supported from international assistance organizations ("outside the [national] plan"), and (3) communities that had been designated for a project, but for which there were no funds as yet. The projects to be implemented jointly by Civil Defense and either the housing bank or private contractors were slated to start in October 1987. For these projects, construction materials were to be given to the homeowners who were to provide the labor, with technical assistance from Civil Defense or the housing bank. Necessary machinery was to be loaned by the municipal government. At the time of the author's reconnaissance visit, it was not possible to say to what extent any of the planned housing programs would be implemented or in which villages this would occur.

The town of Tabacundo (Figure 4.3) provided one example of a community in which many stages of housing reconstruction could be seen at one time. The temporary housing being used ranged from crude, makeshift shacks, to tents from foreign donors, to small houses of wood slabs. Many lots had been completely cleared of the damaged structures, and construction was beginning (Figure 7.4). Some residents were rebuilding with their own resources, while about 120 households had received metal frames, donated by a German organization, to provide support for walls made of brick infill. Other people were building more traditional adobe buildings. The community was given a machine for compacting the adobe bricks to make them more seismic-resistant, and we were told that technical assistance was available in the community from Ecuadorian agencies. The people could request certain building materials from Civil Defense; these materials were delivered by trucks provided by the municipal government.