

PARTIAL RECOVERY AND RECONSTRUCTION AFTER DISASTER: THE LICE CASE*

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INTRODUCTION

Natural hazard research includes the examination of human adjustment to earthquake disasters. The importance and need for empirical case studies of earthquake disasters have been recognized for both developed and developing countries (White and Haas, 1975; "Disaster Assistance: Earthquake Hazard Reduction" no date; and *Earthquake Hazard Minimization Conference*, 1968). This report, like an earlier Gediz study (Mitchell, 1976) is a systematic case study appraising the restoration after an earthquake disaster in Turkey (Mitchell, 1976). It is designed to partially assist in meeting the need for research on post disaster recovery [1].

Asia Minor, the land mass that is now Turkey, has experienced devastating earthquakes for thousands of years. According to the American National Geophysical and Solar-Terrestrial Data Center, over 700 earthquakes of Richter magnitude 4.0 or greater have been recorded in this area since 1900. For the past several decades, an average of at least one earthquake measuring 6.0 Richter magnitude or greater has been recorded in Turkey. Recent disasters (in Varto, 1966; Gediz, 1970;

Burdur and Bingöl, 1971; Lice, 1975; and Muradiye, 1976) further demonstrate the vulnerability of a country that is located in an active seismic zone (Fig. 1). The seriousness of this earthquake threat is quite evident when considering the extremely poor quality of housing construction throughout most of Turkey.

Based on the Turkish Earthquake Research Institute's 1972 map of earthquake zones in Turkey, over 90 percent of the 780,576 kilometers squared area of the country, containing about 95 percent of the total population (40,197,669 population in 1975), are located in earthquake zones (Fig. 2). The Lice region is located in earthquake risk degree III zone; however, the region borders zone II, and is less than 100 kilometers from zone I, the highest risk area of Turkey.

DIYARBAKIR PROVINCE

Diyarbakir province, in which the disaster area is located, is situated south of where the anti-Taurus mountain range begins its curve around the Tigris river (Dicle) basin and turns toward the southeast where it then connects with the Zagros mountains of Iran. The province is located close to the juncture area of the North Anatolian and East Anatolian

* The views expressed in this article are those of the author and do not necessarily reflect the opinion of the United States Air Force Academy or the United States government.

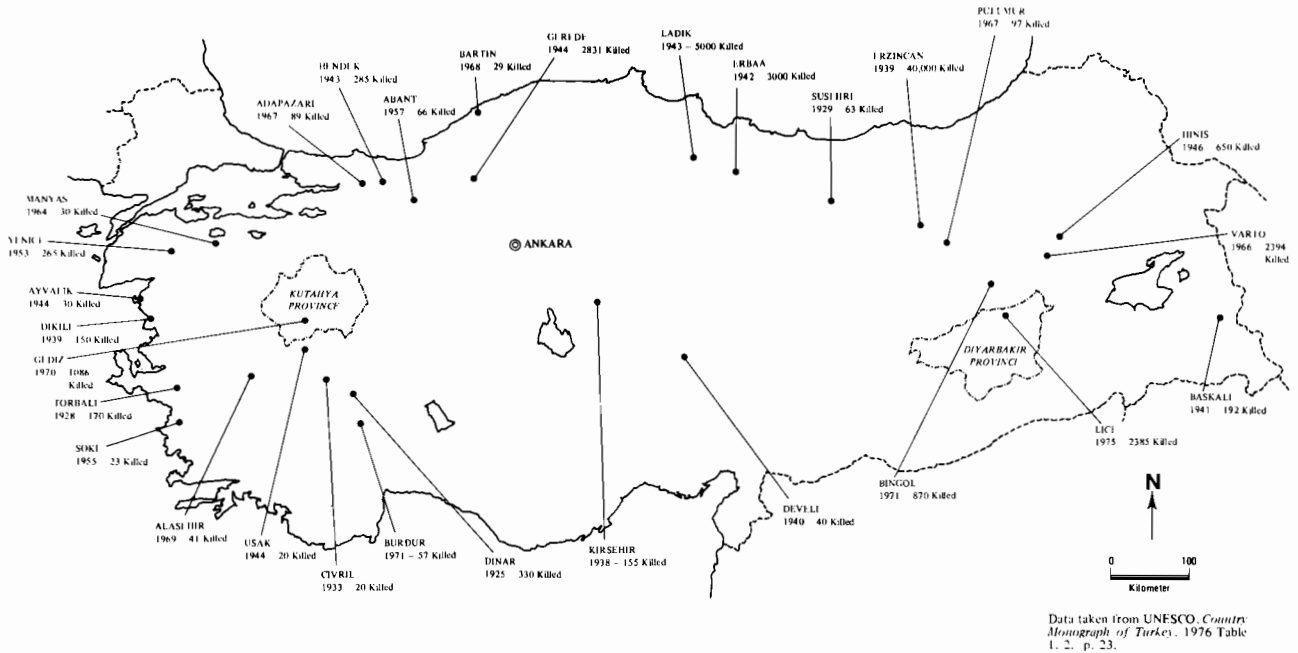


Fig. 1. Earthquakes with more than twenty fatalities (1925–1975).

fault systems. Lice town, situated practically on the epicenter, is located 75 kilometers north-northeast of Diyarbakır, on the very edge of the anti-Taurus mountains.

Many villages in Diyarbakır province expand outwardly to form scattered quarters (*mahalle*) (Tuñçdilek, 1974). Thus, there are several sections or settlement cores of a village that are physically separated often by several kilometers, and cover a relatively large area [2]. These dispersed settlements are a result of rough relief features, poor soil conditions, and various socio-economic factors. It is a practical settlement type for the predominantly livestock economy found in much of the province.

Diyarbakır province is populated largely by Kurds, an ethnic minority in Turkey [3]. Estimates of Kurds in Turkey vary greatly,

ranging between three and eight million. Turkish statistics suggest about two million Turks are Kurds, or “mountain Turks” as Kurds are officially labeled. It is illegal to teach Kurdish or to dress in Kurdish costumes. It is a perplexing situation; the disaster is located in an area with its own unique sub-culture, yet it is undiplomatic to even mention the word “Kurd”.

Kurdish culture includes an Indo-European language that is closely related to Persian, rather than Turkish (Ural-Altai), and contains many dialects. The Kurds are divided by dialects which form geographical boundaries more than political ones. Most are Muslims. Families are headed by the oldest male member in a patrilineal and patrilocal structure, with primary loyalty to the family, the dominant social and political unit.

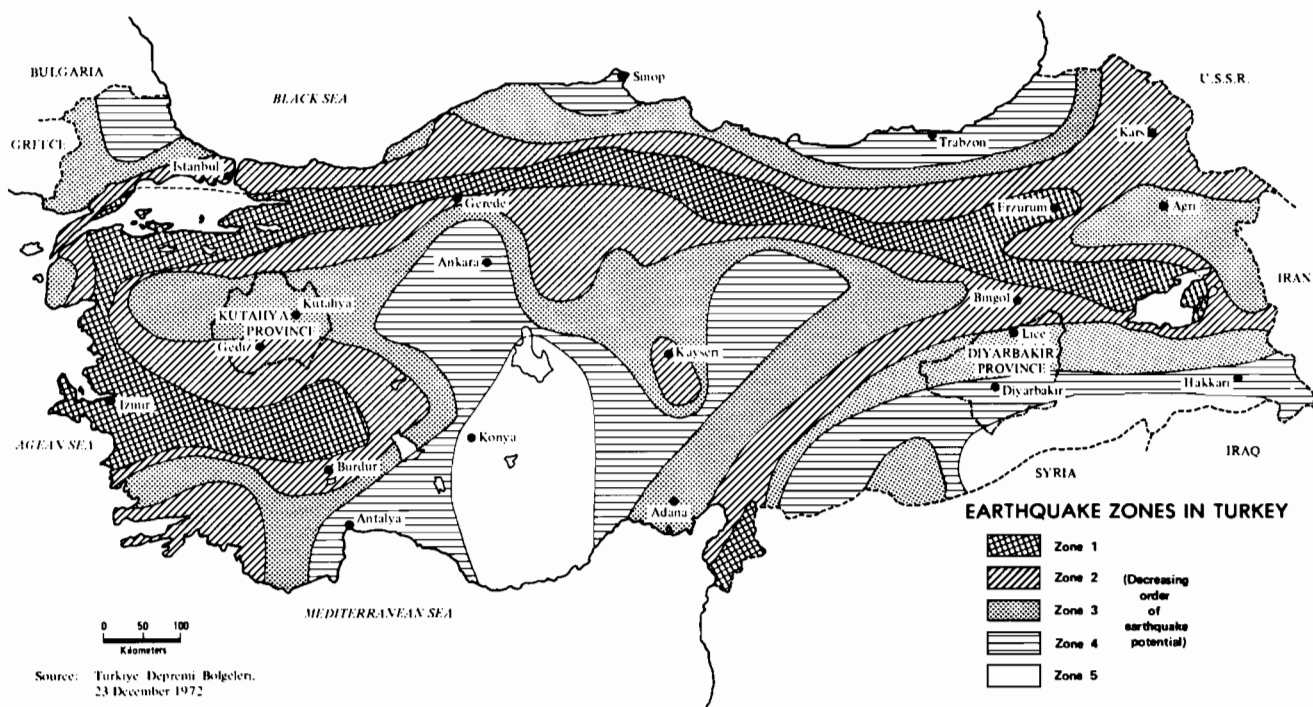


Fig. 2. Earthquake zones in Turkey.

The central government tends to minimize the differences between “mountain Turks” and other Turks. It has been suggested that the reconstruction of Lice may be used by the government as a means of acculturating them into the majority society [4].

The disaster area is sparsely populated and the Kurds are principally engaged in raising sheep, goats, and cattle, and in more recent times sedentary subsistence farming of wheat, barley and corn. Although there are areas of intensively cultivated alluvial soils along stream beds, the land generally is of poor agricultural quality and mostly farmed on a sharecropper basis. Diyarbakir province lags behind the national average in mechanization of agriculture, in motor vehicles, and in banking facilities. Literacy is also lower in the region than in most other regions of Turkey. It is an area with high birth rates and limited medical facilities.

Communication between village and town is a serious problem in the area. Although the district centers are connected by all-weather roads of fairly good quality, I found it impossible to travel to several villages because of the road conditions. Many villages have no roads suitable for motorized vehicles of any type.

SEISMICITY OF THE LICE AREA

The earthquake occurred at 12.20 hours local time on September 6, 1975. The epicenter of the main shock was only a few kilometers northeast of Lice, at 38.57 degrees north and 40.80 degrees east. Preliminary reports placed the magnitude between 6.6 and 6.7 on the Richter scale, but final measurements verified the average magnitude at 6.9. The main shock was felt over an area of 210,000 squared kilometers (Yanev, 1975:7).

Focal depth was between 15 to 25 kilometers and the shaking lasted between 20-24 seconds (statement by the Turkish Delegation on Earthquake at Lice, Turkey, 1975:1). After-shocks continued for over a month. Smaller aftershocks on 25 September 1975 caused additional damage and several casualties.

Although some damage occurred in the districts of Dicle and Hazro, the major damage was in the region between Hani, Lice, and Kulp. Historically, there have been low magnitude earthquakes along the Çermik-Hani-Lice-Kulp fault system, but fortunately no damage has been recorded. Of course, on a larger scale, the nearby region has not been as fortunate.

LICE: AN EARTHQUAKE SCENARIO

The town of Lice was situated in rows of terraces on the south side of a steep mountain. The town consisted of 13 sections (*mahalle*) containing 2,238 homes: Cami Kebir (58); Çarşı (105); Delvan (111); Kali (245); Kalvan (237); Karahasan (261); Kaya (68); Körtük (200); Mirminağa (142); Molla (158); Muradiye (104); Şaar (386); and Yenişehir (163) [5].

Twenty minutes after the noon hour on Saturday, September 6, 1975, a large percentage of Lice's 8,093 people were in their houses resting. Very few were eating since it was early in the month of Ramazan, a time of religious fasting. Many others were walking along Çarşı, Hukümet, Koprubaşı, Cortyol, Kulp, Yenişehir or other streets. Some were working in the two bakeries, in the four mills, in the six barber shops, and in the five hotels. The town's movie would not be open until dark. The public bath was open, as was the post office, telephone and telegraph office. The three elementary and one high school were closed. A very few were eating the noon meal in the various *lokantaler* in Lice. A few others were having coffee or tea in one of the seven coffee houses. Still others were washing their face, hands and feet in the mos-

que washing fountains.

The disastrous shaking began suddenly, with no warning. Large boulders were broken off the top of the mountain and rolled down onto and through the town. The horizontal shaking quickly collapsed tons of stones, mud and logs from the roofs of houses, onto the people inside.

The result was awesome. According to the mayor, about 1,500 people were killed in Lice. The death toll throughout the disaster area was 2,385, with 3,339 injured. As terrible as the disaster was, it could have been far worse. Obviously, had it been late at night, or in the winter, or during rainy weather, casualties would have been far greater. Twelve of Lice's *mahaller* were completely destroyed. The thirteenth, Yenişehir, suffered 21 homes totally destroyed. However, more than houses were destroyed in Lice. Damages included 17 official structures, 132 commercial buildings, 6 schools, and 6 mosques [6].

All of the government and public buildings in Lice were destroyed or badly damaged. Included are the state hospital, located on the western edge of town, the high school, boarding school, gendarmerie building, old municipality building, government houses, and the new municipality building. Early reports of property damage were estimated by Turkish officials at between seventeen and eighteen million dollars.

NATIONAL AND INTERNATIONAL RESPONSE TO THE DISASTER [7].

The series of responses to disasters are well documented for developed nations, but only minimally documented for developing societies (Barton, 1970). Turkey, as all developing societies, faces extreme difficulty in coping with the events immediately following an earthquake disaster (Mitchell, 1976: 303-304). Political instability and bickering can hardly assist in a major reconstruction program. The role of a strong central government is critical during the initial relief and subsequent recov-

ery periods following a disaster in a developing country. Based on local press reports, which must be interpreted with some care, there was political controversy concerning Prime Minister Demirel's decisions and intentions in directing the government's reconstruction efforts [8]. Bulent Ecevit, one of the Prime Minister's major political opponents, reportedly charged gross negligence and ineptness in the disaster recovery program. As one might expect, in contrast to the Ecevit and other political leaders' charges, Demirel's party continually claimed extreme efficiency in dealing with the Lice relief effort.

Turkey developed an improved plan to organize emergency and relief services after the 1966 Varto earthquake disaster (UNESCO, 1976:51-52). The plan has been tested by the Gediz, Burdur, Bingöl, and Lice earthquakes.

In accordance with the plan, the Central Coordinator Committee for Natural Disasters was called into session when the news of the earthquake was relayed from Lice to the Diyarbakır governor's office to the Ministry of Reconstruction and Resettlement in Ankara. Undersecretaries from the Ministries of Reconstruction and Resettlement, the Interior, Health, Defense, and the Director of the Turkish Red Crescent (Red Cross) were called into session. While the Central Coordinator Committee was convening, the Diyarbakır Provincial Relief Committee, headed by the governor and consisting of the Diyarbakır mayor, gendarmerie commander, secretary of civil defense, chief of police forces, Red Crescent director and the military forces commander, were implementing emergency plans for immediate rescue and relief for the victims. Urgent actions are necessary in any disaster, and the reaction to the Gediz disaster saved many lives. Similar urgent actions were reportedly repeated in Lice.

The Diyarbakır Provincial Relief Committee established sub-committees for emergency rescue and ruin removal, tent distribution, health affairs, food distribution, evaluation

of damage, and security. The sub-committees carried out their functions in Lice, Hani, Kulp, and other damaged settlements.

Military personnel arrived in the area about three hours after the disaster and began rescue operations. A helicopter shuttle was established between a central storage point in Diyarbakır and an area near Lice. Helicopters also brought vital assistance to the scores of isolated villages in the region. Bearing in mind the potential for political conflict in this region, since it has been under martial law several times, the 15,000 Turkish soldiers could have been a very controversial subject. During my visit, the soldiers had completed their mission, and had returned without causing any additional problems.

Immediate attention was focused on rescue, medical care, shelter, and food. Ambulances, taxis, trucks, and private cars jammed the road to Lice, trying to get into the area to provide assistance in rescue efforts. An army engineering battalion brought in cranes, bulldozers and graders to clear the debris and assist in searching for survivors. On the same day of the earthquakes the Prime Minister and Minister of Reconstruction and Resettlement visited the area.

After the immediate rescue phase, the government's main objective was to provide permanent housing for the survivors. Before construction could begin it was necessary to evaluate the damage. The Earthquake Research Institute of the Ministry of Reconstruction and Resettlement did the evaluation, with assistance from Ankara and Istanbul university departments. The Ministry officials visited settlements and classified damage to houses. Settlements were visited and classified, by house and buildings as: not damaged, lightly damaged; moderately damaged; heavily damaged or destroyed. Based on this classification, an individual would be able to claim aid and new housing assistance.

If a settlement could be restored safely and economically on its original site, it usually

was. If the original site was declared geologically unsafe, the settlement was rebuilt on a new location. Lice was declared unsafe and a new site was chosen after the Department of Geological Investigations, General Directorate of Natural Disasters Affairs, conducted geological soundings and soil tests in the new area.

Private construction contractors sometimes construct villages, and even when construction is carried out by the Ministry of Reconstruction and Resettlement, much of the project can be subcontracted. This is especially true of the public facilities such as roads, water lines and wells, and electricity and sewage facilities.

Construction bids from private industry are usually received by government officials when an entire village or town must be rebuilt. In many cases, the Ministry of Reconstruction and Resettlement constructs the new settlements (see Table I). The individual who receives a new home is usually required to accept a 20-year low or no-interest loan. Sometimes the debt is cancelled after a few years, depending on the government or bank official's perception of the individual's ability to pay.

Three days after the disaster, the Turkish government appropriated about 34 million dollars (500 million Turkish lira) for rehabilitation and reconstruction. This compares with 50 million dollars after Gediz, 25 million after Burdur, and 28 million after Bingöl (Mitchell and Glowatski, 1971:229; Keightley, 1975:1).

International assistance was prompt and extensive [9]. A total of 14,837,058 dollars in assistance was received by Turkey from private and government foreign sources (see Table II). The United States, through its Ambassador to Turkey, donated an amount equivalent to 25,000 dollars to the Turkish Red Crescent on 9 September 1975. The U.S. Office of Foreign Disaster Assistance, Agency for International Development, assisted by providing a grant of 200,000 dollars to Tur-

TABLE I

Turkish Supplied House Types¹ (Ministry of Reconstruction and Resettlement)

District	Village	Houses Scheduled	Houses Completed
LİCE	City	1,615	1,615
	Budak	43	0
	Kıpçak	139	75
	Kıy1	60	30
	Signak	44	44
	Dallıca	31	10
	Baharlar	58	42
	Yorulmaz	75	16
	Dibek	83	83
	Bekirhan	29	29
	Ecemiş	87	0
HANI	Okur	42	0
	Topçular	51	51
	Gürbüz	223	155
	Ahil	40	22
	Kirim	49	49
	Süslü	22	0
	Kalaba	77	27
	Marık (Seren?)	14	0
KULP	Kaynak	20	0
	Elmalı	32	0
	Bozova	20	0
	Altay	30	1
	Kocaaalan	45	0
HAZRO	City	100	0
Total		3,029	2,249 (74%)

¹ Provided by T.C. İmar ve İskân Bakanlığı, Bölge Müdürlüğü, Diyarbakır, Turkey (Diyarbakır Regional Director, Ministry of Reconstruction and Resettlement), June 1976.

key through the League of Red Cross Societies. The U.S. government also paid part of the transportation cost of materials and equipment donated to Turkey by the London OXFAM organization for construction of 800 polyurethane "igloo" style shelters in the disaster area. However, by far the largest government contribution was that given by Saudi Arabia.

TABLE II

International Assistance for the Lice Disaster (Government and Red Cross Societies)¹

Country	Assistance	Country	Assistance
Afghanistan	\$ 3,035	Libya	\$ 1,000,000
Australia	3,003	Luxembourg	13,941
Belgium	84,877	Monaco	1,124
Brazil	1,012	Netherlands	529,711
Bulgaria	57,600	New Zealand	2,102
Canada	47,097	Norway	70,731
Peoples Republic of China	51,592	Pakistan	994,384
Denmark	32,121	Poland	4,856
France	19,282	Romania	112,482
Democratic Republic of Germany	} 10,739	South Africa	813
Federal Republic of Germany		129,220	Saudi Arabia
Greece	3,649	Spain	4,349
Iran	129,910	Sweden	72,407
Italy	110,840	Switzerland	461,518
Ireland	964	Taiwan	21,468
Japan	16,896	Thailand	256
Jordan	780	Tunisia	1,263
Republic of Korea	10,939	United Arab Emirates	9,995
Kuwait	503,407	U.S.S.R.	19,180
Liechtenstein	375	United Kingdom	37,406
		United States	258,892
		Yugoslavia	2,862
		Total	\$ 14,837,058

¹ Calculated from tentative data provided by Office of U.S. Foreign Disaster Assistance, Agency for International Development, Department of State, August 12, 1976.

An ambulance was donated to Lice by the Netherlands. There was controversy about whether the vehicle was being used for its intended purpose. Some villagers claimed that an expensive fee was charged for its use. In any event, there are vehicle operating costs which must be paid.

Although international aid was prompt and extensive, donor agencies continued to provide assistance that conflicted with cultural preference or actual needs of the people in this region. As in the Gediz disaster, and later in the Çaldıran (Van) earthquake, unfamiliar canned food, along with the tons of donated medical supplies, were either sold for animal food or stored away probably never to be used again [10]. Many villagers were suspicious that the food might contain pork or pork by-products. This is taboo in the Islamic soci-

ety of Turkey. Western style womens' dresses were also a wasted donation.

THE NEW TOWN OF LICE

On 11 September, just five days after the disaster, a geological investigation was completed by the Earthquake Research Institute officials, and a new site for Lice was chosen. The new location is about two kilometers south of the old city, and unlike in the town of Gediz, in western Turkey, which was not totally destroyed, practically all the residents live in the new city (Mitchell, 1976:88).

Fifty-four days after the disaster, on 29 October, 1,568 houses had been built. In addition, 40 shops, an elementary school, a mosque and a bakery were also finished. The new

town's infrastructure included 28 kilometers of stabilized streets, 901 electric power poles, 32,050 meters of electric power lines, and 22,463 meters of water and sewage lines (*Yeni Lice*, 1975:15). The release of this date by the Demirel officials was quickly attacked by political opponents and subjected to lengthy discussions in the news media.

Ten months after the earthquake, Lice was almost completed. Final plans were for a total of 2,327 homes, 12 bakeries, 4 mosques, 6 coffee houses, 1 public bath, 192 shops, a high school, and an elementary school [11]. In addition, three government buildings have been built along the newly asphalted Lice-Kulp road north of new Lice. For recreation, the town plans are for a green belt and a sport complex. New Lice is planned for an eventual population of 20,000.

The new houses in Lice are constructed under the auspices of the Ministry of Reconstruction and Resettlement. They have wood-framed, pre-fabricated wall panels of cement board covering a layer of insulation, and either corrugated steel or tile roofs. These houses have been described in detail by Mitchell (1974: Chapters III and V) for the Gediz earthquake of 1970 and by Keightley (1975:77) for the Bingöl disaster of 1971. The Bingöl and Lice earthquakes tested the earthquake resistant homes built along the Lice-Kulp road, after the rockslide several years ago, suffered minimum damage and most remained occupied after the earthquake. Some houses had fallen and cracked plaster, and dislocated roof-tiles, but none had severe structural damage.

Houses in the Lice area, as in many others of Turkey, are made of cobblestone, held together with mud mortar, and topped with a flat earth roof which may later support part of another level of houses. Official government buildings are either brick or stone masonry, held together with lime mortar. There were very few reinforced concrete structures in the area before the earthquake.

Although there are stringent government

building codes for houses in earthquake areas, they cannot be enforced, so the typical house in the earthquake region invited catastrophe. The cobblestone walls have little shear strength and the heavy earth-covered roofs are not properly connected to the walls. Walls and roofs are almost independent except for the contact exerted by gravity. Consequently, all the houses in old Lice (excluding the *mahalle* of Yenisehir) were totally destroyed.

VILLAGE RECONSTRUCTION

Lice town was the focus of catastrophe, but there was spectacular destruction in many villages. For example, rock falls onto Yamac and complete collapsing of houses in Yünlüce, Kipcak, Karpuzlu, Damar, and Gürbüz clearly reflected the intensity of the earthquake and the poor quality of houses and construction techniques.

A total of 5,555 houses in 188 villages were either completely destroyed or badly damaged. Three thousand seven hundred and eighty-three village homes were moderately damaged, and 4,664 village homes received light damage. A total of 5,805 houses are scheduled for construction (see Table III).

The two prefabricated house factories in Ankara, producing at near maximum capacity, were considered capable of completing 1,500 houses for the Lice restoration by the middle of November. Since far more were needed before winter would begin, the Turkish government decided to import houses from European countries. Thus, there are more different types of structures in the disaster region than observed after any previous disaster. Finland, France (Fig. 3), Germany (Fig. 4), Libya, Switzerland and Yugoslavia (Fig. 5) have exported houses with distinctive characteristics. Seven hundred and four French style houses in 15 villages have been completed; 377 more are scheduled. Seven hundred and ninety-five Yugoslavian styles are planned for 21 villages

TABLE III

Total House Construction for the Lice Disaster Region¹

District	House Construction Scheduled		Houses Completed	
	Foreign Assisted	Turkish Gov't	Foreign Assisted	Turkish Gov't
DİCLE	736	95	75	1
HANI	0	518	374	304
HAZRO	97	100	0	0
KULP	541	52	129	0
LİCE	1,402	2,264	1,073	1,944
Subtotal	2,776	3,029	1,651	2,249
Total	5,805		3,900 (67%)	

¹ Construction by Turkish Government and Foreign Assisted (as of 1 June 1976). Provided by T.C. İmar ve Iskan Bakanlığı, Bölge Müdürlüğü, Diyarbakır, Turkey (Diyarbakır Regional Director, Ministry of Reconstruction and Resettlement), June, 1976.

but only 335 have been completed. Two hundred and fifty Finnish style houses were built in Hani. Approximately 46 percent of the planned 2,776 houses built with foreign assistance have been completed (see Table III). In addition, several social facilities have been completed.

The new earthquake resistant houses were built to quickly solve a critical housing shortage. New houses went up within days after the disaster. Hasty construction before the winter set in was important. In light of the Gediz experiences, were the reconstructions efforts compatible with the *perceived* as well with real needs of the affected people? This question can be answered by evaluating the new housing characteristics within the traditional framework of eastern Turkish settlements.

The new prefabricated houses in the villages are small single units, widely spaced, and considered by the villagers to be expensive. Although costing the user only between 5,000 and 1,200 dollars, depending on the govern-



Fig. 3. French style prefabricated house.



Fig. 4. Settlement of German style houses.



Fig. 5. Settlement of Yugoslavian style houses.

TABLE IV

Foreign Supplied House Types¹

District	Village	Houses Scheduled	Houses Completed	Country
DİCLE	Yokuşlu	99	75	Yugoslavia
HANİ	City	250	250	Finland
	City	90	50	France
	City	188	60	Yugoslavia
	Gomerç	21	0	Yugoslavia
	Seren	88	14	France
HAZRO	Dadaş	97	—	France
KULP	City	96	—	Yugoslavia
	Karpuzlu	92	—	Yugoslavia
	Gürlük	26	—	Yugoslavia
	Dürü	47	—	Yugoslavia
	Narlıca	122	100	Yugoslavia
	Zeyrek	49	—	Yugoslavia
	Bayır	30	—	Yugoslavia
	Ağaçlı	49	—	Yugoslavia
Çağlayan	30	0	Yugoslavia	
LİCE	Gürbeyli	70	70	France
	Damar	13	13	France
	Tuzla	56	28	France
	Ergin	72	51	France
	Dürü	135	53	France
	Daralan	122	117	France
	Yazı	32	32	France
	Boyunlu	102	42	France
	Çavundur	46	46	France
	Arikli	16	16	France
	Çağdaş	50	50	France
	Kumluca	150	140	France
	Guclu	32	32	France
	Yaprak	127	127	Libya
	Yünlüce	50	50	Switzerland
Kıralan	65	65	Yugoslavia	
Dernek	181	121	Yugoslavia	
Çeper	83	20	Yugoslavia	
Totals		2,776	1,651	

¹ Provided by T.C. İmar ve İskan Bakanlığı, Bölge Müdürlüğü, Diyarbakır, Turkey (Diyarbakır Regional Director), Ministry of Reconstruction and Resettlement), June, 1976.

ment's determination of his ability to pay, and even though financed over a 20-year period at low or no interest rate, in this most economically depressed region of Turkey, villagers with annual incomes equivalent to only a few hundred dollars faced a severe financial burden.

The climate in Diyarbakır ranges from extreme heat in the summer (113°F highest recorded) to severely cold winters (−12°F lowest recorded). The traditional houses had thick rocks and earthen walls and roofs which provided adequate insulation from heat and cold. Additionally, the few and small windows, usually high on the walls, contributed to privacy and minimized heat loss. The new Turkish government houses have a few inches of insulation in the wall panels, covered by exterior cement board. Roofs are corrugated sheet steel and glass windows are large (many are two feet by four feet) and numerous (as many as four or five on most styles). The roofs, walls and windows are not as practical as the traditional house type for insulation — but they are more earthquake resistant.

A major inadequacy of the new houses is their lack of animal shelters. In this herding economy of southeastern Turkey, most villagers housed livestock indoors, on the first floor level, during cold weather. The animals were protected from the elements and additionally generated some body heat which helped warm the homes. Villagers are very hesitant to move into a newly constructed settlement unless they are convinced animal shelters will be provided. In the Gediz disaster, many villagers moved out of the new houses (or refused to move in) because there were no animal shelters. I expect the same for Lice.

Yünlüce: A Swiss-Supported Village

Yünlüce village is now very distinctive compared to other restored settlements (Fig. 6). The Swiss Disaster Relief Organization of the Swiss government, in cooperation with the Republic of Turkey, selected Yünlüce for rebuilding as a model "Swiss" village. A Swiss survey team visited the disaster area from 29 September to 4 October 1975 and selected the



Fig. 6. Yünlüce: Swiss style houses.

the new village site, about 600 meters south of the old village. Between 15 October 1975 and 26 November 1975, fourteen Swiss construction engineers, working with Turkish laborers from Yünlüce, completed 50 houses which were immediately occupied.

In June 1976, construction of Yünlüce was almost completed. The new village, with a Swiss and Turkish flag displayed side-by-side at the southwest entrance, contains an elementary school with three grades, a teachers' home, a coffee house, mosque, medical dispensary, six wash houses, and 50 toilets.

The Swiss realized the problems of separating the villager from his animals and are constructing 150 animal shelters. Also, since the village is about 2,000 meters from a reliable water source, a storage facility has been built at the spring site and water is being piped down by gravity flow. Pressure is adequate, since the relief drops 300 feet over the horizontal distance.

The new white colored homes with brown Swiss window shutters and bright green colored sheet steel roofs make a remarkable contrast with the traditional adobe house. Unfortunately, it is doubtful that Yünlüce will have electricity in the foreseeable future. The expenses to the Swiss government for materials, labor, and transportation for the 50 houses was 966,500 Swiss francs [12].

The Germans, who were constructing a school, hospital, and several houses in Kulp, could learn from the Swiss experience. The Germans were very concerned that the finished product be immaculate. For example, tile floors in the kitchens were cleaned and waxed; although houses had already been painted, a second and third coat were planned. General cleaning efforts by the Germans exceeded that observed during the Gediz reconstruction and that of all other observed Lice settlements. The rigorous use of facilities will quickly erase the effects of immaculate cleaning, second and third coats of paint, waxed floors, and highly polished indoor plumbing

fixtures. The additional money spent on niceties could be used to furnish the hospital or the school. Or, the money could be used to defray the cost of bringing water into the houses. The houses had plumbing installed, but were not connected to any sewage system or water lines. Based on the Gediz experience, it is unlikely that a majority of the new houses will ever have indoor water.

Yaprak: A Libyan-Supported Village

New Yaprak village is located on the road between Lice and Kulp, about 10 kilometers east of Lice. The Libyan government donated an amount approximately equal to one million U.S. dollars for building the new village of 127 homes. During my visit to Yaprak the homes were almost completed. The uniqueness of this village is that a water shortage tank was built and pipes laid along with the construction of houses. The village is expected to be the first in the region with operating indoor plumbing [13]. One hundred and fifty families were scheduled to move into the village by the end of June 1976.

POLICY IMPLICATIONS

Restoring an earthquake devastated area is an enormous task. There are bound to be problems when outside agencies attempt to restore communities. The government of Turkey is well experienced with the disruptions caused by earthquake disasters, and faces many more earthquake disasters in the future.

Complaints concerning new village houses constructed after the Gediz disaster have been surveyed and reported elsewhere. (Mitchell, 1974: Chapter V). Those suggestions were provided to the appropriate officials, yet because of reasons unknown to me, most of the earlier recommendations concerning physical arrangements of new villages, quality control of construction, indoor plumbing, water, ani-

mal shelters, and glass windows were not implemented. Consequently, as in the Gediz case, research in the Lice disaster area in 1979 or 1980 may reveal that many houses have been abandoned, and that villagers have returned to either their original or other villages.

A basic question concerns the introduction of modern conveniences (high level technology) into the traditional society of the Lice village areas. A somewhat simpler approach (lower level of technology) would probably be more practical and acceptable by the villagers. For example, why include water faucets, sinks, shower stalls, and indoor toilets if there is an extremely low probability that the house will ever have running water? Need houses be wired for electricity in economically depressed regions that have no electrical infrastructure within reasonable proximity? Considering the unavoidable rigorous use of the houses, do village houses need two or three coats of paint? Why are animal shelters not provided? Finally, are new villages physically arranged as the villagers prefer?

As I have suggested in 1974 (Mitchell, 1974: Chapter V) and 1976 (Mitchell, 1976: 312-313), it seems that the cost of the restoration program could be significantly reduced and the effectiveness of the resettlement program improved. One way to do this is to modify the present program to include an objective assessment of each damaged village in terms of short term availability of electricity and water. The Gediz study suggests that construction based on future availability of water and electricity is not realistic. Thus damaged villages that had no electricity and are not relocated close to electrical power lines, could be rebuilt without electrical fixtures and wiring. Since electricity is required to pump water indoors, the new earthquake resistant houses could also omit water faucets, sinks, shower stalls and indoor toilets which seldom ever function because of no water or drainage system. Thousands of new houses have been built since the late 1960's. Small savings from

each house unit become significant at this scale of reconstruction. Savings could be reinvested in the construction of village roads.

More emphasis should be placed on restoring traditional homes with improved construction methods to minimize the hazard of horizontal shaking. The Ministry of Reconstruction and Resettlement is making some headway in this direction as evidenced by their rural educational programs on hazard minimization.

Perhaps the most important recommendation is what should now seem obvious to the national government. That is, the villagers must be surveyed and their perceived needs and opinions taken into account. A non-partisan team from the Ministry of Reconstruction and Resettlement could conduct opinion surveys in high risk areas before earthquakes occur, and in settlements affected by past disasters. The goal should be to minimize the dissatisfaction of the villagers. Realizing that allocations for reconstruction are limited in Turkey and other developing countries, the significance of these recommendations will become even greater in the future. The solution seems to lie more in implementation of a program drawing on local labor, local materials, and local cultural needs rather than in importing a Western-style community.

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NOTES

- 1 This paper is an abbreviated and rewritten version of *The Lice Earthquake in Southeastern Turkey: A Geography of the Disaster*, United States Air Force Academy Technical Report 76-24, December, 1976.
- 2 For example, the village of Baharlar (Lice District) consisted of Sünzer, Berbik, Süngeran, Hun, Antikan, and Hamzabey *mahalleler* (quarters). The number of houses in each quarter ranged from 3 in Hamzabey to 12 in Sünzer. Total houses numbered 44, and they were scattered over several kilometers.
- 3 A lengthy report on the Kurds is found in Short and McDermott (1975). It is difficult to obtain an unbiased portrayal of the Kurdish people.
- 4 "The Lice Earthquake: A Briefing Document", London Technical Group, September 15, 1975, Appendix I, p. 3.
- 5 Data provided by Diyarbakır Regional Office, Ministry of Reconstruction and Resettlement.
- 6 Statistics provided by Diyarbakır Regional Office, Ministry of Reconstruction and Resettlement, and observations in Lice.
- 7 This discussion is based on a variety of sources, including verbal accounts by residents of Gediz and Lice and officials in Ankara, Diyarbakır, Lice, Kutahya and Gediz. Also useful was "Statement by the Turkish Delegation on Earthquake at Lice, Turkey" (1975).
- 8 The Turkish press began reporting controversial and conflicting stories on the earthquake recovery only days after the disaster. For example, see: *Cumhuriyet* 10 Eylül 1975; *Akşam* 15 Eylül 1975; *Yeni Ortan*, 13 Eylül 1975; and *Milliyet* 10 Kasım 1975. The newspaper *Cumhuriyet*, 1 Kasım 1975 presented plans for the new town of Lice which were criticised in the *Milliyet*, 10 Kasım 1975.
- 9 This paragraph is based on tentative data provided by the Office of U.S. Foreign Disaster Assistance, Agency for International Development, Department of State, August 12, 1976.
- 10 This was documented for Cıldırın in a recent AID report: *Disaster Relief, Case Report Turkey-Earthquake November 24, 1976*.

- 11 Interview with the mayor of Lice, 4 June 1976 and *Yeni Lice: 6 Eylül-29 Ekim*. Records of the İmar ve İşkan Bakanlığı, Bölge Müdürlüğü, Diyarbakır, indicate that a total of 1615 homes would be built in Lice, and that all have been completed.
- 12 Interview in Yünlüce village, June 2, 1976.
- 13 Interview in Yaprak village, June 6, 1976.

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