Impact of Parícutin on Five Communities

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Now one sees an admirable flow of fire covering the traces of our last footsteps and the works of man that he made during the life that God permitted him

—CELEDONIO GUTIÉRREZ

The tower of a ruined village church rises above a mass of lava in the Sierra Tarasca of Michoacán, Mexico (Figure 10.1). Once the site of regional religious pilgrimages, the church is now visited by tourists on excursions from Uruapan, a rapidly growing provincial city about 25 km away. They travel the last 2 km on foot or horseback through a forest of young pines that spring from ground blackened by pyroclastics. When the tourists reach the edge of the lava flow, they must clamber over the sharp, black rock to the church, which marks the site of San Juan Parangaricutiro.

San Juan was a thriving, although somewhat isolated, local political center when, on the afternoon of 20 February 1943, a dust-belching hole in a cornfield 3.5 km to the south began to grow into the lava- and ash-spurting Parícutin volcano (Figure 10.2). When the eruptions ended on 4 March 1952, the cinder cone rose 410 m above the former cornfield surface and a 233-km^2 area had been devastated by lava and ash (Fries and Gutiérrez 1954:490). Lava had claimed San Juan and nearby Parícutin village. Pyroclastics, called "the sands of the volcano" by the local people, had covered the lands of three other peasant farm communities, Angahuan, Zacán, and Zirosto (see Figures 10.3 and 10.4).

The inhabitants of San Juan and Parícutin had relocated in refugee settlements near Uruapan. The communities of Zacán and Angahuan remained in place. Zirosto had fragmented into three parts, with some residents remaining in the original settlement while others moved to the refugee settlements of Miguel Silva and New Zirosto. Thus, the five communities that lay

ISBN 0-12-659120-3

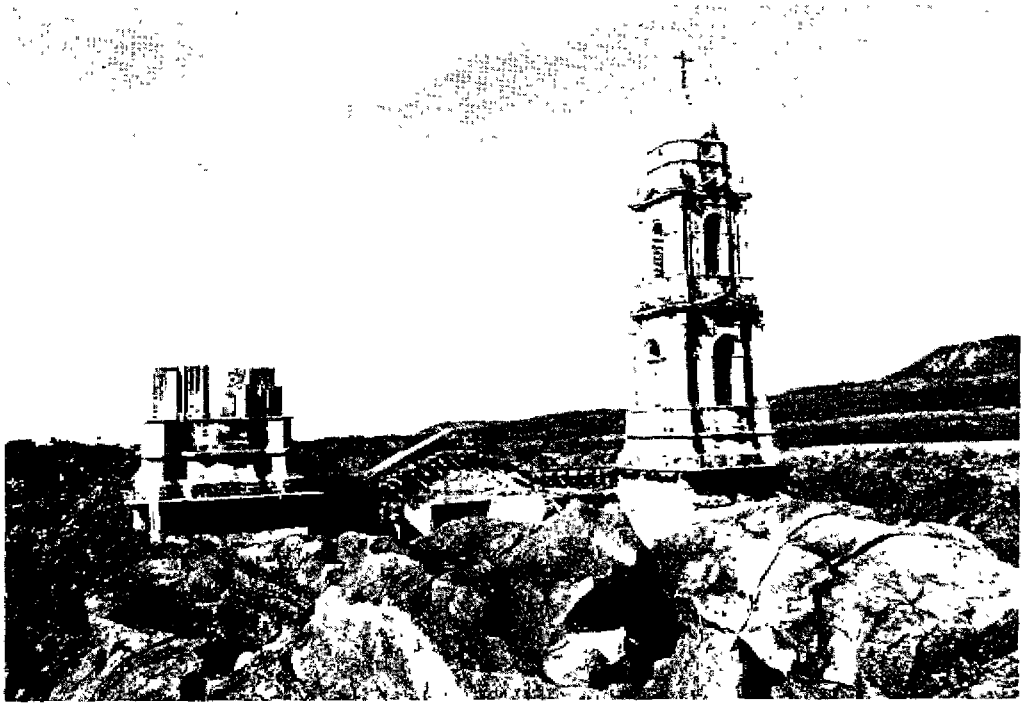

FIGURE 10.1. Ruins of the pilgrimage church at San Juan Viejo Parangaricutiro. The façade survived because it was encircled by the lava flow. [From M. L. Nolan, "The Mexican Pilgrimage Tradition," *Pioneer America,* Vol. V, No. 2, 1973.]

FIGURE 10.2. Parícutin Volcano, 1972.

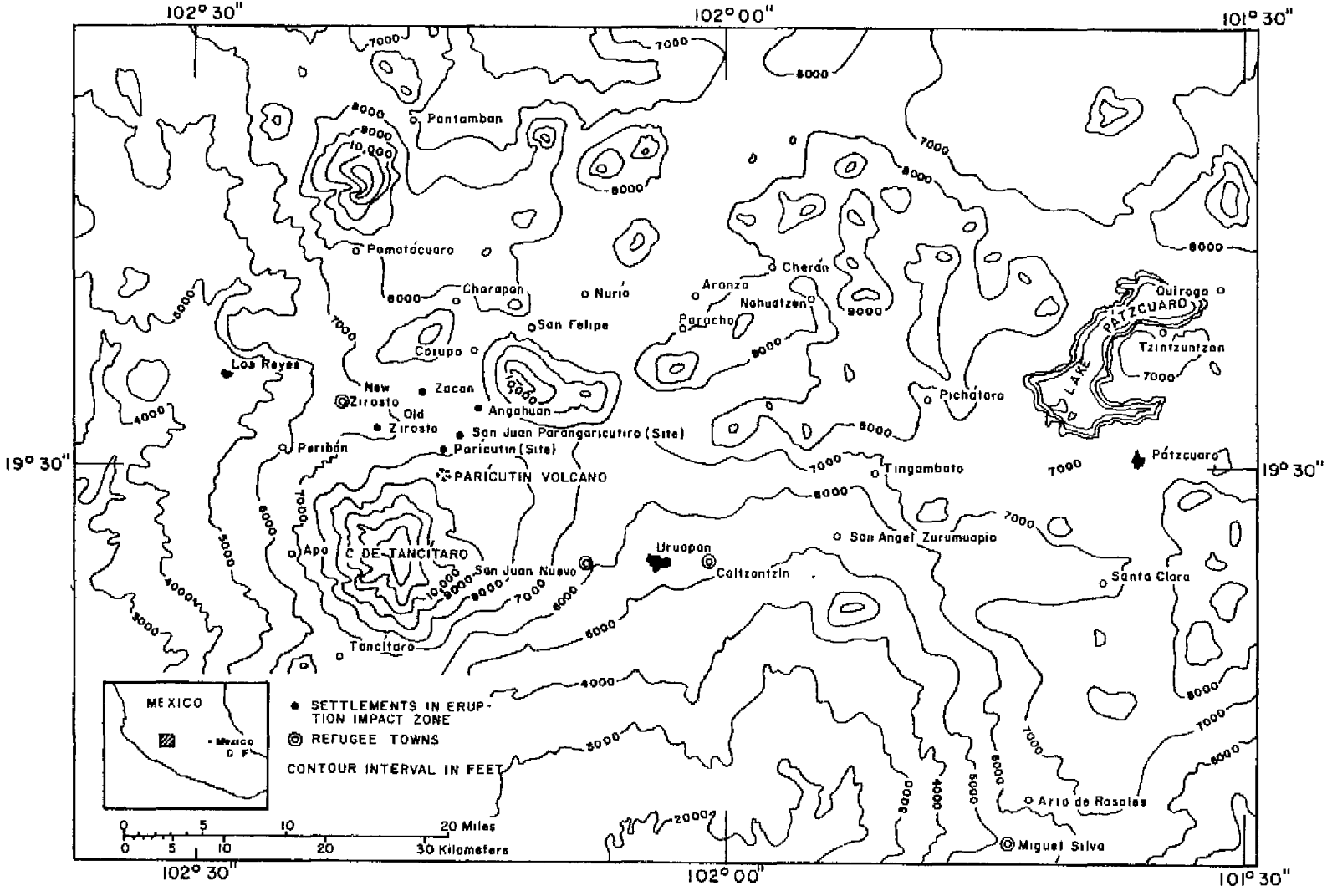

FIGURE 10.3. Topographic map of the modern Tarascan area.

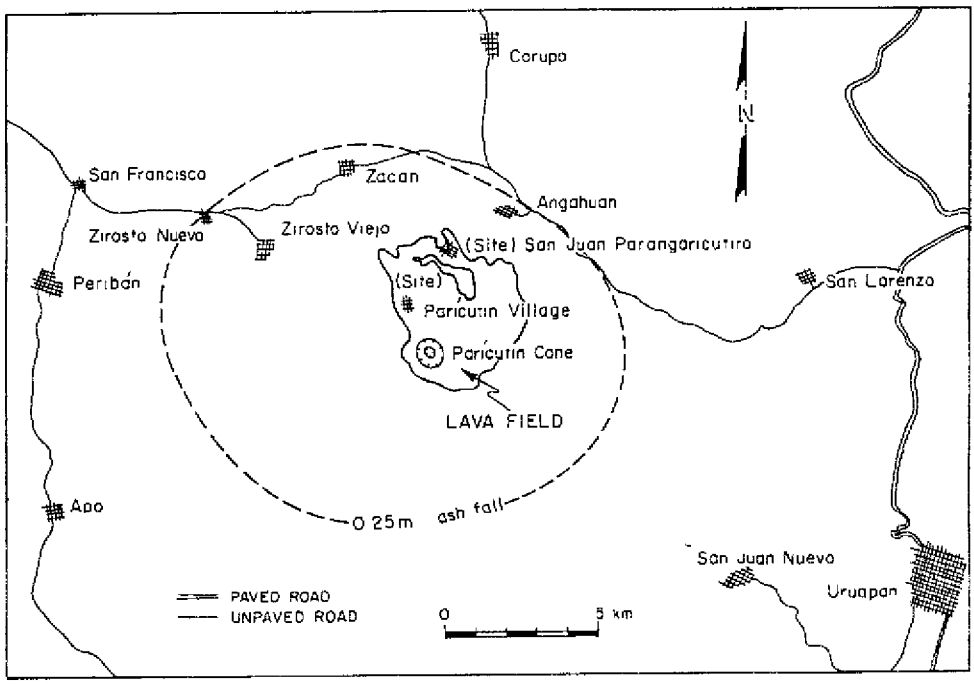

FIGURE 10.4. Region near the Volcano Parícutin.

within Parícutin's zone of devastation (Williams 1950: Plate 9), are now seven quite diverse and geographically scattered settlements known in the region as "the towns of the volcano" (Nolan 1972:2).

The new volcano's birth initiated drastic changes in the environment to which the people of these communities were accustomed. The forces of social, political, economic, and technical change that were already at work in Mexico were focused on these villages because of destruction or severe damage to the resource base and traditional places of habitation. As individuals and communities, the people were faced with the challenge of adapting to rapidly changing physical and social situations. Ostensibly similar in lifestyle and cultural background, the people revealed underlying differences in the variety of adaptive choices they made and the extent to which they allowed forces for change to determine their futures. Had the volcanic zone population been truly homogeneous in cultural orientation, and had the physical force of the volcano been the only change agent at work, then the story might be simple to recount. However, a volcanic eruption in a rapidly changing society creates a situation of great complexity.

This case study of the communities most affected by Parícutin volcano seeks to provide insights by examining the situation before the eruptions, the sequence of events and human responses during the 9-year period of volcanic activity, and the characteristics of the resulting seven communities nearly 30 years after the eruptions began. Attention is then focused on implications of the Parícutin eruption in the context of current research on human response to natural hazards and disasters and followed by a brief speculation on the

significance this study holds for archaeological investigations in zones of volcanic devastation.

COMMUNITY LIFE BEFORE THE VOLCANO

In folk mythology the time before the volcano was a golden age when the region was beautiful and prosperous. Folk songs describe flowers and singing birds, the rains of summer and the green fields—a time when all was pleasure and happiness. The region lay along the northern foot of the Cerros de Tancítaro, an old shield volcano that loomed above a landscape dotted with hundreds of younger and smaller volcanic forms. These were interlaced with a network of valleys that lay at an elevation of about 2100 m. The valleys and gentle slopes around the villages were cultivated, or allowed to grow in pastures that supported locally owned livestock. The ancient cinder cones and the rocky badlands of old lava flows were covered with forests of pine and oak (Dorf 1945:258). These forests provided cover for the region's wild fauna, which primarily consisted of deer, rabbits, and many species of birds, and wild bees valued for their honey.

The life of the region's people was not so idyllic as the folk songs suggest, but it was not a bad life. The very lack of abundant resources and transportation networks had left it a place where village farmers, many of whom spoke the Tarascan language, still followed traditional patterns as subsistence tillers of the soil. Most of the valley lands were in private ownership but, according to custom in most communities, were not supposed to be sold to outsiders without the consent of community elders who had paid their dues to society by sponsoring religious fiestas. Forest lands were generally in community ownership. They were utilized for timber, with which village homes were built, and for resin sold to nearby turpentine distilleries. Each village had its own craft traditions, as was the custom in the Sierra Tarasca, and goods were exchanged in nearby market towns and during the fairs held in association with local fiestas. One hacienda had been established in the region, but its sphere of influence affected only the Zacán community. In many ways, life before the volcano followed the socioeconomic model laid down by the Spanish bishop Vasco de Quiroga some four centuries earlier in the wake of the Spanish conquest.

In a general way, the communities to be affected by the volcano were similar. All were designated as *pueblos*, a term that can mean either village or town. Populations were small, ranging from 733 in Parícutin village to 1895 in San Juan Parangaricutiro (hereafter referred to as San Juan) (Secretaría de la Economía Nacional 1943). All had been founded as Tarascan Indian settlements. In 1940 some people in each of the communities spoke the Tarascan language, although the number varied from 100% in Angahuan to only 20% in Zirosto, indicating that the communities lay along the margin of a shrinking Tarascan culture area (West 1948:19). The settlements looked much alike. All

were laid out in grid patterns centered on churches. Styles of architecture were much the same, although some communities had a higher proportion of stone and adobe houses than did others (West 1948: Map 19). Most dwelling lots contained a wooden *troje*, or family ceremonial structure, and a *cocina*, or kitchen structure where the family cooked, ate and slept (Beals *et al.* 1944:21). The primary resource base for these small communities was composed of the village fields, pastures, and forests. They were relatively isolated physically. The bus trip from San Juan to Uruapan took 3 hours over an extremely bad road (Secretaria de Hacienda 1940:57), and the region's only telephone had been installed in San Juan only a year or so before the eruptions. San Juan was also the only town with electricity, produced by a small generator that powered lighting for the church and government offices.

Despite their similarities, these communities were distinctive in numerous ways, including orientations toward the larger Mexican society. Some of the communities were, in a sense, preadapted to take advantage of new opportunities, whereas others were either ill prepared for, or particularly resistant to, massive socioeconomic changes The differences rather than the similarities best explain the unique adaptation made by each community in the wake of an abrupt convergence of physical and social forces for change.

San Juan

San Juan, the largest, most important town of the region, was *cabecera* of the *municipio* that contained all but one of the communities. Mestizo or Spanish-speaking families were present in the town by the late eighteenth century. Gradually, the percentage of Spanish speakers increased, so that by 1940 they constituted a majority of the population of 1895. However, the Tarascan-speaking 32% numbered 725 persons and constituted a community within a community. San Juan was the only town described as having two distinct ethnic groups (Gutiérrez 1972:8; Nolan 1972:74). This ethnic division between Indians and mestizos was, however, mitigated by San Juan's possession of an extremely powerful icon in the form of a crucifix called the Lord of the Miracles. The image was revered by Indian and mestizo alike and both groups valued the profits and status that resulted from being a major regional pilgrimage shrine. Meeting religious obligations was still important to the local achievement of secular power. In 1945, San Juan was a mestizo town with a significant Tarascan minority and a traditional local symbol capable of serving to rally both groups in an effort to preserve the community.

Zirosto

The 1314 people of Zirosto had been oriented toward mestizo culture for several generations. The process began with the rise of mule driving, mule-string ownership, and moneylending in the late eighteenth century. By the early twentieth century there was a marked difference between rich and poor

families in terms of access to resources and styles of living, although Spanish did not replace Tarascan as the local language until the second decade of the twentieth century. The 20% of the population that claimed to speak Tarascan in 1940 included men from the mule-driving families who used the language for trade in the Sierra, as well as older people and some women. All who discussed Zirosto claimed that there had been no ethnic difference between those who could speak Tarascan in 1940 and those who could not, although genealogical research indicates that there were a few poor and conservative families with Tarascan surnames who were more Indian in orientation than the majority of Zirosto's citizens.

Meanwhile, Zirosto had suffered economic decline as the importance of mule trade was undercut by railroads and highways. The traditional system for sponsoring fiestas was given up in the 1930s when members of the wealthy families refused to accept the burdens, and there had been an exodus of the younger members of these families. When the volcano erupted, Zirosto faced catastrophe with a nineteenth-century mestizo orientation much like that described by Wolf (1959:236–246). Compared with the other communities, Zirosto seems to have lacked community solidarity prior to the eruptions.

Angahuan

Angahuan was the most Indian of the villages. All of its 1098 people spoke Tarascan, and many were monolinguals. Their version of Tarascan was notably different from that spoken in other places (Beals *et al.* 1944:9; Foster 1948:22). The people of Angahuan generally kept to themselves, and few men had ventured far from the boundaries of the community lands prior to 1943. The rule of endogamy was strong, although the village contained a few women who had married in from other communities. Two of these women, who had come to Angahuan prior to 1910, were still known locally as "the old lady from San Juan" and the "old lady from Paracho." Community lands were not sold to outsiders and people from other places were not allowed to live permanently in Angahuan. It is said that school teachers sent by the government during the 1930s usually did not remain long, largely because of local hostility.

Before the volcano, Angahuan seems to have closely fit Eric Wolf's (1955) model of the closed corporate community. It restricted its social and economic interactions with other communities to an extent that seems to have been unusual for Sierra Tarasca towns in the early 1940s.

Parícutin

The people of Parícutin village were also Tarascan speakers but were considerably more open to the outside world than the people of Angahuan. This greater receptivity to new people and ideas was indicated by fairly frequent exogamous marriages, a desire for education, willingness to accept school teachers in the community, and an active agrarian movement. Fifteen

percent of the population claimed not to speak Tarascan in 1940, although they probably did, because the Indian tongue was the language of street and household. In spite of these portents of change, the *mayordomía* was still in effect. Relationships with San Juan were poor because of a longstanding land feud with the neighboring community. As a result of actions by Parícutin's "agrarianists" that were seen as hostile and sacrilegious, much of the blame for the volcanic eruption was eventually placed on this small community.

Zacán

Zacán's 876 people were transitional. The half who claimed to speak Tarascan were mostly older people. Men of the village had worked in other parts of the nation since the eighteenth century and some had worked in the United States in the early twentieth century. Apparently, these travelers had been welcomed back into the community, and the tales of their adventures were a part of the community life. The community decision to acculturate toward the norms of the larger society was made before the volcano. The transition from old to new orientations was symbolized in 1941 when the *mayordomía* system of sponsoring local fiestas was abandoned on the advice of a priest and the locally born head of the school, who had traveled widely and had also achieved traditional status in the community by serving as *mayordomo* for the Saint's Day fiesta.

'The traditional system demanded hard work and self-sacrifice because the *mayordomo* of a village fiesta had to serve in expensive lesser positions of ceremonial responsibility before he could hope to expend his life savings to pay most of the costs of a major fiesta. The reward was local status and a strong voice in decisions affecting the community (Wolf 1959:212; Foster 1967:206). Thus, in Zacán the focus of community service changed from the sponsoring of fiestas toward the goal of producing educated children "for Mexico." This transition had just begun when Parícutin devastated the village lands and forced adjustments, which included a period of life in Mexican towns and cities for many families. There men and women had firsthand experience with the benefits of education, and they were to bring this message back to the village.

THE TIME OF THE ERUPTIONS

The birth of Parícutin was witnessed by an Indian farmer named Dionisio Pulido, who, in the company of his wife and a hired hand, was preparing his land for spring planting. As the ground began to heave and smoke poured out of a small hole and along a fissure that opened across the newly plowed earth, Pulido and his companions fled in terror (Foshag and González 1956:375–377). The initial eruption column was soon sighted by residents of the surrounding villages as "a simple little smoke which grew little by little into strange grey vapor silently making its course toward the southeast [Gutiérrez 1972:14]."

For the preceding 15 days, the people of the region had experienced nearly continuous earth tremors, including a few strong shocks that cracked the walls of homes and public buildings. The worry and fear with which people responded to these earthquakes were intensified by prophecies that sprang from recent sacrilegious acts. These violations of religion and custom were the front wave of a coming social change, and, in retrospect, were considered serious enough to have caused the volcano as an act of the wrath of God on a sinful people (Foshag and González 1956.372–373; Gutiérrez 1972:10).

When the eruption column appeared, some men thought it a forest fire and others suggested it was a new sawmill that would bring jobs at good wages. However, it had an unusual appearance and men were sent out to investigate from the larger towns of San Juan and Zirosto. As the eruption column grew in size, people clustered around the community leaders in the town plazas and waited for reports. The San Juan investigators, who had been blessed by the priest before setting out on their mission, returned as dusk dimmed the symmetrical forms of the old cinder cones beyond the town. The priest listened to their description of events in Pulido's cornfield, consulted a book on Vesuvius in the church library, then solemnly announced the birth of a new volcano (Foshag and González 1956:380). Word was sent from San Juan by telegraph and telephone to Uruapan and to the state governor in Morelia, the National Secretary of Defense, former president Lázaro Cárdenas, and Ávila Camacho, President of Mexico.

Convergence

Even as many of the local people fled, scientists converged on the scene. The Mexican geologist don Ezequiel Ordóñez arrived on the evening of February 22, and was soon joined by other geologists and natural scientists representing a variety of disciplines. Although North American social scientists were in Michoacán for the purpose of studying Tarascan culture, they continued their studies in other villages. The least studied aspect of the Parícutin eruptions was the impact on the region's people. Nevertheless, the people affected by the volcano were the subject of considerable attention and were exposed to an unprecedented number of people from beyond the region. By 25 February, not only scientists, but tourists, reporters, curiosity seekers, and even peasants from other villages were arriving to witness the spectacle of Parícutin's eruption. Thus, from the very beginning of the physical catastrophe that destroyed their lands, the people affected by Parícutin volcano were also exposed to a radically changed social environment. As refugees, tourist guides, and even field research assistants, they came into contact with a great variety of people from beyond their region, especially North Americans and urban Mexicans. They became subjects of concern and planned social change for officials representing the rapidly modernizing Mexican nation. Within the first week governmental agencies began a search for vacant lands where people from the

eruption zone could be relocated (Departamento de Asuntos Agrarios y Colonización No. 846).

Behavior patterns during the period of earthquakes and the early days of the eruptions were similar to those observed in connection with other catastrophic events that provide warning before direct impact. Curiosity leading to investigation and to remaining in the area to watch (Moore 1964:56; Drabek 1969:377), exaggerated fantasies in an unfamiliar situation (Janis 1962:74), and individual differences in choice of a time to leave the region or even to leave at all (Perret 1924:54; Moore 1964:36; Drabek 1969:341) are apparently common reactions. As is often found in disaster studies (Young 1954:383–391, Hill and Hansen 1962:203; Trainer *et al.* 1977:147–206), the family was an important unit of action and members of the extended family residing outside the impact zone provided a source of aid.

Events of the Quitzocho Period

The period of volcanic activity that lasted from February until October 1943 began with explosive activity followed, after March 18, by a heavy fall of cineric materials. When the seasonal rains began in May, the "rain of sand" was replaced by a terrible "rain of mud." Both ruined attempts at farming over a wide area, and forests in the eruption zone began to die. The pyroclastic fall also created highly uncomfortable conditions for humans within a radius of about 25 km from the cinder cone, but particularly within the five villages in the immediate area (Foshag and González, 1956:399; Gutiérrez 1972:20).

Many of the people who first fled the eruption zone in fear soon returned home; however, within the first 3 months after the volcanic outbreak, a more permanent exodus began. It was composed mostly of those who had kinsmen in other communities or skills allowing reasonable employment in other places and/or resources that could be liquidated to pay for relocation. In other words, it was generally the richer, better-educated, more exogamous, Spanish-speaking mestizos who first left their home communities. However, some of the richer families stayed because their wealth was in land and homes that could not be disposed of without sacrifice, and they felt they had too much to lose by leaving. A few of the early migrants were among the poor but ambitious Spanish speakers who had already been thinking of leaving their villages to seek better opportunities elsewhere.

Hardly anyone left the Indian-oriented communities of Parícutin and Angahuan during this period, but by mid-June 1943, the situation in Parícutin village was desperate. Water sources had disappeared. Fields were buried to great depths under ash and, in some cases, lava. The heavy pyroclastic fall had destroyed the roof of the church and many of the homes. When lava began flowing down an arroyo in the direction of the village, government officials and geologists agreed that the town should be evacuated, even though the geologists were reasonably certain that the settlement was not in immediate danger of inundation by lava.

Accounts of the evacuation of Parícutin village by the Mexican army range from stories of people forced into government trucks at gunpoint to dramatic accounts of a peasant population gladly following General Lázaro Cárdenas to a new land, a new destiny, and a better future. All the accounts apparently contain some truth, because many of Parícutin's younger citizens did welcome new opportunities, whereas many others, especially among the older people, "did not wish to leave and . . . preferred to die covered with lava rather than abandon their homes [Gutiérrez 1972:26]." Dying under the lava was not permitted either by nature or other men. Lava did not cover Parícutin village until more than a year after its evacuation, and then only slowly.

The new settlement of Caltzonzin was 5 km from Uruapan and lay at an altitude of about 1525 m. There the formerly isolated highland Tarascans of Parícutin were given lands in *ejido*, new houses that they did not like, and new shoes that most were not accustomed to wearing. Many well-meant efforts were made to help them adjust to their new situation, but little attention was paid to some of their deepest, noneconomic needs. It would have been a simple matter to change the name of the refugee settlement to Parícutin Nuevo, but this was not done and the loss of the community name was symbolic of many other losses in the continuity of life. Culture shock stemming from too much change too fast plagued the Caltzontzin refugee settlement for more than a generation (Rees 1961·14ff; Nolan 1972:218–309).

The Volcanic Zone

Meanwhile, in the volcanic zone conditions worsened as the reserves from the 1942 harvest were consumed and it became obvious there would be no harvest in 1943. Resin collection was no longer possible and more trees were dying. The livestock, their bellies full of pyroclastics from consumption of ash-covered vegetation, also began to die (Gutiérrez, 1972:52). Wild fruits and berries, bees, and wild game disappeared from the landscape.

Families continued to leave the sierra. Some, especially from Zacán and San Juan, went to other Mexican towns and cities. Others, primarily from Zirosto, headed for lands in the *municipio* of Ario de Rosales, where the government was reported to be planning a major refugee settlement Salvaging the dead and dying forests, road building, and guiding tourists and scientists provided a meager subsistence for those who remained in the volcanic zone through the summer of 1943. In San Juan boys sold rocks from the volcano to visitors, and men and women established refreshment stands dangerously near the eruptions. A Red Cross station was established in San Juan in May 1943, and famine was averted through the donation of nearly 800,000 pesos worth of food and other goods by various relief agencies (Segerstrom 1950:25).

The heaviest and most destructive period of pyroclastic fall in the volcano's short history ceased on 9 June 1943, but the sands did not remain where they had fallen. They were shifted and reshifted by wind and water, deeply eroding slopes and burying some former fields to great depths.

Numerous town meetings were held in San Juan to consider relocation, but the remaining people "were not able to make the effort to uproot their hearts and take themselves to another place far away [Gutiérrez 1972:32]." General Cárdenas came in person to urge resettlement. Finally, the men of San Juan were given governmental permission to locate an acceptable site for a refugee settlement, but resistance to relocation continued.

In spite of 6 months of "hell under the shadows of the vapors, black clouds, cold rains of sticky sand, cinders and ashes [Gutiérrez 1972:33]" the people of San Juan prepared a final September fiesta for the Lord of Miracles. Pilgrims came by the thousands, from Michoacán and elsewhere in Mexico, and even from other nations. Because they suspected that the great pilgrimage shrine was doomed and that 14 September 1943 marked the last year of fiesta in San Juan, "Men and women with tears in their eyes kissed the divine feet of Our Lord of the Miracles. With loud sobs they kissed the altars and the sacred face [Gutiérrez 1972:36]."

The Sapichu Period

October 17, 1943 to 8 January 1944 has been termed the Sapichu period by geologists, after the name given to a small subsidiary cone on the northeast base of the main cone. Eruptions from Sapichu provided a spectacle for tourists, but the main cone became so quiet that it was climbed several times during November and December 1943 (Foshag and González 1956:422).

The principal human event of the period was the founding of Miguel Silva (Figure 10.5). The search for a resettlement location in the *municipio* of Ario de Rosales, about 80 km southeast of the volcanic zone, was initiated during the first week of the eruptions (Departamento de Asuntos Agrarios y Colonización No. 846). Several Zirosto families moved into the area on their own initiative during the summer of 1943. They settled near a rancho and attempted to farm vacant lands that had belonged to the Hacienda de las Animas prior to its expropriation in 1938. On 6 October 1943, the ex-hacienda was formally selected as a refugee location and the lands were listed for settlement on 17 October. Refugees from Zirosto and San Juan were offered 2616 ha, and from late 1943 through the spring of 1944, 1000–1200 refugees poured into the settlement. Government trucks provided transportation and the Banco Nacional de Credito Ejital issued loans, although no *ejido* grants had yet been made (Departamento de Asuntos Agrarios y Colonización No. 846).

Secular leadership was composed of men from both communities. Probably 80% of Zirosto's population relocated, but the number was considerably smaller from San Juan. It is usually explained that the many Tarascan speakers of the latter community were the most resistant to resettlement, although Zirosto's fewer Tarascan speakers were represented.

Unfortunately, the hacienda lands had not been adequately surveyed, and when the survey was completed, it was found that only 350 ha of the vast area were suitable for agriculture. By this time 310 men, most with families, were

FIGURE 10.5. Miguel Silva, founded primarily by refugees from Zirosto, lies at an elevation of about 1500 m. A tradition of pioneering in a strange environment is part of the community iconography.

already there (Departamento de Asuntos Agrarios y Colonización No. 846). Obviously, the major problem with the Miguel Silva settlement was that more refugees arrived than the land could support. In early 1944, the local rancheros killed the secular leaders of the refugee settlement and threatened the priest, who was recalled to another post. They also killed the surviving livestock and otherwise waged war on the huge number of refugees who had descended upon them.

With local leadership gone, refugees from San Juan and Zirosto began to fight among themselves The climate, although not excessively hot at an altitude of about 1500 m, was unfamiliar to these highland people. Many of the seeds they brought failed to grow. In addition, the water was bad and most of the refugees were sick from intestinal disorders and malaria. As many as one-tenth of the refugees died, especially the older people, who are said to have lacked the will to live under such conditions.

Within a year, many of the survivors left Miguel Silva, and by 1946 the population had decreased to about 300 (West 1948:23). Most of the San Juan refugees went to New San Juan after its founding in May 1944. Zirosto families either went to the United States or returned to the volcanic zone. The few from Zirosto who stayed cut themselves off emotionally from the mother community and came to view themselves as the pioneer founders of a new settlement on a difficult frontier. Many looked with disdain on those who returned to the Sierra "to eat the sands of the volcano."

The Taqui Period

In January 1944, two new lava vents opened on the southwest base of the original cone (Foshag and González, 1956:444). The flows from these Taqui vents began on 7 January and continued until the end of July 1945, when scientific observations were temporarily discontinued. The lava flows from these vents ultimately covered San Juan.

As the wall of molten lava slowly approached in March 1944, the people remaining in San Juan reached an agreement. Although the site of a new settlement had already been chosen at Rancho Los Conejos by the men of the community, it was decided that no one would leave the town until the lava flow reached the cemetery (Gutiérrez, 1972:50–51). In April, the San Juan flow moved under a previous lava flow, and men hoped that the town would be spared. Faith that the Lord of the Miracles would save San Juan was reinforced by the belief that science would bring salvation. The latter belief stemmed from the establishment of a seismographic station by Mexican geologists in February 1944 (Gutiérrez, 1972:49). However, both the clergy and the scientists were active in the attempt to reconcile the townsmen to the eventual necessity of relocation.

On 14 April 1944, the lava flow sprang from the tunnels that had hidden its progress. By 24 April, a burst of molten lava from the 9-m-high summit of the flow reached the San Juan–Uruapan road, and the water lines to San Juan were endangered and moved. The road, which passed through a narrow valley, was as yet the only good access to San Juan for motorized traffic, and in a spurt of activity the road linking San Juan to Angahuan and thence to the Uruapan highway was completed (Gutiérrez 1972:53).

The 9-m-high wall of the main lava front continued to move at a rate of 4–5 m/hr as tongues of lava surged forth more rapidly through the pass along the old road and the steep-walled arroyo that ran along the town's eastern edge. In early May, the lava flow reached the cemetery, where it slowed in its progression to a few centimeters per hour. Families came to the foot of the lava front, and there, kneeling on the graves of their ancestors, they prayed In respect for the March agreement, few asked that the town be spared, but only for time to dismantle their church and their homes and take with them all they could of their beloved town. They "cried out to the Lord of the Miracles offering to go with Him, even to the place in which He would make us think we should remain [Gutiérrez, 1972:54]."

On 7 May, the bishop arrived from Zamora accompanied by several priests and other church officials. The next day, the bishop celebrated a solemn mass and confirmed the local children, and an old priest arose to address the people of San Juan. He was Father Luís Gómez, who had served in the community between 1895 and 1917, and it was under his guidance that the colonial church had been dismantled and a new church begun. He spoke of his sadness in seeing the still unfinished church threatened with destruction, but he added that "the Lord God who had allowed the temple to be built was now allowing it

to vanish and we should not regret it so much because that loss was nothing compared to the loss of a human being, or worse of the inhabitants of an entire town [Gutiérrez 1972:55]." When Father Gómez finished speaking, "everyone wept, women and men, and perhaps these were the last sounds of voices to be heard in that place. . . . The sound of the echo filled the space and then vibrated for a long time inside the church which soon would be destroyed by the lava [Gutiérrez 1972:55]."

Even in this emotional moment, the San Juan community was divided because there were still a few who wanted to keep the image of the Lord of the Miracles in the church in hope of a miraculous salvation from the advancing lava. To counteract this belief and avoid possible disaster, the bishop lifted the image of Christ from its place above the altar on 9 May. Accompanied by church officials and supportive townsmen, he held the image high in the beginning of a small procession. A few people threw themselves in the path of the procession, but their fellow townsmen pulled them aside and joined the march behind the most sacred symbol of their community. Soon all were following, and the people spent the night in Angahuan, where the Lord of the Miracles rested in the company of the image of Santiago, patron of that town.

On 10 May 1944, the procession continued toward Uruapan. All along the route groups of pilgrims met the people of San Juan. "They were weeping, seeing that the Holy Christ had left the town of San Juan and was being carried away without their knowledge of where He would be transferred [Gutiérrez 1972:56]." The viewers who lined the roads came out to kiss the image and give water to those who walked behind. When the refugees reached the Uruapan highway, they found great crowds of people who offered them food and water and walked beside the procession shooting off fireworks.

At the edge of Uruapan, the multitude was so great that people could hardly move as the priests of the city came out to meet the procession. "On seeing that people could no longer walk on the streets of the city, some men were asked to pass the word that no one was to move from the place he was occupying. Hundreds of men formed an arm chain in order to take Our Lord in between [Gutiérrez 1972 57–58]." The city was decorated as for fiesta and the people were shouting, "Long live Christ the King." Thus, along the route of procession, a feeling of hope built among the people of San Juan and they "felt a kind of comfort and were sure that we were traveling on a road along which Our Lord was guiding us [Gutiérrez 1972:58]."

On the third day, the people of San Juan reached the valley they had chosen as a new home. Because of their insistence on choosing a new home, they received only a town site and no agricultural lands. They had lost their position as head town of a *municipio*. Many of the richer and more prominent citizens had left the community early in the eruption period, and in the early days in the new settlement people had to do without things to which they had long been accustomed, such as schools, piped water, and electricity in the main plaza. For a time, many lived in tents, although a small chapel for the Lord of the Miracles was built immediately. The new place was called Rancho

Los Conejos, "the little hamlet of the rabbits." People in Uruapan still make jokes about San Juan of the Rabbits, but government documents indicate that the men of San Juan had the name of the settlement formally changed to San Juan Nuevo Parangaricutiro on 9 July 1944 (Departamento de Asuntos Agrarios y Colonización No. 1973). By that time, old San Juan and its church had been buried under lava. People from San Juan who had previously left for Mexican cities or had attempted pioneering at Miguel Silva soon joined the New San Juan community.

The Bracero Program

By early 1944, a new economic opportunity emerged as men from communities affected by the volcano were urged to enlist as contract laborers in the United States. The importance of the bracero program as a stimulus for change is unquestioned. The braceros experienced life in a very different cultural setting, and the opportunities for capital accumulation were enormous. It has been estimated that during the World War II years, bracero workers could make 15 to 20 times as much as they could have earned from the same labor in Mexico (Simpson 1952:311). In contrast with the situation in most other Mexican communities, where quotas were imposed and this opportunity was open only to a few men with good connections or a lucky lottery ticket, all able-bodied men from the towns in the volcanic zone and the refugee settlements could enlist as braceros.

The communities varied in the extent to which opportunities for bracero work were accepted. Although exact figures are not available, it is probable that a large majority of the men of San Juan and Caltzontzin worked at least once as braceros. Many also went from Zacán, but there was a somewhat greater tendency for men of that community to seek wage labor in nearby Mexican cities and towns. A large number of those who had attempted to settle at Miguel Silva also enlisted as braceros, but few of those from Zirosto who had not gone first to Miguel Silva. Hardly any of Angahuan's men accepted the opportunity. This was partly due to a general reluctance to leave the community, and perhaps to some extent to the fact that Angahuan had inherited the traffic in scientists and tourists after the evacuation of San Juan. It is said locally that men could not become braceros because they could not speak much, if any, Spanish, but this is not a completely adequate reason, because numerous Tarascan monolinguals went as braceros from San Juan and Caltzontzin.

The Later Years of Eruptions

By the volcano's second anniversary, February 1945, the period of high drama was over. Never again were the Parícutin eruptions so catastrophic or, for very long, so spectacular. The lava field was outlined by December 1944, and later eruptions added depth and buried exposed areas within the field

People remaining in the volcanic zone tried various strategies of subsistence. They felled the forests, including areas that had not been damaged by the eruptions, and in Angahuan they guided tourists. Seed was planted in pure ash but did not survive. Ash shoveled off small plots by hand produced some crops in sheltered house lots but was not effective in the open fields because the sand drifted back over the clearings Slopes blown or washed free from ash were put into cultivation, including high mountain lands where crops were subject to frost hazard (Segerstrom 1950:20; Eggler 1959:273; Rees 1961:202).

By 1946, the wild bees were returning to the sierra and the wild berries and crab apples near the grave of San Juan bore abundant fruits (Segerstrom 1950:22–23). Crops ripened in painstakingly uncovered soil on lands near Zacán and Zirosto, and some wheat ripened on the lands of Angahuan (Segerstrom, 1950:20). Fighting broke out between the men of Zacán and the rancho of Las Palmas over lands that Zacán had claimed for generations but that had become particularly desirable because they lay away from the zone of devastation (Departamento de Asuntos Agrarios y Colonización No. 154). In Zirosto, men began taking the treasures of the ancient monastic church to sell in the cities.

Meanwhile, adjustments were underway in the refugee settlements. Caltzontzin's citizens began rebuilding their government-designed homes to fit their tastes (Rees 1961:175). Miguel Silva got a pure-water system and favorable government intervention in the feud with the local rancheros (Departamento de Asuntos Agrarios y Colonización No. 846). The population stabilized as the survivors began to think of themselves as pioneers rather than refugees. In San Juan (Nuevo Paragaricutiro or New San Juan), the ground was blessed for the consecration of a new church for the Lord of the Miracles, shown in Figure 10.6 as it is today (Parroquia de San Juan Nuevo ca 1970).

Life was resuming a more normal rhythm, which included the volcano's occasional periods of major activity. In 1947, it was noted that the cone had shrunk in apparent height because of the lava piled up at its base, and toward the end of 1948, the responsibility for continued scientific observation was placed in the hands of Celedonio Gutiérrez of San Juan (Fries and Gutiérrez 1950:406–418). Dionisio Pulido died in Caltzontzin in 1949, and the *ejido* grant to Miguel Silva was confirmed. Zacán found a new technique for waging war with Las Palmas by claiming that old boundaries had been obscured by the ash. In the same year a new species of grass not previously known in the region began invading areas of deep ash.

The year 1950 began with strong, fairly frequent explosions from Parícutin and a few earth tremors. Dust storms were severe during the dry spring and damaged vegetation that was moving back into the zone of devastation. Mosses, lichens, and ferns were found in moist places on the thinner lavas (Fries and Gutiérrez 1951a:212–221). The people of Angahuan were putting corn lands back into production, and as pasturage revived, the region's livestock population increased. Around Zacán, lands had been washed sufficiently free of ash to permit a return to nearly normal agriculture (Fries and Gutiérrez

FIGURE 10.6. The pilgrimage church at San Juan Nuevo Parangaricutiro. Thousands of pilgrims from central Mexico and even the United States visit the new church of the Lord of the Miracles each year. [From M. L. Nolan, "The Mexican Pilgrimage Tradition," *Pioneer America*, Vol. V, No. 2, 1973.]

1951b:572–581), although the land war with Las Palmas continued (Departamento de Asuntos Agrarios y Colonización No. 154).

In 1951 it was dry in the spring as usual. In the summer it rained. The volcano erupted occasionally. Life had, indeed, returned to normal. For some geologists, as judged from their writings, the volcano became boring because nothing new happened. For others it became more interesting because it was repetitious and therefore predictable. For Celedonio Gutiérrez, "Every day for nine years the volcano was different. The earthquakes were recorded and the march of the lavas. All this, for me, was very interesting [Nolan 1972:204]." Then, on 4 March 1952, Parícutin was dead. Spring brought damaging dust storms, but the following summer was unusually wet and many areas were washed clean of ash. The best harvests since the birth of the volcano were gathered in August 1952 (Fries and Gutiérrez, 1954:486–494). Figure 10.7 shows the progression of the lava field from December 1943 through March 1952.

The Immediate Aftermath

For most people in the refugee towns, the end of the eruptions did not matter very much. They had long before come to terms with new destinies. Nor was it of much importance in Zacán, where agriculture was already nearly

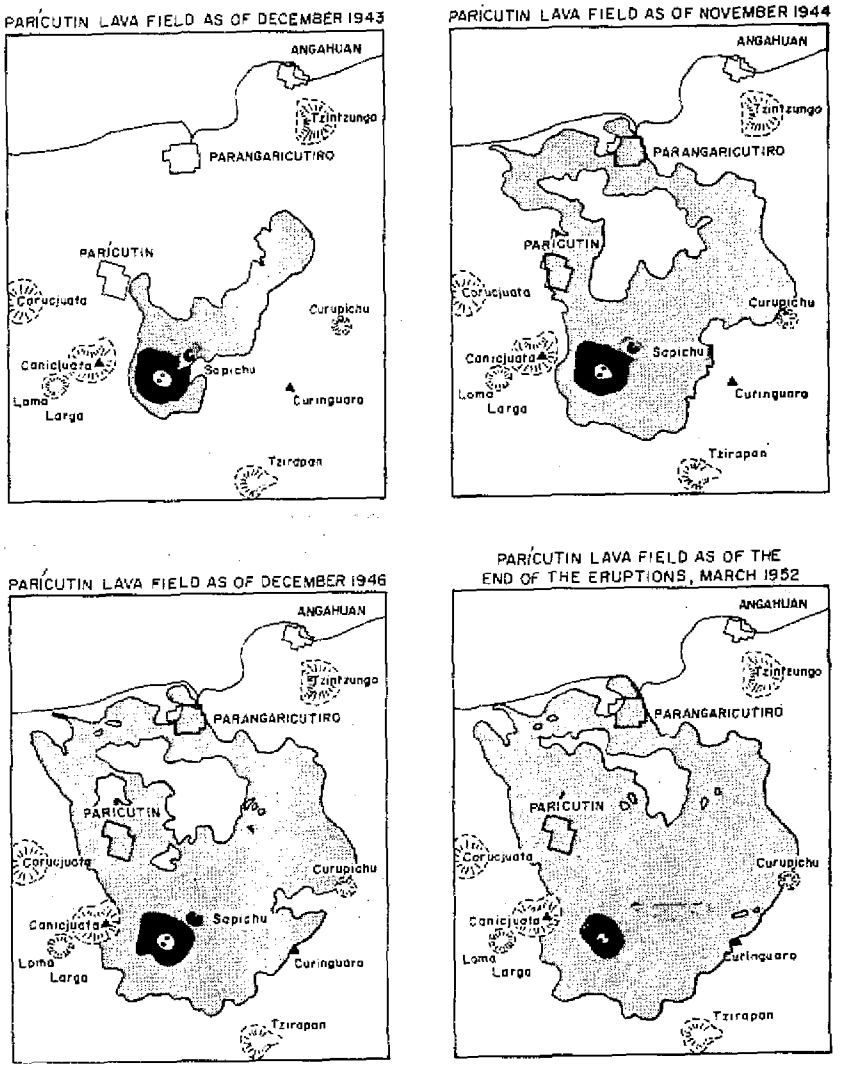

FIGURE 10.7. Parícutin Volcano lava flows, December 1943 to March 1952.

normal. Angahuan, however, had become dependent economically on tourists who came to see the eruptions. As word spread that the show was over, the tourist traffic virtually disappeared. Some men were finally forced to leave the town as temporary laborers because the lands were still too unproductive to support a population that had increased slightly during the eruption years. Although a new generation of tourists eventually returned to see the volcano they had read about in school textbooks, Angahuan tourist guides still look wistfully at the conical black form of Parícutin. Most probably feel what one expressed: "It would be nice if the volcano would erupt again—just a little bit."

In Zirosto, the last act of a social tragedy was played out, when the community fragmented into the spatially discrete settlements of Old and New Zirosto. Things had been going badly for a long time, and men had fought among themselves for the few available resources. In about 1949, the church of the once important colonial monastery burned (Figure 10.8), and the bapistry

FIGURE 10.8. Ruins of the monastic church at Old Zirosto. This colonial structure burned in about 1949. The bells, long a symbol of the Zirosto community, were retained by those who stayed in the old settlement in 1953.

FIGURE 10.9. The main road from Uruapan to Los Reyes bisects New Zirosto, a town established on the edge of the devastation zone in 1953 by residents of Zirosto.

was fragmented into three pieces by a lightning bolt from the eruption column. When the eruptions ended, the Mexican government encouraged the Zirosto population to relocate a few kilometers away at the site of Rancho Barranco Seca which was on the Uruapan–Los Reyes road (Figure 10.9). In return for relocation, the people were promised an *ejido* grant, a 6-year school, bus service along the road, electricity, piped water, and street lights.

A majority went to New Zirosto in 1953, but some adamantly refused to leave the old town. Brothers made different choices, placing strain on family relations and the solidarity of kinship networks. It is said in New Zirosto that the move would have been truly successful if all had gone together, taking with them the old bells that symbolized the community. In Old Zirosto, those who left are blamed. It is argued that if all had stayed, the Mexican government would eventually have rerouted the road, provided electricity, water, 6 years of school, and all the other benefits. In terms of social disruption Zirosto became, as is said locally, the town "most destroyed by the volcano [Nolan 1972:209–213]."

COMMUNITY LIFE AFTER THE ERUPTIONS

As the years passed, plant and animal life continued its regeneration in the zone of early devastation. Slowly, plants invaded the lava fields and appeared in scattered, humble forms on the dead cinder cone. Although the lava field will remain agriculturally useless for centuries, areas of light ashfall were back in production before the eruptions ceased. Areas of heavy ashfall and places where ash had washed down on former fields, covering them to depths of several meters, remained useless for agriculture in the early 1970s (Nolan 1972:449; Rees 1970:25). However, urban entrepreneurs had discovered an economic value for pyroclastic deposits and some deep sand deposits were being mined for use in concrete manufacture.

As fertility returned to areas of medium ashfall, both naturally and through human efforts, the conditions generated by the eruptions continued to affect human life. Incidents of aggression and land wars with loss of human life became more intense in the region as formerly useless lands regained agricultural value. These conflicts were particularly difficult to settle because the eruptions had destroyed landmarks traditionally used as boundaries between one village or individual and another.

The longstanding struggle between Zacán and Rancho La Palma was resolved in 1957 when Zacán was allowed to annex the rancho and thus became politically responsible for it. Sporadic sniping continued for several more years (Departamento de Asuntos Agrarios y Colonización No. 154).

The most serious later hostilities involved New San Juan, Caltzontzin, and the people of ranchos founded by both refugee settlements on community lands in the volcanic zone. Court battles were in process by the early 1950s and incidents of aggression were reported in 1959 and 1960. In 1965, the feud

intensified and reports of hired gunmen, killings, and substantial property destruction were filed with government agencies by San Juan and Caltzontzin. In 1969, representatives of the two communities agreed to let trained surveyors set the disputed boundaries. The exact toll in lives and property is impossible to estimate because the record consists largely of unsupported claim and counterclaim from the feuding communities. In April 1967, however, a government investigator documented destruction of harvest, killing of livestock, and the burning of 128 houses (casas) in small volcanic zone settlements (Departamento de Asuntos Agrarios y Colonización No. 154).

The San Juan–Caltzontzin land war clearly retarded the course of permanent resettlement in the volcanic zone. In 1971, both communities contained a number of families who had left the volcanic zone ranchos during the height of the conflict.

The Towns of the Volcano in the Early 1970s

Although the eruptions ended in 1952, social pressures for change continued to affect the three eruption-zone settlements and the four refugee communities. In 1971, these seven communities were quite different in spite of their original similarities and their shared history of experience with a catastrophic natural event. To a considerable extent they represented a cross section of rural Mexico under the pressures of a rapidly changing socioeconomic order.

New San Juan symbolized the success story of the modernizing rural *cabecera*, or *municipio* head town, capable of retaining meaningful traditions in the course of change. It also provided a case study of one of Mexico's numerous thriving pilgrimage centers. In contrast, Old Zirosto exemplified the community that declines even as others progress. New Zirosto was the community with insufficient roots and communal purpose. Miguel Silva could be compared with many pioneer settlements that have developed on newly opened lands in recent years. Caltzontzin had its counterparts in the numerous small communities that are being transformed into urban barrios as cities expand across the countryside. Zacán was the village that gave the best of its young to the growing urban middle class and declined in the process. Angahuan was the adamantly Indian town, greatly changed, yet clinging to outward expression of tradition, a condition complicated by the interests of tourists and folk-craft developers.

The general trend of change was toward greater interaction with the larger Mexican society accompanied by loss of Tarascan traditions. This generalization, however, obscures a multitude of complex variations in the nature of the new societal adjustments.

Except in Angahuan, where everyone still spoke the Indian language, use of Tarascan was declining. No exact figures are available, but only a few of the elderly spoke Tarascan in Zacán, Miguel Silva, and the Zirostos, although a few poets and songwriters in Zacán and Miguel Silva cultivated the language

for artistic purposes. Tarascan was sometimes heard on the streets of New San Juan, but one of the local priests estimated that only about 20% of the population, mostly elderly, could use the language fluently. Tarascan was more frequently heard in Caltzontzin, and was deliberately retained as a household language by several relatively affluent families, but for the most part, Spanish was the first language of the younger generation.

In 1971, fiestas were celebrated in all the communities, but the traditional *mayordomía* system survived only in New San Juan. There, the great fiesta for the Lord of the Miracles had long been sponsored by the community as a whole, but individual sponsorship of the fiesta of the town's patron saint remained a route to local power and prestige in the early 1970s. It was only one such route, however.

Traditional Tarascan dress, particularly for women, was common in Angahuan, not particularly unusual in San Juan and Caltzontzin (Figure 10.10), and either rare or nonexistent in Zacán, the Zirostos, and Miguel Silva. As might be expected, traditional housing was most notable in Angahuan, Zacán, and old Zirosto, the three settlements that remained in place in the volcanic zone.

By 1971 all settlements but Old Zirosto had federally sponsored electric power, a piped supply of potable water, and a 6-year elementary school. Only Old Zirosto lacked a post office and bus service to the center of town. Comparison between the study towns and three other Michoacán communities along

FIGURE 10.10. Elderly Tarascan woman in Caltzontzin, the refugee community founded by people from Parícutin village. The large wooden crosses were a distinctive culture trait in the prevolcanic community, and are also found in Caltzontzin.

the lines of "institutional differentiation" (Graves *et al.* 1969) is presented in Table 10.1.

The list of facilities and services was derived by means of Gutman scaling techniques applied by Young and Fujimoto (1965) to information contained in early 1940s ethnographic accounts of several small Mexican communities including the Michoacán towns of Quiroga (Brand 1951), Cherán (Beals 1946), and Tzintzuntzan (Foster 1948). The second point of reference for these communities comes from 1967 data collected by Graves *et al.* (1969). Data for the existence of these traits in the communities affected by the volcano in 1943 and 1971 were obtained through interviews with knowledgeable older citizens during the 1971 field season. The results of these interviews were checked by administering the same set of questions to at least two other people in each town. Probably because the volcano provided such an excellent time marker, there were few inconsistencies in response about what was present in 1943.

Comparison of communities in the 1940s indicates that Zacán, Parícutin, and Angahuan were relatively undeveloped. They also had the smallest populations. San Juan and Zirosto, in contrast, were well-developed towns for the region. Both compared favorably with the much larger community of Cherán, which had recently won the advantage of location on a paved highway.

By 1971, the item list no longer "scaled" but still served as a useful measure of comparative change. San Juan was already close to the top of this scale in 1943, as were Quiroga, Cherán, and Zirosto. San Juan, which lost many of these facilities and services during the eruption years, had regained its high position by 1971. None of the fragments of Zirosto had reached the level of the mother community in the prevolcanic period. Caltzontzin, Zacán, and Angahuan had acquired appreciably more new facilities and services during the time period involved than had Tzintzuntzan, an intensively studied mestizo community with a Tarascan heritage, located on the shores of Lake Patzcuaro.

Another comparative measure based on 24 facilities and services (Graves *et al.* 1969) allows comparison between the communities affected by Parícutin and a selection of other small Mexican towns and villages (Table 10.2). As in the first comparison, the most obvious features are the failure of any of the Zirosto-derived communities to reach the 1943 level of the mother community, and the major increases in services and facilities achieved by Caltzontzin, Zacán, and Angahuan. Prevolcanic San Juan was too close to the top of the scale to show much change along this dimension. If such items as dry-goods stores, banking facilities, and farm-supply outlets were added, the amount of change in San Juan could be better evaluated.

In 1971, the towns were still predominantly agricultural communities (Figure 10.11). According to the 1970 Mexican census (Secretaria de Industria y Comercio 1971), more than three-fourths of the work force in Angahuan, the Zirostos, and Miguel Silva was engaged in primary activities. Well over 60% of the workers in San Juan and Caltzontzin labored in field and forest. In those towns, as in Angahuan, there was a substantial amount of small industry, mostly backyard enterprises, and in Caltzontzin's case, a plant in which hand-

TABLE 10.1
Comparison of the Study Towns with Other Michoacán Communities

Community	Population	Items[a]													
		Autonomous and named	Elementary school	Plaza or square	Government organization	Bar or cantina	Bakery	Barber shop	Butcher shop	Resident priest	Hotel or inn	Pool hall	Resident doctor	Movie theater	Gas station
Quiroga	1940:3009	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Quiroga	1970:7129	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Old San Juan	1940.1895	×	×	×	×	×	×	×	×	×	×	×	×	—	—
New San Juan	1970:4689	×	×	×	×	×	×	×	×	×	×	×	×	×	—
Cherán	1940.3358	×	×	×	×	×	×	×	×	×	×	×	—	—	—
Cherán	1970:7793	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Zirosto	1940:1314	×	×	×	×	?	×	×	×	×	×	×	f	—	—
Old Zirosto	1970: 434	×	×	×	—	—	—	—	—	—	—	—	—	—	—
New Zirosto	1970.1085	×	×	—	×	—	×	×	×	—	—	f	—	—	—
Miguel Silva	1970: 648	×	×	×	×	—	—	—	×	×	—	—	—	—	—
Tzintzuntzan	1940:1077	×	×	×	×	×	×	—	—	×	—	—	—	—	—
Tzintzuntzan	1970:2174	×	×	×	×	×	×	—	—	×	—	×	—	—	—
Zacán	1940: 876	×	×	×	×	—	—	—	—	—	—	—	—	—	—
Zacán	1970 926	×	×	×	×	—	×	×	×	—	—	×	—	—	—
Parícutin	1940 733	×	×	×	—	—	?	—	—	—	—	—	—	—	—
Caltzontzin	1970:1295	×	×	×	×	—	×	—	×	×	—	×	—	—	—
Angahuan	1940:1098	×	*	×	—	—	—	—	—	—	—	—	—	—	—
Angahuan	1970:1762	×	×	×	×	×	×	—	×	×	—	—	—	—	—

[a]The 1940s item list for Quiroga, Cherán, and Tzintzuntzan was compiled by Young and Fujimoto (1965) from ethnographic accounts. The second item count for these towns comes from the 1967 data collected by Graves *et al.* (1969). Items for the towns of the volcano reflect conditions in 1943 and 1971 (Nolan 1972).

× = item present
? = conflicting information
f = item had recently been present
* = item present off and on

TABLE 10.2
Comparison of the Study Towns with Other Mexican Communities

Number[a] of items	Selected Mexican towns as of 1967 (1960 population figures)	Study towns, 1943 (1940 population)	Study towns, 1971 (1970 population)
24	Quiroga, Michoacán (5336)		
23	Mitla, Oaxaca (3651)		San Juan (4698)
21	Cheran, Michoacán (5651)		
20		San Juan (1895)	
19	Cajititlan, Jalisco (1880)		
18	Aldama, Guanajuato (1919)		
17	Lagunillas, Michoacán (1981)		
16	Yalalag, Oaxaca (3117)	Zorosto (1314)	Caltzontzin (1295)
15	San Pedro, Tobasco (1500)		Zacan (926) and Angahuan (1762)
14	Tzintzuntzan, Michoacán (1840)		
13	Teotitlan, Oaxaca (2849)		
12	Amatenango, Chiapas (1832)		New Zirosto (1085) and Miguel Silva (648)
11	Santa Rosa, Guanajuato (632)		
9	Zangarro, Michoacán (327)		
8	Atzompa, Oaxaca (1726)		
7	Santa Cruz Etla, Oaxaca (613)		Old Zirosto (434)
6	San Feli Rigo, Puebla (701)	Zacan (876) and Paricutin (733)	
5	Chachalacas, Veracruz (208)		
4	Kikeil, Yucatan (230)	Angahuan (1098)	
2	Tatacuatitla, Hidalgo (153)		
1	Carmen, Sinaloa (221)		

[a]Items drawn from Graves *et al.* (1969) are elementary school, grocery store, mass once a year, church, square or plaza, government organization, government official, public transportation, bakery, butcher shop, shipping service, newspaper delivery, barber shop, resident priest, bar or cantina, telephone, billiard parlor, movie theater, resident doctor, filling station, restaurant, hotel or inn, secular organization, and secondary school. Only the number of traits present is considered in this table

loomed textiles were produced. The largest percentage of the work force engaged in commerce and services was in Zacán, where slightly less than half of the population was employed in the primary sector of the economy. Since there was relatively little local development of commerce and services, it seems likely that these figures describe people who maintained the community as a home base but were employed in Uruapan and elsewhere. In keeping with an old Zacán tradition, some were musicians who primarily made a living by playing in urban nightspots during the weekends. Periods of work in the United States, often without permits, were common, especially among younger men from San Juan and Zacán. Migrant labor of various kinds in other parts of Mexico also resulted in contributions to the local economies.

There had been a general trend toward population growth, as was occurring all over Mexico during the same time period. However, only the San Juan community had more than doubled in size, and none of the offshoots of

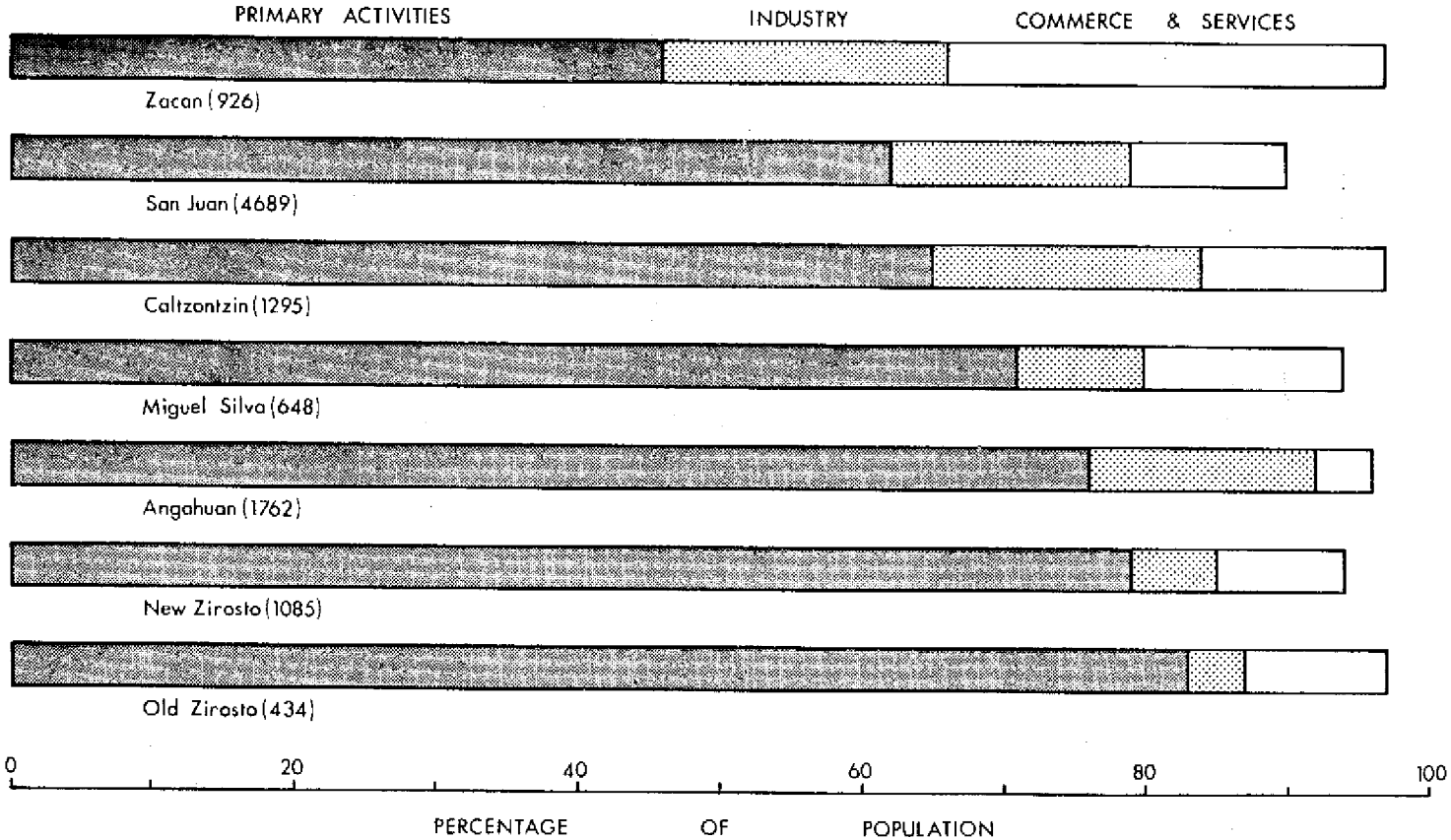

FIGURE 10.11. Occupational categories in the communities as of 1970.

Zirosto had reached the size of the prevolcanic town. Comparative population figures are included in Table 10.1.

In a nation like Mexico, where migration of the young from rural areas to the cities is a major means of adaptation to changing conditions and rural population pressures, the viability of the rural community is, to some degree, indicated by the out-migrants' ability to achieve positions of economic and social reward in the larger society. The custom of keeping track of professionals, common in many small Mexican communities, provides an indicator of achievement along these lines. Examination of Figure 10.12 shows that Zacán and Caltzontzin were significantly more productive of offspring with careers in teaching, medicine, law, engineering, and other professions requiring educational certification than any of the other communities. For more than a generation, Caltzontzin young people had been located a short bus ride from Uruapan schools. In 1971, Zacán children still had to leave their home community for larger towns to continue their studies beyond the sixth grade, a fact that makes the Zacán achievement more remarkable than that of Caltzontzin.

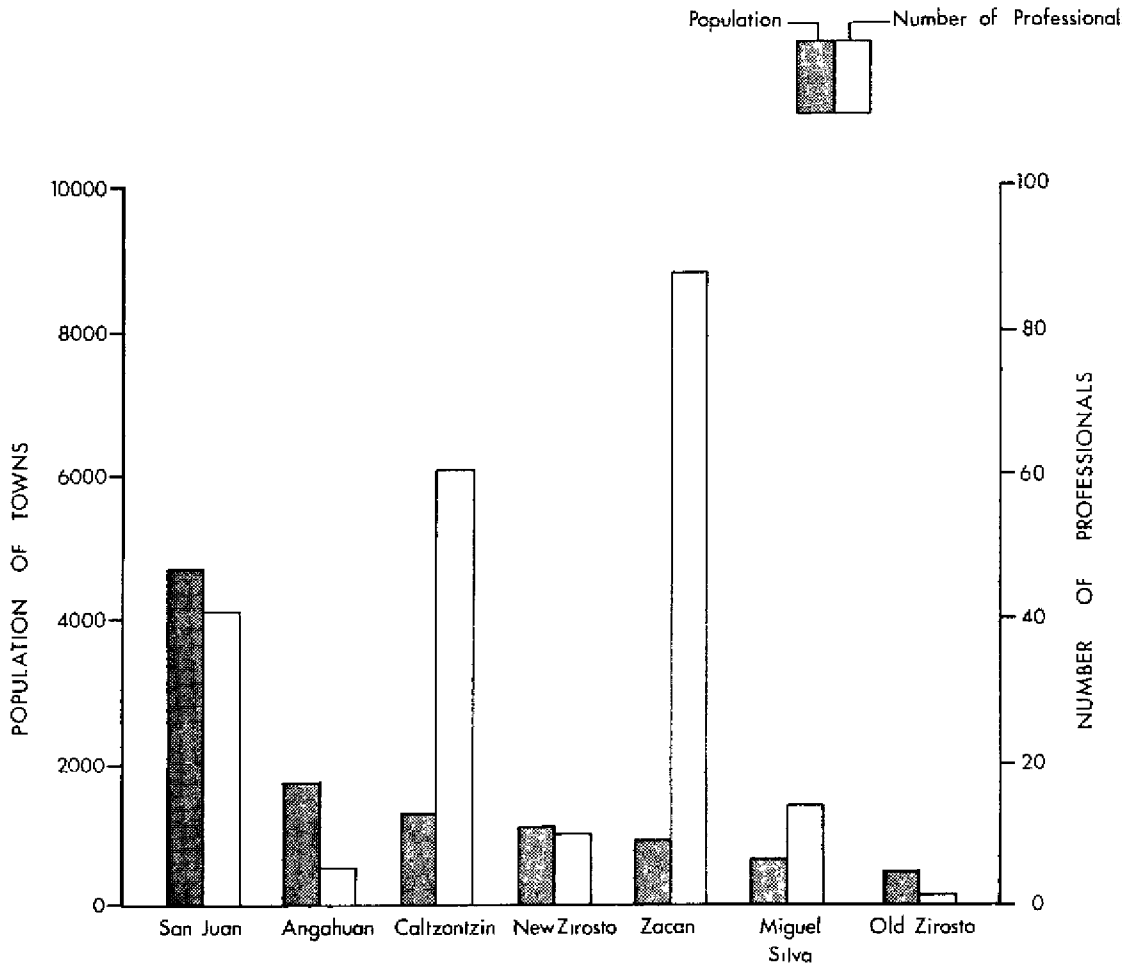

FIGURE 10.12. Number of offspring with professional positions, 1971. (Figures for Angahuan may be an underestimate.)

Educational levels of local residents also showed differences that may well influence continued viability of adjustments. Three-fourths of the adults in San Juan, Zacán, and Miguel Silva were literate, according to 1970 census figures, whereas fewer than half the adults in old Zirosto could read and write. The other communities were intermediate. Miguel Silva had the highest percentage of children aged 6–14 in elementary school, followed closely by Zacán. The lowest percentage was represented by Old Zirosto, which only had three grades of school available locally. Twenty-nine percent of the Zacán adults held degrees from primary school, whereas only 4% of the adults in the Zirostos had graduated from a 6-year educational course.

Objective attempts to measure change and current circumstances convey only part of the complex reality that geographers sometimes refer to as the "personality" of places. The uniqueness of each town was reflected in some degree by the way people spoke of their community when first questioned. Comments collected from a diverse, although not systematically sampled, variety of people carried much the same message within a town, but differed appreciably from community to community. The consistency of initial statements about past community experience and future possibilities showed no particular variation with the individual's socioeconomic status within the community, and was affected to only a slight degree by age and experience in the prevolcanic community.

In-depth interviews with selected people resulted in more complex interpretations of community but rarely were completely inconsistent with initial statements. Examination of first-reaction statements recorded in field notes suggested that there were certain things that people in each community more or less automatically expressed to outsiders on initial acquaintance. Although the extent to which these statements reflected internalized perceptions of the community, its history, and its prospects is unknown, their very consistency within a town was certain to affect the perceptions of outsiders, some of whom might make decisions that affected the community. Further research along these lines should be undertaken, because if the differences in local perception of community success in dealing with conditions created by the eruptions and present problems were as great as they seemed, the implications are important.

In general, people in San Juan and Miguel Silva expressed the most positive views of community. In both cases, these views related to a perception of past success in meeting the challenges of the eruption years. In Zacán there was a strong expression of community educational achievement, thought to have resulted from an opening of horizons during the volcanic years, but there was also concern about community future because few of the educated young could work in this small, still relatively remote community. The basic note was positive, perhaps best expressed in a local woman's statement that "we are giving our children to Mexico." In both Old and New Zirosto, emphasis was placed on the "death" of the old community, sometimes followed by a casting of blame on the other highland settlement. There was much ambivalence in Caltzontzin, but in spite of individual achievements and what seemed to be a

new sense of hope and community spirit, there was a downbeat cast to many comments. Half the people spoken with almost immediately volunteered information that the town was poor, and, in contrast to New San Juan and Miguel Silva, there was a tendency to state that the old town had been better than the new. The notion that "we had to come here" was often reflected, and the positive note, if there was one, might best be paraphrased as "we endured in spite of all the things that happened to us." In Angahuan, the constant refrain was, "We are indigenous. We are Tarascans." It prefaced and/or ended many other statements about community.

Comparisons

The two largest, richest, and most mestizo of the original communities were San Juan and Zirosto. In both cases, agricultural lands near the communities were destroyed, although the devastation of many San Juan fields by lava represents a more permanent loss of land. Both communities also had vast forest reserves, including stands of timber not badly damaged during the eruptions. The most significant difference in the experience of the two was that whereas San Juan had to be evacuated in the face of the lava flow, old Zirosto, though virtually buried in sand, was never threatened by lava; thus the choice of remaining in the home community stayed open. Accounts of growing social stress in San Juan prior to the evacuation indicate that the community may well have been saved by the lava that destroyed the town site (Gutiérrez 1972:45–46).

In any event, the San Juan community survived and eventually prospered while Zirosto fragmented into small social units None of these pieces of Zirosto had regained either the population or the importance of the prevolcanic community. Old and New Zirosto, which exist a few kilometers apart in the highlands, were not highly viable as communities, and there was bitterness between the two settlements. In contrast, those of Zirosto who endured the hardships of pioneering in Miguel Silva were proud of their new community. They had reinterpreted the old traditions and established new ones around their common frontier experience. They were also better educated and more open to new ideas than the people of either Old or New Zirosto. However, their town was small, their land base poor, and the opportunities for growth severely limited.

The building of New San Juan was an epic story. This community of nearly 5000 people was again the head town of *municipio*. The battle for lands in *ejido* was won in 1968, and the new lands connected the town site with community lands in the volcanic zone, thus creating a geographical unit. San Juan graduated its first class from secondary school in 1971. In 1973 the road to Uruapan was paved, reducing an hour's journey by bus or car to about 10 min. Possibly because the growing community offered local opportunity for ambitious young people, educational orientations stressed literacy but not advanced degrees. Perhaps most important symbolically, the people of San

Juan had built a great brick church for the Lord of the Miracles. The community was again a major shrine visited by more pilgrims than ever before and from greater distances. Many came as before to ask for health or pay respects to the Lord of the Miracles, but increasing numbers came to witness the "Miracle of San Juan," interpreted as a miracle of achievement through faith and hard work in the face of heavy odds.

The former difference between Indian and mestizo had greatly diminished, and San Juan's traditions, old and new, were thriving and profitable. In New San Juan it was said, "We are the same town and the same people. Only the place is different." The people were exceptionally proud, resourceful, and confident of their ability to cope with new changes.

New San Juan can also be compared with Parícutin–Caltzontzin, the other group to be resettled near Uruapan. The Caltzontzin refugee settlement seemed like a perfect opportunity to make Mexicans out of Indians overnight, and little effort was spared in furthering this dream of Lázaro Cárdenas and other change agents. The people received much more government assistance than those of San Juan, and the *ejido* grant was the most generous received by any refugee settlement in terms of good farmlands relative to population. The new location on the outskirts of Uruapan provided proximity to jobs and schools. New San Juan was several kilometers more distant from the city, and the road, which ran over mountainous terrain, was extremely bad until 1973; thus San Juan's access to urban opportunities was more limited than Caltzontzin's. Nevertheless, Caltzontzin was not an especially happy community in 1971, and its people often referred to local poverty. Because the majority of Caltzontzin's citizens seemed reasonably well off for Mexican villagers, poverty seems to have meant being poorer than their urban neighbors. According to a 17-year-old girl whose father owned two brickyards, a truck, and a brick house, people in Caltzontzin were so impoverished that they could not afford lavish fifteenth-birthday parties for their daughters.

However, the true poverty that existed in Caltzontzin was more obvious than in the other communities. The obviously poor were ragged in dress, ill-housed, generally illiterate, and often unemployed, and they were particularly notable because they composed a relatively small minority of the population. The mark of poverty had little to do with retention of certain aspects of Tarascan traditionalism. Although some of the poor were among the most conservative inhabitants of the town, others had lost all roots in the Indian heritage, including the language In contrast, some of the more prosperous families with the best-educated children spoke Tarascan at home and preferred houses modeled on the traditional style, although there was a widespread tendency to regard symbols of Tarascanness as obsolete.

Several lines of evidence suggested that this originally homogeneous community had developed a definite class structure within 28 years. It was marked by differences in dress, quality of housing, educational level, and patterns of mate selection. The symbols of class position were much like those evident in the nearby city. Uruapan people sometimes spoke of Caltzontzin as just

another *barrio*, or district, of the city. The edge of Uruapan was growing ever nearer to Caltzontzin, and eventually the larger community would absorb the smaller physically as well as in social patterns.

In spite of numerous somewhat fatalistic comments about past and future community destiny, there were some strong positive notes in 1971. A new generation that had never known life in Parícutin village identified with the new town, and the period of massive culture shock that followed relocation had largely ended. A young priest who arrived in 1967 had worked diligently toward the creation of community pride and solidarity. He reinstituted an annual fiesta for the patron saint sponsored by the community at large. The celebrations stressed sports events rather than traditional dances (Figure 10.13). He raised money for a new church, but the men of the town told him they would rather have an enclosed basketball court, and he agreed. As he explained this decision, it was what the people needed. The church could be built later Local men finished the basketball court in the summer of 1971 in time for the fiesta games. The name of the team, emblazoned on the shirts of the players, was "Parícutin."

As was the case in all the towns, Caltzontzin was plagued with too little land for its population and shortages of outside work. However, many families had encouraged their children to seek education. By 1971, 55 young people had taken advantage of scholarships and/or proximity to urban schools to win professional degrees. Most of these were schoolteachers, but among those still in school there was an increasing trend toward university educations in engineering and other practical fields. The proximity of Uruapan meant that young people with good educations did not necessarily have to leave the home region to find employment, although many were established in more distant towns and cities.

Angahuan and Zacán also offered an interesting comparison. Both were small, isolated villages before the volcano. Zacán's agricultural lands were not as badly damaged as those of Angahuan, but the latter town was richer in forest resources. In addition, Angahuan had income from tourism during the volcanic period and afterwards, whereas Zacán did not. Both communities remained in their original locations, and they looked much alike because of the traditional nature of the housing. Angahuan was an hour by road from Uruapan, whereas it took an additional 15–20 min by car to reach Zacán. Each highland community had six grades of school available locally, and in 1971 there were no secondary schools within commuting distance. Both Angahuan and Zacán had faced the same geophysical ordeal and had much the same options for response. Therefore, the differences are astonishing unless one considers the very different social orientations of these two villages in the early 1940s.

During the most difficult years of the eruptions, many Zacán families moved to nearby towns and cities, and some of the men worked as braceros Strong ties with the home community were, however, retained. The realization of a need to educate the children grew stronger. Within 20 years, this

FIGURE 10.13. Instead of having traditional dances, the people of Caltzontzin celebrate the annual patron saint's fiesta with footraces and crowning of a fiesta queen.

FIGURE 10.14. View of Zacán, with Parícutin in the background. Although the house types remain traditional, this community produced 88 offspring with professional degrees between the early 1940s and 1971.

small, economically devastated community with six grades of school available locally, boasted 88 children with professional degrees (Figure 10.14). Many other offspring held white-collar and technical positions in Mexican cities. An organization of the professionals of Zacán, based in Uruapan, raised scholarship money for local children, and the kinsmen and friends who had established themselves in urban areas provided additional aid. Because of lack of local opportunity, most of Zacán's educated children did not return home permanently. The approximate 25% of the population that did not send children to local elementary school was inheriting the village. For others, the decline of Zacán was considered a tragedy offset by the belief that their educated children could contribute to the larger society and find good lives in the process. Zacán in 1971 appeared traditional in terms of material culture because the parents and grandparents of the educated offspring were using available funds to educate more children, rather than build new homes. It seemed likely that any family who attempted to display prosperity but refused to provide educational opportunities for offspring would meet the kinds of local sanctions that in the past induced the more affluent to sponsor fiestas.

Angahuan was considered different, closed and apart in 1943, and it retained this reputation in 1971 (Figure 10.15). The Tarascans of Angahuan met the volcanic crisis with a staunch refusal to move, a decision made possible because the town was not reached by the lava field. Very few of its men accepted the opportunity to work as braceros and almost none of its people took up temporary residence elsewhere in Mexico. When competition was eliminated by the evacuation of San Juan, Angahuan found economic salvation through catering to tourists.

An institution of tourist guiding had emerged by 1971. The guides were considered marginal by several local elders because their work did not involve traditions of obtaining sustenance from field and forest. Their primary function seemed to be a combination of allowing a flow of income into the community and ensuring the least possible contact between locals and outsiders. Tourist income primarily benefited hotelkeepers and restaurateurs in Uruapan because Angahuan had no such facilities. Even the direct sale of craft items was limited. It was mediated by the tourist guides, who carefully screened prospective buyers before taking them into homes where wares were displayed. Because crafts were not displayed on the streets, considerable revenue was probably lost to the community. Many tourists who passed through to see the volcano did not know that crafts were available locally. In 1971 one shop, owned by a local power figure, displayed the local goods, but it was tucked away on a corner off the main square Craft entrepreneurs who sold to shop owners in Uruapan and other cities did not advertise the goods available within their house lots or display such goods in the little shops that some of them owned along the main tourist access into town. It seemed likely that powerful social sanctions were operating against an economic activity that would lead toward obvious differences in wealth, although it seemed equally likely that subjugation of craft sales to maintenance of "an image of limited good [Foster 1967:

FIGURE 10.15. School boys en route to the lava field walk through the streets of conservative Angahuan.

123–125]" would not last much longer. Mechanized carpentry had already become important and was resulting in economic differentiation, although both the activity and the differences in prosperity deriving from it could be hidden behind the high walls of the house lots.

Perhaps most critical for the future of Angahuan was the increasing commercialization of visible aspects of the Indian heritage. The town's importance as a tourist attraction near Uruapan was based on its proximity to the scene of volcanic devastation and its importance as a staging point for guides and horses. However, by the late 1960s it was being viewed by urban entrepreneurs as a quaint Tarascan village and thus a tourist attraction in its own right. The national thrust to make Mexicans out of Indians, which had contributed to social–psychological traumas in Caltzontzin, was waning. A new theme emphasized respect for indigenous traditions. Undoubtedly good as a basic idea, this emphasis was potentially damaging for the community which found its new place in the larger society as an enclave of "professional Indians" needed to meet tourist expectations. There was reason to believe that Angahuan was in danger of falling into this category.

In spite of its outward appearance of traditionalism, Angahuan had changed drastically. As Celedonio Gutiérrez of New San Juan stated it, "They have changed far more than we have." The community was linked economically to the larger society to a far greater extent than before the volcano. The underlying roots of traditional life were greatly diminished, although the exterior manifestations of house type, dress, and fiesta dances remained. The

population had grown substantially and was placing a strain on the resource base. Some community lands had been sold to outsiders, who had begun capital-intensive development of these lands with the aid of employees from the village. Such people were viewed by many as patrons in the traditional sense. Thus, the first line of the "corporate community's" defense against the world beyond had been broken (Wolf 1955).

Although literacy rates and percentages of young children in schools were about average for the communities affected by the volcano, there seemed to exist relatively little insight into the value of education except as a defense mechanism against the encroaching Spanish-speaking society. As one elderly local leader put it, there was no point in much education because schools did not teach the young how to work on the land. Yet, in another conversation, the same man said there was a need in Mexico for more engineers and agricultural technicians. In contrast to those in Zacán, few parents in Angahuan seem to have grasped the idea that their children could be the engineers, teachers, and agricultural technicians of the future given a certain native ability, hard work, parental sacrifice, and good luck (Figure 10.16).

THE PARÍCUTIN ERUPTION AS A HAZARD EVENT

Most geographical literature on human response to environmental hazards focuses on specific hazard conditions. Works such as that by Hewitt and Burton (1971) that deal with all the hazards faced by a particular people in a given place are rare. Yet people in hazard zones do not respond exclusively to events labeled "floods," "earthquakes," or "volcanic eruptions," but to the perceived totality of their constantly changing life situations. Even during the impact period of a particular hazard event, the environment may be charged with other hazardous conditions, including social hazards. Convergence of hazard events is often a factor in major disasters, and volcanic eruptions are particularly complex because they generate a complex set of environmental problems.

As is the case during any volcanic eruption, the people affected by Parícutin dealt with a large variety of hazards during the eruption years. These included hazards such as tornadolike storms, which ordinarily affect the region; hazards such as lightning and earthquakes, which were intensified during the eruption period; and hazards associated uniquely with volcanic activity, such as pyroclastic fall and lava flows. Decisions to remain in the volcanic zone or relocate were made in the context of real and perceived social and biotic hazards outside the zone, not just in response to volcanic conditions. For some people, particularly those of Angahuan, the world beyond the familiar region was seen as more threatening than the volcano, and this perception affected human action (Nolan 1972:33). The hazards of relocation in Miguel Silva were greater than those in the volcanic zone. Only three people, all struck by lightning thought to be associated with volcanic activity, were killed as a direct

FIGURE 10.16. Angahuan children.

FIGURE 10.17. An Angahuan youth herds cattle in the volcanic zone. The rocks in the foreground are volcanic bombs. In the middle ground are cornstalks—an area that is in agricultural production. Parícutin can be seen in the distance, and beyond lies the Cerro de Tancitaro.

TABLE 10.3
Hazards Faced by the Affected People during the Eruption Period

I Volcanic eruption

II. Hazards directly or indirectly connected with the eruptions or the products of the eruptions plus other variables
1. *Earthquakes* in addition to those to which the region is ordinarily subject
2. *Air pollution* from pyroclastic fall
3. *Shifting sands*, after pyroclastic fall
4. *Sandstorms*, especially in windy spring months
5. *Mineral deficiencies and excesses* in the pyroclastic materials covering formerly fertile fields
6. *Landslides* and mudslides relating to the shifting of pyroclastics
7. *Lightning* associated with the eruption column, in addition to that associated with thunderstorms in the region
8. *Floods* due to topographic changes resulting from the eruptions
9. *Drought*, including failure of the regular water supply because of covering of springs with pyroclastics and changes in groundwater levels and extremely droughty soils resulting from high concentrations of volcanic sands
10. *Agricultural frost*, always a hazard at high elevations, but greatly intensified during the eruption period by more extensive plantings in high, relatively ash-free lands

III. Other physical environmental hazards common to the region but not associated with the eruptions
1. *Tornadolike storms*, strong enough to fell trees and deroof homes
2. *Hail*
3. *Fog*, which may have been more intense during the eruptions, but which did not constitute a major hazard

IV. Biological hazards recorded in the region
1. *Insect plague*, including locust plague, which damaged crops before the eruptions and was described as the "first punishment" for the sins that produced the volcano (Gutiérrez 1972:13)
2. *Epidemic disease*, apparently not too serious since the major cholera years of the nineteenth century
3. *Death of game and livestock* from ingestion of vegetation covered with pyroclastics directly related to the eruptions

V. Biological hazards in Miguel Silva
1. *Polluted water*
2. *Malaria*
3. *Nonviability* of highland seed corn and other plants

VI. Sociocultural hazards related to the eruptions and relocations
1. *Culture shock* and/or serious psychological breakdown including loss of will to live, especially among the elderly (Nolan 1972:179)
2. *Perception of the world* beyond the region as alien, perhaps hostile
3. *Low economic viability* outside the region due in some cases to lack of literacy often combined with little or no knowledge of Spanish, and lack of training in skills other than those of subsistence agriculture
4. *Hostility* of local rancheros at Miguel Silva, leading to at least two murders
5. *Land wars* in the volcanic zone during and after the eruptions, resulting in loss of life and property

consequence of the eruptions (Nolan 1973:29). In contrast, the colonization of Miguel Silva took an estimated 100 lives (Rees 1970:15) from a combination of malarial conditions, polluted water supplies, loss of will to live—especially among the elderly sick—and the actions of hostile natives. The multihazard nature of the eruption period is summarized in Table 10.3, which is based on hazard lists presented by UNESCO (1970:6–7), Burton and Kates (1964:415) and Burton *et al.* (1978:21).

Early work in environmental hazard research that focused on the United States and other urban–industrial countries suggested that people in a hazard zone seldom recognize the full range of theoretically possible adjustments (Burton *et al.* 1968:11). However, the people affected by Parícutin responded with an exceptionally wide range of adjustments. Results of a major collaborative research program focused on human response to a variety of hazards in many countries (White 1974) have since indicated that peasant agriculturalists tend to show more adaptive ingenuity than the urbanites of more advanced societies (Figure 10.17). Burton *et al.* (1978) have concluded that "the pattern of folk response is a large number of adjustments and a high rate of adoptions among individuals and communities" as compared with the "favored adjustments" of modern industrial society, which tend to be "uniform in application, inflexible, and difficult to change [p. 216]." Thus, results of research in the Parícutin area that ran counter to accepted theoretical trends in the early 1970s (Nolan 1973) now fall into the category of what should be expected.

The difference in response between ethnically and economically similar communities affected by Parícutin has its parallel in a study of five Eskimo villages affected by the Alaska earthquake (Davis 1970). This study also supports the finding that an essentially religious response to catastrophe, combined with other actions, can be highly adaptive, especially during the recovery period. Old notions of peasant fatalism in the face of hazard and disaster such as those presented by Kendrick (1957:113), Kingdon-Ward (1951:130–131), and Sjoberg (1962:363) probably need revision. One must always be careful, however, to avoid confusion of past and present. Evidence that modern peasants generally are not highly fatalistic does not prove that this orientation was not widespread in the past. It is only suggestive.

There may have been prehistoric episodes of volcanic activity that pitted man against nature in situations little influenced by outside social conditions, but this was obviously not the case during the Parícutin eruptions. The convergence of social pressures for change with a physically destructive environmental event make it impossible meaningfully to distinguish sociocultural changes induced by the eruptions from changes resulting from response to the modernizing larger society. As has been found in other studies of disaster-impacted communities, the rate of change was accelerated, but the essential direction of change showed little variance from expected patterns (Kates 1977:263).

For most of the affected communities, the changes were in the direction of greater integration with the modern Mexican socioeconomic system and

many would have occurred even had there been no volcano. New roads, the building of dams, penetration of a region by change agents such as schoolteachers, discovery of a place by promoters of tourism, or decisions concerning location of industrial plants can also be catalysts for social change in traditional communities. There was nothing unique about Parícutin as a volcano in its impact on the eruption-zone communities except for the fact that it abruptly destroyed their traditional means of livelihood at a time when the larger society could encourage both relocation and alternative ways to make a living.

It should be emphasized that not all change was in the direction of general societal trends. The remnant population of Old Zirosto was probably more isolated from Mexican life in 1971 than was the town's population in 1943, and neither New Zirosto nor Miguel Silva had regained the mother town's prevolcanic position in terms of local facilities and services. This is not so unusual, however. Recent North American history is full of examples of communities that declined even as others progressed. Near ghost towns now stand where once-prosperous communities were bypassed by railroads and later highways. The abandoned buildings of crossroads farm-market towns attest to loss of function after the spread of the automobile carried the rural population to larger trade centers. Zirosto, with its prosperity tied to mule driving, was in a state of economic decline before the eruptions (Nolan 1972:100–104). Had there been no volcano, the community would not have fragmented, and the decline might have been reversed. But there is no way to know exactly what would have happened in any of these communities if Parícutin had not appeared when and where it did.

In examining change that coincides with a catastrophic event, a distinction should be made between the concepts of eventual result and direct cause. Many things happened as a result of the volcano, yet hardly anything other than the destruction of farmlands and two town sites was actually *caused* by the eruptions—that is, was an inevitable consequence. The distinction between result and causation can be illustrated with the story of Manuel, the Zirosto-born principal of a school in a medium-sized Michoacán town. According to Manuel, he would not be a schoolteacher today if Parícutin had not erupted. His family was poor and lived some distance from the center of Zirosto. He had no schooling until his family moved to Miguel Silva when he was 11 years old. There he began elementary school and because of societal attention focused on the children of refugees, he received scholarships that allowed him to complete normal school. This man and many others who were children in the volcanic zone during the eruption years believe with good reason that they are schoolteachers because of the volcano.

Thus, the volcano is an important part of the explanation for the course of individual lives, just as it is a critical episode in the history of seven Mexican communities. Many lives would have been different had there been no volcano, and the affected communities would have had a different history. Yet, as a man of New San Juan pointed out after listing the advantages of the new town site, "We would have had all those things anyway by now, in the old town. It really didn't make any difference."

DISCUSSION AND CONCLUSIONS

Adaptation in the Communities

The Parícutin eruptions severely damaged the traditional resource base of five farm communities. The changed physical environment forced new adaptations, which included migration and the acceptance of new ways of making a living in the volcanic zone and elsewhere. Those who continued as volcanic-zone agriculturalists developed strategies for dealing with ash-covered lands, and farmers in the refugee settlements of Caltzontzin—and particularly Miguel Silva—were forced to adapt their traditional agricultural technology to lands of lower elevation. In two communities, one in the volcanic zone and the other in a relocation site near a city, advanced education for the younger generation was an important means of dealing with new conditions. However, even in these towns only a minority of the young achieved advanced degrees, and most of the highly educated left the community.

The fact that individuals and communities responded differently to similar physical and social forces for change suggests that neither the volcano nor the larger society determined the exact nature of the new adaptations. Change occurred because people adapted to a changed environment, but the variety of adaptation was too great to be discussed in terms of simple cause-and-effect relationships. However, the idea of preadaptation is useful. Some individuals and populations are better suited to certain kinds of environmental change than are others. When change occurs, they may prosper even as those best adapted to the former environmental conditions flounder in search of appropriate new responses. Within the framework of this case study, some communities were more receptive to the new opportunities offered by a modernizing Mexico than were others (Nolan 1974:47–49)

Perhaps more important for the future is the community tradition of success or failure in controlling destiny. In this situation of forced response, some individuals and community units made deliberate choices. Others simply reacted, thus becoming pawns in the hands of nature and the larger society. At the individual level, choice reflected personality and family influence as well as the kaleidoscope of physical and social factors (Nolan 1975). Communities chose or failed to choose in accordance with their traditions, the quality of local leadership, and agreed-upon perceptions of the total situation.

The people of communities with a tradition of choice and a shared belief in the desirability of the outcome seemed to display a greater sense of potential control over future events than those of communities that had a tradition of simply coping with outside events perceived as uncontrollable.

San Juan and Caltzontzin exemplified the difference between choice and making the decision work, and lack of choice combined with continual coping. Although community differences in perception of control over destiny probably go back much earlier, the early eruption period proved a crucial testing point of local will. The lava flows represented a natural event that could not be controlled and that permitted no adaptation in place. Yet, although the flows

covered the sites of two settlements, only the people of San Juan were truly forced to evacuate because of the lava. Some people of that community watched as the lava covered their house lots, then turned away to join their fellow citizens in a refugee settlement that they had insisted on choosing. When slow-moving lava eventually covered the site of Parícutin village more than a year after its evacuation, only a few scientists were present to record the event. The people of Parícutin had long before obeyed government orders to move to a strange place with an alien name, which they had not chosen. As a reward for their cooperativeness, the people of Parícutin–Caltzontzin received lands in *ejido* and much special attention As a result of their stubbornness, the people of San Juan were initially given no *ejido* lands and much less special governmental attention.

Nearly 28 years later, people in Caltzontzin were explaining that they had to come to the new place, and some were complaining about past governmental unfairness and insufficiency of current aid. Even educating children was occasionally described as something that had to be done because the community had few resources. The ideal of educating offspring for a better way of life and as a contribution to the nation, frequently expressed in Zacán, was not very evident in Caltzontzin. As recognized by the priest and some local secular leaders, the community needed to build a more positive self-image.

In contrast, people in San Juan pointed out the good features of the new place and often emphasized their communal wisdom in choosing it. Rather than complaining about lack of government assistance, they boasted about their achievement in building the new town by themselves, although they were quick to explain how they had won concessions from larger, more powerful political entities.

It seemed that there was an important difference between the people of communities which had a tradition of control over destiny and those which had a tradition of coping, or, as in the case of the Zirostos, a history of failure to meet the challenge of the past. The greatest consideration of future community choices in the face of new problems was found in San Juan, Zacán, and Miguel Silva, the communities with the greatest apparent sense of control over past events. The significance of these microcultural differences is supported by recent experimental studies with human subjects and animals that indicate that even the illusion of control improves performance in several kinds of situations (Perlmuter and Monty 1977:759).

Archaeological Implications

The archaeologist must often deal with only remnants of material culture and evidence of past physical environmental conditions. Unless historical records are also available, extrapolations must be made from that base. Assuming that no historical documentation existed, future archaeological explorations in the Parícutin volcanic zone would show that two settlements had been overwhelmed by lava. With adequate funding for surveys, archaeologists

could probably establish much the same zone of devastation defined by geologists in the 1940s. Because no human remains would be found in the volcanic layer, it could be assumed that people from the lava-covered settlements had relocated. Perhaps the sparsity of material remains around the stone churches, house foundations, and walls of those former settlements would suggest that the migrants took most of their possessions with them, which was the case.

Presumably, however, the few things left behind would indicate the general level of technology at the time of the eruptions. New settlements on layers of heavy ash, such as the ranchos established by people originally from the region as the lands became more productive, would show in their remains an increased level of technological sophistication. An observer viewing the remains of a rancho burned during the 1960s land wars commented on sadness over the loss of "hand-operated tortilla presses, transistor radios, sewing machines . . . national flags and sports equipment [Departamento de Asuntos Agarios y Colonización No. 1973]." It would be evident that major changes in material culture had occurred between the onset of the eruptions and the period of recolonization; however, more extensive investigations would show the same radios, sewing machines, and sports equipment appearing at about the same time in other sierra communities far beyond the eruption zone. Examination of only the volcanic zone could lead to speculations about migrations of new peoples, but a broader survey would suggest that the eruptions occurred during a period of rapid and extensive culture change.

This case study, based on written and oral accounts collected largely from individuals who witnessed the eruptions of Parícutin, may provide insights that can help in the interpretation of material cultural evidence. As a general rule, the Parícutin case suggests that volcanic eruptions do cause change in patterns of human life and habitation, but that the eruption events do not determine what the changes will be It may also be taken as a generalization that similar groups of people affected by the same physical event may adjust to changed conditions in quite different ways and that the perceived success or failure of choices made during times of crisis will affect future decisions and the ongoing course of community history.

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