Chapter

From a Bulldozer Cut to a World Heritage Site

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Abstract

A Salvadoran bulldozer encountered some architecture and artifacts so well preserved that it was assumed to be recent. I examined the site in 1978 and dated the thatch roofing to 1400 BP. With collaborations of volcanologists, I have investigated the Maya village for 42 years. The eruption of Loma Caldera volcano preserved the village and its landscape extraordinarily. Food is still intact in ceramic vessels, earthen buildings are preserved, and plants are intact in gardens and fields, in spite of being in a tropical wet environment. I nominated the Cerén site to the UNESCO World Heritage list, and it was accepted, as it is the best preserved ancient village in the Americas. Every season we publish our results in English and in Spanish and make them widely available. Local high school students in the past two decades are giving reenactment public performances that are highly accurate about the precursors of phreatomagmatic eruptions, the eruptions themselves, and proper emergency behavior. The result is a widespread awareness and preparedness that is greater than I could achieve with a plethora of scientific publications. I suggest that volcanologists and archaeologists consider supporting similar performances in hazardous areas, to improve risk perception and salutary emergency behavior.

Keywords: phreatomagmatic eruptions, ancient Maya, multidisciplinary research, Cerén site, UNESCO world heritage, high school reenactments

1. Introduction

El Salvador experiences considerable volcanic activity. The catastrophic Ilopango eruption in the mid-sixth century depopulated what is now that country, and ecological recovery may have necessitated about a century [1]. A small group of Maya migrated into the area, and established a hamlet on the left bank of a major river, now called the Rio Sucio. Although they lived there only for a few generations, they had time to establish a thriving community. Their agriculture was based on many different species, with each household largely self-sufficient. Each household built their homes with wattle-and-daub walls and thatch roofs, a seismically resilient form of architecture. In addition to their household buildings, families built and maintained special-purpose religious and civic structures. Each household had a different part-time occupational specialization; thus, the system of economic exchanges built a social network integrating the community. Surplus agricultural and craft production was taken to markets in the large towns, to obtain long-distance traded commodities. Had the ancient community, which I

named Joya de Cerén, been abandoned in the usual fashion, we would never have been able to learn such details about the high quality of lives lived there. The usual abandonment of wattle-and-daub structures has people taking their most valued artifacts to their new location. Other people remaining in the area take items that are useful to them. And, when the thatch roof fails, the rains, sun, and wind reduce the buildings to low mounds. The greatly impoverished record available to archeologists limits the knowledge that can be gained from excavation and analysis.

An overview of volcanism in central El Salvador was provided by Lexa et al. [2]. What makes Joya de Cerén unique is the nature of the Loma Caldera eruption that buried it in the mid-seventh century [1]. That volcanic vent opened up less than a kilometer away, and buried the village under some 5 m of tephra [1]. An earthquake preceded the tephra emplacement, and presumably the loud noise of the eruption beginning, gave warning to the residents. They literally "headed south" as evidenced by human footprints. The alterations of phreatomagmatic and magmatic phases of the eruption preserved the buildings, foods stored, crops in gardens and fields, and the landscape to an extraordinary degree. The site provides the first clear window into the vitality of Maya commoner life.

Our publications in Spanish (e.g. [3]) were accessed by high school students and their teachers in the area, and they regularly make public presentations depicting village life before the eruption, recognizing the danger signals, and fleeing the village. These performances provide effective training to families living along this active fault, as the next eruption is coming at an unknown time.

2. From the bulldozer cut to UNESCO world heritage

As a beginning graduate student in archeology in 1969, I was intrigued by finding a white volcanic ash layer between pyramid construction phases at Chalchuapa, El Salvador [1]. After almost a decade of archeological and volcanological research it became clear that tephra was from a colossal eruption, the source was Ilopango volcano, and we named it the "Tierra Blanca Joven" tephra, meaning the young white earth [1]. During archeological survey in central and western El Salvador, I found that same tephra layer underlying and overlying cultural features, including agricultural fields, artifact-bearing soils, and various ancient constructions [1]. Project members appreciated the graciousness and generosity of Salvadorans, particularly the rural poor, and we vowed to search for something special to give back to them, and to Salvadorans in general. Surveying near the town of Joya de Cerén, in 1978, in a bulldozer cut I discovered that same Ilopango tephra underlying the floor of a house, with some five meters of tephra burying the house [1]. Radiocarbon dating the thatch proved the house was about 1400 years old [2], and finding ceramic vessels full of beans in perfect preservation in spite of the hot moist tropical environment made me think I may be seeing the rest of my professional life at the site. That is precisely what happened in the decades since that discovery. The extraordinary preservation of the village and the landscape by the Loma Caldera tephra in the mid-seventh century provides the first clear window into ancient Maya village life of commoners. The exceptional preservation even included plants, allowing the reconstruction of "plantscapes" within the community [4]. Although commoners constituted more than 90% of ancient Maya populations, not much has been known about them, when compared to Maya elites. The notable accomplishments of Maya elites has been the focus of research for the past two centuries, emphasizing their

architecture, writing, astronomy, art style, dynastic succession, history, and other domains of impressive accomplishment. Based upon our research discoveries during the 1980s and early 1990s, I nominated it for inclusion in UNESCO's World Heritage list, and it was accepted in 1993. Salvadorans are justifiably proud to have it, and many claim it is the most important cultural feature in the country.

I named the site Cerén, or Joya de Cerén, after the nearby present-day village. The villagers are justifiably proud of the association, and many are employed as guides in the park, architectural conservators, maintenance workers, and as excavators when I am conducting research at the site (**Figure 1**).

2.1 Results of integrated volcanological-archeological research

Almost all seasons of fieldwork, for surveys and excavations, have included volcanologists with archeologists and other specialists, supported by grants from the US National Science Foundation. Integrating the specialists from different disciplines within the fieldwork has resulted in much better understanding of what happened 1400 years ago, than archeologists consulting with specialists after they got home from their fieldwork.

The white tephra underlying the Cerén site is from the cataclysmic eruption of Ilopango volcano, probably in AD 539 [5], which depopulated most of El Salvador, and contributed to the mid-sixth century worldwide climatic crisis [5]. After a few decades of weathering, and floral and faunal recovery, a few Maya families immigrated and founded the village of Cerén on the left bank of the Rio Sucio. Although the village was occupied for only about three generations before the Loma Caldera eruption, they adapted to the environment with sophisticated agriculture, built earthquake-resistant household structures and intriguing special buildings, and maintained lifestyles largely separate from elite influence. A few decades after the Ilopango eruption, the village was deeply buried by tephra from nearby Loma Caldera volcano, the focus of the following section.

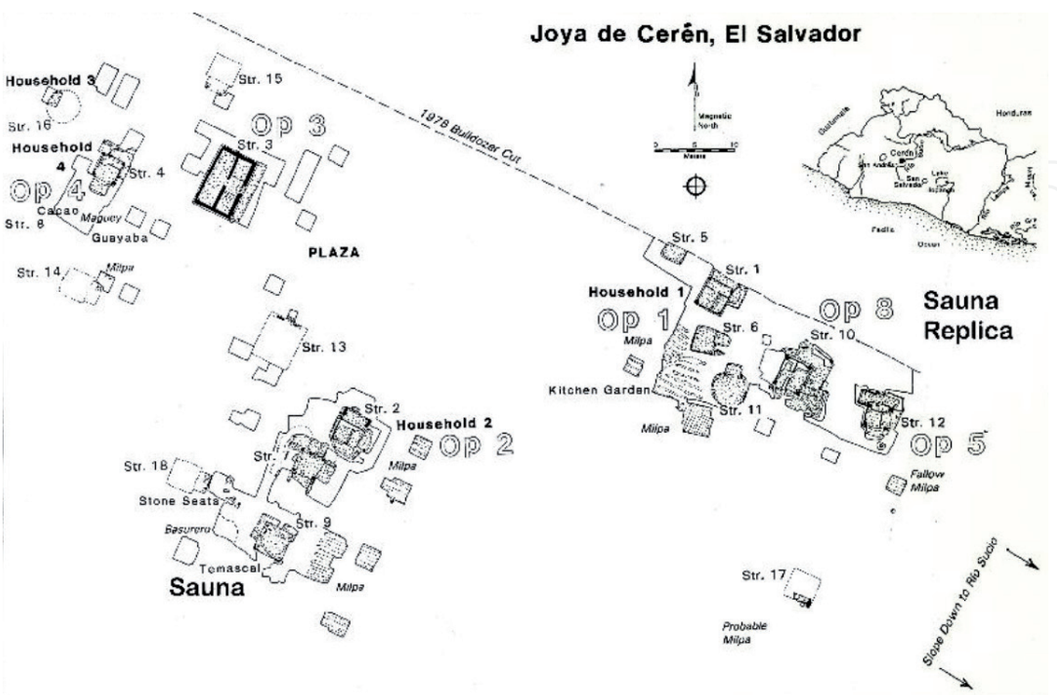

Figure 1.
Map of the ancient Maya village.

2.1.1 The Loma caldera eruption, and the burial of the Cerén village

The Loma Caldera vent is only 600 m north of the village, along the many-kilometers-long fissure that runs from north of it all the way southeast to San Salvador volcano [6]. Many hydromagmatic and explosive eruptions occurred along the fissure in centuries before Loma Caldera, and two occurred after Loma Caldera, less than 2 km distant, and one other (El Playon) in 1658, 4 km away. The social implications of these frequent eruptions are considered in a later section, below.

The eruption was preceded by seismic activity [6], including an earthquake of about 4 on the Richter scale, as we judge from a round-bottomed pot not falling off a broad flat walltop of Structure 3, and tiny fissures and subsidence in the immediate pre-eruption ground surface. The eruption began with a pyroclastic surge generated by an energetic explosive hydromagmatic eruption, followed by a drier phase of hot blocks (lava bombs) and lapilli falling. That alternation occurred at least 14 more times, taking hours, deeply burying the village of a few hundred residents. The tephra thins rapidly with distance from the source, with only about 4 square km buried deeper than a meter. Inhabited areas farther away would have received only a dusting. Because no human remains have been found to date in the village, the precursors, including the deafening sound from the north, may have been sufficient for people to evacuate (**Figure 2**).

The first tephra to arrive in the village, Unit 1 [6], was a fine-grained and moist pyroclastic surge that traveled at 100 km/hour, or faster [6]. It plastered around buildings and their roofs, and the mature corn plants and other cultigens in gardens and fields. The tephra temperature was approximately 100°C from magma in contact with water from the Rio Sucio. Unit 2 was from a dry phase, composed of blocks and lapilli fall. The larger juvenile clasts followed ballistic trajectories, landing with temperatures above 575°C. They penetrated the thatch roofs of all structures, and caught the thatch on fire on the underside, and the wooden roof-support framework. The top of the roofs did not burn because Unit 1 coated them. Because only the bottommost zone of the thatch burned, very little time elapsed between the fires starting, and Unit 3's arrival. Unit 3 is a much thicker deposit of largely pyroclastic surges, with abundant accretionary lapilli, and occasional ballistic blocks. Because it was often some 75 cm thick, its weight collapsed most roofs and snuffed the fires.

From the volcanological point of view, Units 1–3 were highly destructive to the village by collapsing all roofs, collapsing many walls, and of course creating an emergency and a natural disaster for inhabitants. Dan Miller's chapter [6] is representative of various volcanologists' considerations of the eruption's deleterious effects on the village, emphasizing the destructiveness on buildings. The emphasis is the natural disaster. The subsequent Units alternated with pyroclastic surges and dry lapilli falls until some 5 m buried the village. The archeological perspective was totally different from the volcanological, because the tephra nature and sequence were spectacularly successful in preserving the village in its cultural and natural landscape. All elements of the structures were preserved and were fully reconstructable to their condition and use right before the eruption. Units 1 and 3 preserved plants in the kitchen garden of Household 1, and the maize plants in fields. Ceramic vessels in households contained a wide variety of foods, preserved in original conditions, in spite of being in a tropical wet environment for 1400 years. A following section details what we learned about life in an ancient Maya village of commoners, that could not have been learned if the eruption did not occur and bury the site, after we consider the usual preservation of ancient households and their villages.

Figure 2.
Structure 4, the storehouse for household 4, buried under 5 m of volcanic ash from Loma caldera volcanic vent, looking north. All walls withstood the forces of the eruption, except the southern wall, that fell to the south.

2.1.2 Maya households and villages in the archeological record

In almost all cases, when people abandon their households, they take with them the most valuable and transportable artifacts. Then people still in the area scour the structures for still useful artifacts, and take structural elements away for their own purposes. When the thatch roofs disintegrate, the rains, sun, and wind reduce the wattle-and-daub walls to a small mound of dirt with some mixed broken artifacts. The cultural and natural factors immensely degrade the condition of the site, thus limiting the understanding that can be gleaned from excavations and analyses. The remains can be dated, approximately, by comparing artifacts such as ceramic sherds with other dated remains from other sites. Occasionally radiocarbon, obsidian hydration, or other quantitative dating can be done, but are done only rarely on

housemound remains of commoner villages. Most of Maya archeology focuses on the architecture, sculpture, art, writing and other accomplishments of the elites, especially of the royals. Thus, commoners have been largely ignored, and assumed to be the "blue collar" workers that supply elites with food and labor. Because of the nature of the eruption, the Cerén site provides the first clear window on ancient Maya commoner architecture, agriculture, life style, in their landscape.

2.1.3 Volcanic-structural impacts, and archeological discoveries

All thatch roofs caught fire on their undersides from the hot ballistic lava bombs during the emplacement of Unit 2, and most of them collapsed during the tephra loading of Unit 3 [6, 7], extinguishing the burning. The turbulent velocity of Unit 1 blew off some of the thatch of many buildings, before they collapsed. Because thatch roofs must be replaced every two to three decades, radiocarbon dating of them avoids the old wood problem, thus giving dates closer to the eruption.

Structure 3 is one of only two buildings excavated to date that had no wall damage from the eruption, because its thick walls were constructed of *terre pise*, i.e. rammed earth [7]. The downwind drifts of the Units 1 and 3 pyroclastic surges provided Dan Miller with data to estimate their velocities [6].

Structure 11, the kitchen for Household 1, anchors the other end of the spectrum of structural solidity [1, 7]. (Ref. [7] is the source of the remainder of this chapter, unless otherwise noted. The details were obtained from the unique preservation, which could not have been achieved without the volcanic burial.) The hearth, with three stones to support round-bottomed cooking vessels, could ignite flammable materials of a building, and burn it down. Therefore, it was separated from other buildings by a few meters, and it had a thinner-than-usual thatch roof, and thatch walls. Thus, it was more easily replaceable than other structures, and even had a replaceable floor in the form of the TBJ tephra. The first stage of construction of all other structures was to make a rounded low mound at or beyond the anticipated edge of the thatch roof. We even found the drip lines from the edges of the thatch roofs. Then a substantial rectangular platform was built and covered with a smooth surface of clay, dried, and then fired to make a hard floor. Holes were drilled about 10–15 cm apart and vertical poles inserted to support the roofing framework. Horizontal reinforcements of poles connected the verticals, and then were mudded on both sides up to about 1.75 m above the floor. That left a significant gap between the mudded wall and the roof, for light and air to enter. The finished walls were stabilized from below, above, and internally, so were seismically resistant. But in a big earthquake, the largest fragment to strike someone was about the size of a grapefruit, and would do little harm. Grass was used for thatching. The thatch roofs of household domiciles and storehouses extended for about 1.5 m beyond the walls, providing ample multipurpose space under the eaves that was shaded, and dry during the rainy season. The result is that the roofed area outside the walls was about double that inside the walls.

The most unusual building in the village is Structure 9, a steambath/sauna with ample seating for a dozen people. The Household 2 members looked after the functioning of it by providing firewood and water for steam and probably for rinsing off after exiting. This is the other building whose walls did not suffer from the eruption. However, it had two roofs, and both were affected by the eruption. The top roof was thatch, to shed rain, and it was coated by Unit 1, and then set afire during Unit 2. The lower roof was a marvelous dome, of wattle and daub, and is the only domed structure ever found in the ancient Maya area. It was penetrated and largely destroyed by two lava bombs. The holes in the dome were sufficiently large

and fortuitously located to allow tephra from Unit 3 and later to enter and shore up the portions of the dome that remained in-situ. Had the lava bombs not penetrated, the overburden of Units 3 and above would have completely collapsed the dome, and we would never know its original shape. This building has attracted the greatest attention from visitors and scholars, and after years of my suggesting, a 1:1 scale precise replica was constructed in the public access area of the archeological park.

Every time I entered the sauna replica, I noticed it fundamentally changed my voice. To explore this phenomenon, I made a stereo recording of my speaking voice outside, then inside, and then again outside the sauna, and took it to the Physics Department at the University of Colorado, Boulder. There, physicist Michael Thomsen analyzed the recording, and discovered that the primary resonance was at the very low tone of 64 Hertz [8]. The other frequencies decayed rapidly, while the predominant resonance continued for a long time. Mature male speaking voices, or singing, or chanting, experience this effect. However, mature female voices, or those of children, would not have this effect. It is likely this was a deliberate acoustic effect for male uses, but does not obviate female uses. Such apparent acoustic sophistication had never been imagined for the ancient Maya, especially among commoners (**Figures 3** and **4**).

Figure 3.
Structure 9, the sauna, with two holes in the domed roof created by lava bombs. The stubby columns in the corners supported beams and a thatch roof that protected the earthen architecture from the elements.

Figure 4.
The replica of the sauna, in the public access part of the archeological park. The architectural firm accurately reconstructed the original ancient building, so visitors can enter it and experience the acoustic phenomena.

2.1.4 Life in the Cerén Village, before the eruption

Prior to the discovery of the Cerén site, there was little data upon which to examine the quality of life of ancient Maya villagers. Thus, the assumption grew that the households must be redundant, all about the same, and just providing food, labor, some crafts, and firewood for the top class. Fortunately, Cerén has challenged that assumption since 1983 [1], and encouraged others to closely investigate commoners in various areas of the Maya world. Two recent books, with titles "Ancient Maya Commoners" [9] and "Commoner Ritual and Ideology in Ancient Mesoamerica" [10] exemplify their successes. The following material presents an overview of knowledge about life in the Cerén village [7] that would not be attainable if it were abandoned in the usual fashion, and left open to the elements of nature and to subsequent human interference. The volcanic preservation made all the difference.

The size of families was unknown; they could have been extended families with three or more generations residing together, or nuclear families of two generations. The sleeping areas of the domiciles at Cerén were sufficient for nuclear families, but not beyond. Thus, family members enjoyed abundant space in their three buildings (domiciles, kitchens, and storehouses) within the walls, and much more space under the eaves of their large thatch roofs. They stored and used valuable and important artifacts within the walls, and less valuable items outside the walls. Their work spaces for crafting items were generally under the eaves, where light and air circulation was best, yet protected from rain.

Each household crafted items for exchange, and for their internal consumption. What is notable is that each was different in their part-time occupational specialization, which resulted in economic exchanges within the village, thus providing a social network of familiarity, cooperation, and communication. Household 2 painted gourds. They maintained a set of pigments in their storehouse, of hematite, limonite, and five miniature pots with varying hues of cinnabar (HgS), a bright red pigment. The gourds grew on a nearby tree, and they cut them in half to make hemispherical bowls. They kept a few for their own use, and exchanged them within the community for the semi-specialized products of other households. Like the other households, they also took their gourds to markets in the big towns to obtain the specialty products only available there. Those items were fancy painted ceramic vessels that made up over a fifth of their household pot inventories, obsidian tools, a jade axe, and pigments.

Household 1's specialty was making groundstone tools for grinding corn and other hard substances, and making cotton thread and weaving it into garments. It appears that Household 3's specialty was preparing achiote (*Bixa orellana*) seeds into a bright red water-based organic pigment. Some spilled on the floor of their kitchen, indicating that they had recently made it and were using it. A common use of it in ancient and modern times is for body painting, and its color symbolizes blood. Because the, the community was celebrating the harvest the very evening the Loma Caldera eruption occurred, it appears probable that participants stopped at this household to be painted, on their way to the ceremony.

Household 4's specialty was cultivating unusual plants. They maintained a garden of some 70 mature maguey (*Agave americana*) plants, from which they obtained long fibers. They twisted them into 2-ply string, twine, and rope. We estimate their production would have been sufficient to supply the entire village of some 200–300 people with all their needs. They also grew chili plants in sufficient abundance to supply their needs and the entire village. They grew strong cane poles (*Cana americana*) for vertical reinforcements in wattle-and-daub walls of household buildings.

Service relationships are a category of social integration of a community that had not been discovered in sites prior to Cerén. A service relationship here is a household maintaining a special facility for community use. Household 1 maintained two religious buildings adjacent to them, Structures 10 and 12. Structure 10 was hosting the community harvest festival, which can be dated to the month (August when maize and manioc are harvested) and time of day (evening, as dinner had been served but the family dishes not yet washed), but ironically not to the year (radiocarbon dating range). Household 1 was providing large amounts of processed maize for the participants at the ceremony, and loaned maize husking tools and grinding stones for the event. They likely maintained the structure itself, but data are not definitive. After the earthquake, and hearing the initiation of the eruption, participants evacuated to the south, as indicated by many footprints. How far they got is unknown, as the tephra cloud of Unit 1 was moving fast.

Household 1 also evidently maintained Structure 12, just a few meters farther east than the ceremonial building. This building was highly unusual, with five different floor levels, with the highest being the largest, in the far back. By Maya canons, that denoted greater supernatural power by greater elevation. Its walls and interior partitions were more delicate than any others in the village, and had a lattice window in front, and one in the far back. A collection of minerals that was stored atop an interior partition wall provided the best clue to the function of the building. Shamans used, and still use, minerals in divination. People left artifacts in the front of the building, in reciprocity for services rendered. Many artifacts are used by both genders, but all of the gender-specific artifacts left there, food-grinding stones and spindle whorls for thread-making, are female-associated. Hence, we conclude that the shaman was a woman. She practiced in the building, but did not live in it.

Household 2 maintained the sauna, Structure 9, just a few meters south of its storehouse (Structure 7). In the storehouse they kept quite a bit of firewood along with some pine kindling, likely for the fire inside the sauna. And they had an unusual number of "ollas" to hold water, probably for pouring on top of the firebox in the middle of the building. Excess water flowed out from the firebox through the entrance of the building, leaving a tiny erosional channel, thus providing clear evidence of their producing steam inside. People likely also used the water to rinse off after exiting from the sauna. It is also likely that Household 2 maintained the structure by re-thatching its protective roof every few decades. The contemporary and historic Maya use saunas for childbirth and other feminine purposes, and both sexes use it for curing respiratory problems and other medicinal uses. Both sexes and all ages use it for personal and spiritual cleansing. The fact that it has such a profound effect on mature male voices suggests that it was also used in ways that have not been imagined before.

2.2 Anticipated and unanticipated consequences of data sharing

We present our research results regularly at our national meetings, and in journal articles and book chapters. We publish in English and Spanish for our colleagues and interested lay people. We regularly train the guides at the Cerén Archeological Park, so visitors, including hordes of schoolchildren, receive accurate information. We update the signage and displays in the on-site museum, and at the national museum in San Salvador.

Students in the modern town of Joya de Cerén, and in the nearby city of San Juan Opico, are proud of having the intriguing World Heritage site in their neighborhoods. They accessed the Spanish language literature on our website https://www.colorado.edu/anthropology/payson-sheets as well as took advantage of the didactic

materials and guides at the site, and on their own decided to put on performances reenacting aspects of life in the ancient village. The plays take place in August, when local farmers are engaged in the harvest of maize and manioc, just like the harvest in ancient times. The clothes made by their mothers are quite imaginative, resembling Native American costumes worn in US movies more than ancient Maya clothing, but nobody complains. The performances begin with life in the village before the eruption, with father talking about the harvest, and mother talking about processing the food in the kitchen, and the children saying they are hungry, and wanting attention. Then they go over to the community ceremonial building to unite with other families. But as the rituals were underway, giving thanks for a good harvest, and asking for a good growing season in the future, the ground started shaking. They said "is this a big one?" and waited anxiously until it attenuated. However, seconds later a horrific shrieking noise hit them, and they yelled in emergency as their oral history informed them that this is the beginning of a violent eruption. The sound came from the north, so they all ran as fast as they could to the south. The audience of the performance I witnessed was composed of many families in the town of Joya de Cerén, and they clapped exuberantly as the actors came back to the improvised stage, and took their bows.

The depictions of life in the village, the harvest ceremony, the earthquake, and the beginnings of the phreatomagmatic eruption were presented with great accuracy. The actors, and presumably their school teachers, had utilized our publications in Spanish, that were available on the internet. The presentation was strikingly reminiscent of how traditional native societies use oral history to accurately transmit detailed information about volcanic eruptions for centuries or millennia. Blong [11], for instance, discovered that the natives of Papua New Guinea retained detailed information about an eruption and tephra emplacements for about three centuries. That would be about 15 generations, and was achieved by frequent repetition in public performances. Krajick [12] notes the accuracy with which details of the Mount Mazama eruption was transmitted for about 7000 years. Therefore, it is reasonable to assume that the Cerén residents were familiar with the precursors, and the eruptions, along that active fault, and thus most if not all the participants in the ancient harvest ceremony headed south, fast. How many escaped alive is unknown, particularly because the time between the defining sound and the arrival of Unit 1 is unknown. Future excavations are likely to encounter the remains of some people who did not attend the ceremony because of illness, old age, or some other reason. More than a century of research remains to be done at the Cerén site.

Native peoples around the world, for many millennia, have been dealing with extreme events. Lacking writing, they have initiated effective ways of transmitting traditional environmental-social knowledge for many generations [11, 12], by public performances and paying close attention to variations in nature and their societies. Such indigenous knowledge provides people with time-tested resilient behavior. Oral history of extreme events has an impressive record of durability and accuracy, and oral traditions of various geological events, including volcanism, can be incorporated into cultural aspects of everyday life, including performances, dance, and even tattooing [13, 14]. However, oral history is not invulnerable to massive disruptions. The last few centuries of colonization by the world powers, depopulation by epidemic diseases, massive migrations, or other factors can cause destruction to, or elimination of, traditional ecological knowledge [15–17]. The scientific literature on hazards, disasters, and suitable responses, is not an effective substitute for most peoples around the world. However, the high school students' reenactment of the Loma Caldera eruption, and the ancient Cerénians' perception of the precursors, and emergency evacuation of their village, do inadvertently train local Salvadorans to the very real hazard along their volcanic vent.

This unanticipated training for disaster perception and response was "Ceréndipitously" the result of our publications in Spanish available on the internet, and high school students proud to have the only World Heritage site in the country right in their neighborhood. This need not be limited to this high-hazard zone in El Salvador. Rather, I suggest that volcanologists and archeologists explore high school or college level students and their teachers in their research areas, and encourage similar performances. In areas like this, where literacy is limited and very few residents would understand our social science and natural science literature, even when written in their native language, the reinstatement of oral history in performances could have a salutary effect of increasing hazard understanding, perception of precursors of the next extreme event, and appropriate emergency behavior.

3. Conclusions

Maya elites and royals are well known after two centuries of study, as they built their pyramids, palaces, and tombs of stone, and recorded their histories in hieroglyphics literally "written in stone." The created one of the world's great art styles, and their economic and political systems endured for many centuries. Commoners made up the vast majority of the population, but have been poorly known in part because they constructed their buildings of wattle-and-daub. They did not record their histories in written form, but in oral history form by repeated public performances, like so many traditional societies around the world. The frequency of eruptions along the fault indicates it is likely that people in the ancient Cerén village were well aware of the antecedents to an eruption were earthquake and a defining noise. No human remains have been found in excavations to date, and the footprints headed south, both indicate that people evacuated the village. How far they got is unknown.

The frequent reenactments of village life, eruption indicators, and the emergency evacuation by high school students both in the present-day town of Joya de Cerén, and the nearby city of San Juan Opico, are didactic means of training for families that could experience the next eruption, at any time. I encourage archeologists, volcanologists, and other scientists, to consider supporting similar performances by local students in other hazardous locations.

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I gratefully acknowledge the support of the U.S. National Science Foundation, for funding the many seasons of excavation, analysis, and publication of our Cerén research project. The generosity and helpfulness of the Salvadoran rural poor people have been a testimony to their core of humanity, and all project members wish to acknowledge this. Therefore, we took pleasure in giving back to them, with a UNESCO World Heritage site in their neighborhood. Karoly Nemeth's comments improved the text of this chapter.

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