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FRANCIS A. GEALOGO

# Historical Seismology and the Documentation of Postdisaster Conditions The 1863 and 1880 Luzon Earthquakes

The June 1863 and July 1880 earthquakes that struck Manila and environs caused widespread destruction. But in varied and complex ways they stimulated the documentation of earthquakes and their aftermath, ranging from cataloging past earthquakes that placed these events in a historical series of earthquakes to recording street- and neighborhood-level damages to buildings and infrastructure to writing appeals for state support for victims years after the event. This documentation reveals different layers of the narratives of the social history of these two disasters and other similar events in Philippine history.

**KEYWORDS:** EARTHQUAKE HISTORY · PRIMARY SOURCES · HISTORICAL SEISMOLOGY · DISASTER HISTORY · HISTORIOGRAPHY

**O**n 29 September 1865 a letter signed by Agapita Francia was addressed to the head of the Junta Central de Socorros de Manila, appealing for financial assistance due to the miserable situation that she and her sisters Leandra, Juana, and Dorotea found themselves as a result of the earthquake of 3 June 1863. The orphaned sisters reported that the family's house in Santa Cruz, Manila, which they inherited from their deceased parents, suffered massive destruction, which made it uninhabitable for over a year. With no other assets, they had been left in misery and poverty, a state of existence from which presumably they did not suffer before the earthquake. The letter of appeal that they submitted to the central committee implored the colonial government for charity, although it was not clear if the requested assistance was for daily subsistence or the completion of the repair of the house (Francia 1865):

Escmo. e Ylmo. Sor Presid.<sup>te</sup> y Vocales de la Junta Central de socorros de Manila

Agapita Francia y mis hermanas Leandra, Juana y Dorotea huérfanas de padre y madre, vecinas del arrabal de Santa Cruz ante VE é Ylmo. Llenas de profundo respeto nos presentamos y decimos que por el certificado que acompañamos en debida solemnidad se acredita que de resultas del terremoto del 3 de Junio de 1863 ha sufrido ruinas y deterioros de gran consideración la casa de nuestra propiedad heredada de nuestros difuntos padres situada en el barrio de Mabolo de dicho arrabal parte era la que habitábamos y parte alquilada antes de aquella catástrofe.

No teniendo Escmo. é Ylmo Sor dinero con que poder reparar la citada finca ni alhajas u otros bienes que poder vender pues es bien notoria nuestra pobreza y es también publico que esta finca es la única que poseemos de propiedad, ha quedado ella en estado inhabitable y abandonada en sus ruinas mas de un año hasta que en Diciembre del año pp.<sup>do</sup> hemos podido conseguir con hipoteca de ella y con el crecido interés la cantidad de mil pesos que á duras penas bastaron para reedificarla.

Por tan lamentables desgracias venimos suplicando a la superior munificencia de la respetable Junta de limosna a fin de que en consideración a nuestra miseria y pobreza se sirva colocarnos en el numero de los acreedores a la citada limosna. Es gracia especial que:

A VE é Ylma rendidamente imploramos y la que no dudamos merecer de los piadoso y caritativos corazones de los Sres de la Junta.

Setiembre veintinueve de mil ochocientos sesenta y cinco

Most Excellent and Illustrious Mr. President and Members of the Junta Central de socorros de Manila

Agapita Francia and my sisters Leandra, Juana, and Dorotea, orphaned of father and mother, residents of the suburb of Sta. Cruz before Your Excellency and Illustriousness. We are filled with profound respect as we present ourselves and relate to you that, according to the certified document that we furnish in rightful solemnity, it is confirmed that, because of the earthquake of the 3rd of June 1863, the house we inherited from our deceased parents, situated in the barrio of Mabolo of the said suburb, part of which we lived in and part of which we rented out before the catastrophe, has suffered very considerable ruin and damage.

Most Excellent and Illustrious Sir, we have no money to repair the said property, nor jewelry or other possessions that we can sell. Our poverty is well known. And it is also known publicly that the house is the only property we own, which has been left in its uninhabitable condition, abandoned in its ruins for more than a year up until in December of the previous year when we have been able to obtain a mortgage on it and with high interest the amount of one thousand pesos, which is barely enough to rebuild it.

For such lamentable misfortune we come imploring the great benevolence of your esteemed Junta for aid that, in consideration of our misery and poverty, we be placed among the recipients of the said charity. It is a special favor that:

To Your Most Excellent and Illustrious Sir, we humbly implore and [this special favor] we no doubt deserve from the pious and charitable hearts of the gentlemen of the Junta.

September 29, 1865

This letter forms part of the multilayered documentation of the experiences that constitutes the primary sources for the history of the 1863 and 1880 earthquakes in Luzon.

The 1863 and 1880 Luzon earthquakes were two of the most destructive earthquakes in the archipelago that devastated the colonial capital of Manila and challenged the capacity of the state and society to cope with the disaster. According to the Jesuit Fr. Miguel Saderra Masó (1910), the 1863 earthquake was extremely devastating. It killed 400 persons and injured a couple of thousand individuals. Except for the San Agustin Church, most of the churches in Intramuros, including the Manila Cathedral, were destroyed. Public buildings were either badly damaged or totally ruined. Hundreds of private homes were also destroyed. Some towns in Morong, Laguna, and Cavite were likewise heavily damaged. Strong aftershocks were felt in the area weeks after the major earthquake.

In 1880 another big earthquake shook a larger geographic area, but the number of casualties was much smaller than that of 1863. Saderra Masó (1910) described the earthquake as affecting several provinces in southern and central Luzon. Damage to buildings and infrastructure was described as “severe,” with stone buildings totally destroyed or heavily damaged. He also described the ground subsidence, fissures, and lateral displacements in the alluvial lands along and the delta region near the mouth of the Pasig, Pampanga, and Agno Rivers.

## Historical Seismology

This article aims to provide examples of primary sources in history that yield significant information on the different dimensions of the two earthquakes as a result of which different types of documents were produced. These documents reflected postdisaster attempts at documenting, recording, tabulating, and cataloging experiences linked to these two earthquakes. The documentation revealed the possibilities and potentials for the historical reconstruction of the conditions of affected communities.

This study aims to contribute to the growing field of historical studies of disasters in the Philippines through the use of available archival and other primary source materials. In so doing, it provides historians research directions to further the understanding on the history of earthquakes and advance historical seismology as a field of historical inquiry in Philippine studies.

This study adopts Emanuela Guidoboni and John Ebel’s (2009, 6–7) definition of historical seismology as a field of study that deals with the historian’s act of documenting, enumerating, and cataloguing earthquakes and emplotting their history. They describe the field as including activities that account for the effects of the earthquakes on the environment, the infrastructure, and the population, on the one hand, and the impact of such effects on research on the history and archaeology of societies of the past, on the other hand. Historical seismology, therefore, deals with both the phenomenon of the disaster as well as its historiography. In both instances historical seismology presents the readers its capacity to understand the past of historical disasters as well as its documentation. The social, political, geographic, economic, and even psychological dimensions of the disaster thus become part of the narrative of historical seismology, which recognizes the potential of various historical sources that natural scientists would tend to overlook.

According to Guidoboni and Ebel the documentation of a particular earthquake (referred to as “real seismicity”) forms part of the historical narrative and catalog of the series of earthquakes that provide long-term data on what they call “apparent seismicity,” which both the historian and the historical seismologist use in their studies. The catalog in turn creates the basis for the study of the qualitative and quantitative historical data that the historian can use to advance one’s understanding of the conditions of physical structures, the human–environment interaction, and the experiences of individuals in a given population affected by the earthquakes.

In the Philippines Greg Bankoff (2003, 2004) has emphasized that the physical, geographic, seismological, and climatic conditions of the Philippines have made it more vulnerable to disasters than other locales. This high level of vulnerability has created conditions in society that culturally have grounded people’s reactions and adaptations to the different disasters that occur regularly. This “culture of disaster” has partly shaped the everyday existence of most Philippine localities in a rather uneven manner, exposing some sectors to an even more vulnerable situation to disastrous conditions than others—limiting their capacity to cope and further restricting the possibilities for them to experience social upliftment. This observation affirms another possible dimension of disaster research from a perspective of social history—one that highlights social inequality, the powerlessness of some groups and sectors, and the occurrence of disasters that emphasizes the realities of such social conditions.

## Catalogs of Historical Earthquakes in the Philippines

For the Philippines Maria Leonila Bautista and Kazuo Oike (2000, 138–39) mention five extant catalogs of historical earthquakes, which were recorded in historical time as opposed to the seismologist's study based on geological features of land formations. These five catalogs are the works of Perrey (1860), Saderra Masó (1895, 1910), Repetti (1946), and the Southeast Asian Association of Earthquake Engineering or SEASEE (Arnold 1985).

Alexis Perrey based his catalog mostly on European travel accounts and included not only earthquakes but also volcanic eruptions from the fifteenth to the eighteenth century. Bautista and Bautista (2004) consider Perrey's catalog as deficient because it had noticeable errors in place names that he was unable to check, and it contained exaggerated descriptions of natural events. Bautista and Oike (2000) consider Saderra Masó's work in 1895 as more comprehensive than Perrey's catalog (1860).

Saderra Masó was affiliated with the newly established section on seismology of the Manila Observatory in 1890 and was responsible for setting up a network of seismic stations in Luzon (Schumacher 1965, 265). Saderra Masó obviously appreciated the need to advance seismic studies resulting from the 1863 earthquake. His catalog, which exclusively dealt with earthquakes in the archipelago, arose as part of his work of consolidating the data for scientific study found in the observatory's seismology section.

Fr. William Repetti, SJ, came to the Philippines and joined the Manila Observatory and the Philippine Weather Bureau in 1928; he was put in charge of all seismological stations in the Philippines (Bautista and Bautista 2004, 381). Repetti (1946) expanded the Saderra Masó catalog and included other historical accounts. The relatively recently compiled SEASEE catalog (Arnold 1985) included reports up to 1983, with studies made by international agencies included in it (Bautista and Bautista 2004).

As it is the most proximal to the 1863 and 1880 postdisaster conditions and events, which is the subject of this study, the Saderra Masó catalog is given greater focus in this article than the other catalogs.

### The Saderra Masó Catalog

The Saderra Masó 1895 study was the most significant catalog of historical earthquakes in the Philippines in the nineteenth century. Although limited in scope and by the technology of the period, the catalog nonetheless provided essential data to understand the recording and cataloging of the

phenomenon of earthquakes in the country. These data included not only the quantitative estimates of the intensity of the earthquakes, but also the qualitative descriptions of the conditions of the localities in the immediate aftermath of the disaster. The catalog started with the year 1599, which Saderra Masó considered as the year when the first historically recorded earthquake of significance (with actual verifiable records) occurred in the islands. The study formed the basis of another publication in 1910, also by Saderra Masó, that extended the coverage of the historically recorded earthquakes up to the first decade of the twentieth century.

More than being an efficient cataloger of historical earthquakes, Saderra Masó was keen on compiling and critiquing historical records despite the limitations of historical observation in the different periods covered. He mentioned that catalogers during these periods had a characteristic similar to the ways of

the old chroniclers, who dwell upon the political happenings with an attention to detail which is occasionally overdone, [but] were invariably laconic when there was question of earthquakes and similar natural phenomena; as a rule they were satisfied with mentioning the occurrence in a general and therefore vague way, without any attempt at precision as to dates and places. (Saderra Masó 1910, 3)

He also explained the paucity of data on recorded earthquakes that occurred before the 1800s as well as the limitations in geographical coverage in the catalog, with the earthquakes in the Visayas and Mindanao having fewer data compared with those that happened in Luzon.

Saderra Masó listed earthquakes of intensities corresponding to those in the scale of De Rossi–Forel, which was one of the first scales developed to reflect the intensities of earthquakes (Guidoboni and Ebel 2009, 482). Similar to what Saderra Masó noted in his discussion of historical earthquakes in the Philippines, Tiedemann (1992) remarked that the scale of intensity indicated the levels of destruction in the areas affected by the earthquake. Hence, the intensity levels were classified accordingly as: microseismic tremor (Intensity I); extremely feeble tremor (Intensity II); feeble tremor (Intensity III); slight tremor (Intensity IV); moderate tremor (Intensity V); strong tremor (Intensity VI); very strong tremor (Intensity VII); damaging tremor (Intensity VIII); devastating tremor (Intensity IX); and extremely high

intensity tremor (Intensity X) (ibid.). Saderra Masó (1910, 3) included only those earthquakes with intensity VI and above in his catalog, which were further classified into three classes: Class I (for intensity VII), “earthquakes of sufficient force to produce cracks in buildings and to throw down chimneys”; Class II (for intensity VIII), earthquakes that “not only threw down chimneys but also walls and some weak structures”; and Class III (Intensity IX and X), earthquakes that “caused general destruction.” He also included earthquakes of intensities lying between VI and VII (ibid.).

Although the De Rossi–Forel scale is no longer being used at present since the measure of an earthquake’s impact is now appreciated in terms of its magnitude and not intensity (magnitude measures the energy released at the source of the earthquake, while intensity is measured according to its effects on communities, man-made physical structures, and the environment), the catalog is still of value to social historians of earthquakes if only to indicate the effects of the destruction that were classified according to the different experiences of societies, neatly arranged according to a classificatory scheme.

Saderra Masó applied the same parameters in determining intensity in the study of earthquakes across centuries, although one may consider cautiously that the level of recording and reporting earthquake experiences may have differed across time. As such, the qualitative descriptions of the historical sources from where Saderra Masó based his approximations of earthquake intensity would have differed in manner of documentation. Moreover, the entries most proximal to Saderra Masó’s period of cataloging would have greater documentation accessible to him, making the entries for the nineteenth century most pronounced in his catalog. Table 1 summarizes Saderra Masó’s nineteen-page table presenting the intensity of the earthquakes recorded.

Despite its limitations, the updated Saderra Masó catalog of 1910 can be regarded as an important listing of historical earthquakes produced in the country, covering 203 events from 1599 to 1909. In this catalog the 1863 and 1880 earthquakes received significant attention, with two entries listed in 1863 and four listed in 1880, indicating that aftershocks that took place weeks after the major tremor were significant enough to be recorded with separate entries. However, it should be noted that other earthquakes that occurred elsewhere in the archipelago and were included in the catalog were recorded as equally devastating not only to the physical infrastructures of communities, such as buildings and houses, but also to the general economic and social conditions of the population.

**Table 1. Number and distribution of earthquakes in the Philippines, by intensity, 1501–1910**

INTENSITY	NUMBER	PERCENTAGE
VI	61	30.0
VI–VII	1	0.5
VII	59	29.1
VIII	43	21.2
IX	31	15.3
X	8	3.9
Total	203	100.0

Source of basic data: Saderra Masó 1910

Some of the earthquakes in the catalog were described to have happened concurrently with volcanic eruptions—an indication that a number of the entries in the list were not exclusively tectonic in origin. This observation is consistent with one made by Aitor Anduaga (2014, 503) that, because the Philippines is in a region of high seismicity, the three kinds of tremors (volcanic, tectonic, and rock fall detachments and cavity collapses) frequently happen in the country. As such, they were often historically observed and documented even by nonseismologists.

As noted earlier, Saderra Masó emphasized that the historical records of earthquakes in the Philippines became more pronounced beginning in the nineteenth century. The catalog, therefore, showed more entries for this period than for earlier periods. Table 2 reveals that the catalog recorded over 80 percent of the earthquakes as occurring in the nineteenth century onward. However, it did not mean that earthquakes only became stronger and more pronounced at this time. As Saderra Masó noted, it was an indication that the recording of earthquake events became more systematic only during this period, but the actual earthquakes should have happened regularly in the past even without the benefit of them being recorded.

The catalog compiled by Saderra Masó (1910) also included overwhelmingly more entries for Luzon—nearly two-thirds of the listed events—than for the Visayas and Mindanao, as table 3 suggests. As in the distortion in the temporal recording of earthquakes, the list contained a skewed geographic orientation as it contained more entries for Luzon than for other parts of the country. Moreover, some earthquakes occurred in more than one island cluster. Some earthquakes were recorded as having



**Table 2. Number and distribution of earthquakes in the Philippines, by century, 1501–1910**

CENTURY	NUMBER	PERCENTAGE
1501–1600	3	1.5
1601–1700	19	9.4
1701–1800	16	7.9
1801–1900	141	69.5
1901–1910	24	11.8
Total	203	100.1

Source of basic data: Saderra Masó 1910

**Table 3. Number and distribution of earthquakes in the Philippines, by general location, 1501–1910**

LOCATION	NUMBER	PERCENTAGE
Luzon	165	63.5
Visayas	28	10.8
Mindanao	67	25.8
Subtotal	260	100.1
Uncertain	4	-
Total	264	-

Source of basic data: Saderra Masó 1910

entries for more than one region, rendering the totals for all the regions combined (264) larger than the actual total number of earthquakes with historical records included in the catalog (203). Classifying the occurrences of the events according to geographical divisions would therefore pose some cataloging challenges to historical seismologists and earthquake historians.

The other significant value of the Saderra Masó catalog of Philippine earthquakes is its inclusion of historical notes on the effects of particular earthquakes on specific localities. Thus, for the 1863 earthquakes, Saderra Masó (*ibid.*, 13) noted that it was

a disastrous earthquake, comparable with that of 1645. Laid in ruins the cathedral and nearly all the other churches, except San Agustin, the palace of the Governor-General, the Audiencia, the barracks, warehouses, etc.; all in all, 46 public buildings in ruins and 25 others badly damaged. Of private houses 570 were destroyed, 531 left tottering. Total, 1,172 buildings in ruins or badly damaged. The

number of victims was appalling. It is estimated that in Manila and the surrounding towns alone the number of killed reached 400, that of the injured 2,000. The catastrophe likewise involved many towns in Rizal, Laguna, and Cavite, where it destroyed churches and a great number of houses.

Saderra Masó's description of the 1880 earthquakes was more complex. With four different entries, the series of earthquakes and its aftershocks was described as follows:

Destructive earthquake affecting the Provinces of Tayabas, Cavite, Laguna, Rizal, Bulacan, Bataan, Pampanga, Tarlac, Nueva Ecija, and Pangasinan. In Manila, as well as in the towns of the provinces mentioned, the earthquake did incalculable harm to buildings, besides causing subsidences, fissures, lateral displacements and similar effects, especially in the alluvial lands along the banks of the Rivers Pasig, the Great and Little Pampanga, and the Agno.

Earthquake of destructive violence in the towns surrounding Lake Bay, especially in those south and west of the lake.

Within the epicentral region of the three preceding earthquakes, which measures about 300 kilometers from north to south and 200 kilometers from east to west, severe damage was done to the principal stone buildings, such as churches, *conventos* [convents], court-houses, schools, and a few private houses, of 112 of the principal towns. In the city of Manila some 30 public buildings (administration buildings, barracks, churches, monasteries, and colleges) and about 200 private houses of strong materials were either wrecked or badly damaged. Fortunately the number of victims was not in proportion to the magnitude of the disaster, neither in Manila nor in the provinces. From the various reports published at the time we conclude that the number of killed did not exceed 20, nor that of the injured 50. (*ibid.*, 18)

A remarkable feature of Saderra Masó's text therefore is the inclusion of the narrative descriptions of the extent of damage and the effects of

the enumerated earthquakes on human lives and property. While the quantitative enumeration of the recorded historical earthquakes is important in understanding the long-term patterns of the occurrence of earthquakes in the Philippines, the history of individual earthquakes as viewed from their effects on the social and physical structures of specific communities can be appreciated as equally important data from the catalog. The historical notes are significant at various levels. The descriptions provide the types of damage sustained in the different localities that experienced the earthquakes. They also provide some descriptive accounts of the conditions of local societies at the time of the disaster. Historians may also find value in the notes that provide information on the social and economic impact of the disaster, as some describe the damage to property and disruption to production.

### **Documentation of Devastation Caused by Earthquakes**

Another layer of the narrative of late–nineteenth-century Luzon earthquakes pertains to the impact and effects of the disaster on social structures and the physical infrastructures of the affected communities. These conditions had economic and social consequences on the population. Moreover, institutions of social assistance and organized charity work in the local and international levels played significant roles in postdisaster relief and rehabilitation efforts.<sup>1</sup> The organization of relief and assistance committees at various levels of government was a major feature of this effort. Finally, the rehabilitation of the physical infrastructure and the regulation of building construction techniques were major highlights of the state's response to earthquakes.

Both state and nonstate actors contributed to the documentation of earthquakes and the damage they inflicted on social and physical infrastructures. Local authorities wrote and submitted reports to the colonial capital of Manila, describing the extent of damage to infrastructure and public and private buildings in the affected areas. Some reports, like the one on Cavite Puerto discussed below, included street-level documentation with detailed descriptions of every building, with the entire area mapped accordingly. The Cavite Puerto report also included the names of building owners, the functions of the buildings (whether residential, commercial, religious, military, educational, and so on), and the classification of damage incurred. In addition, documentation came in the form of memoirs read in scientific conferences (cf. the 1880 conference proceedings in Centeno y García 1883) and compilations of newspaper articles on the earthquakes

(Anon. 1880). The information contained in these sources provides the historian with valuable information that can be utilized in constructing the narrative of specific disasters.

Indeed, the immediate response of the authorities after the earthquake was the documentation of the extent of damage incurred by public and private buildings in towns that suffered the most devastation. Local officials were tasked to submit to the colonial authorities in Manila a detailed report on the condition of the buildings, with narrative reports on the state of devastation, the street-based assessments of buildings, and the estimated amount of damage suffered in the locality. These reports were to be submitted to the Junta Consultativa de Obras Publicas (Public Works Advisory Board) under the direction of the Inspector General. The advisory board was in charge of documenting the necessary reconstruction works to be implemented, supervising the projects to be undertaken by the government, and making public announcements for bidding public works projects to be undertaken. All of these would need documentation of the extent of damage incurred because of the disaster (Ruiz Gutiérrez 2005, 997). The damage incurred in the two earthquakes were varied. More public buildings were destroyed as a result of the 1863 earthquake, but more private buildings were destroyed during the 1880 earthquake (ibid.).

A good example of the documentation of this type was the report on the conditions of Cavite Puerto in the aftermath of the 1880 earthquake (NAP 1880).<sup>1</sup> The report included information on the conditions of the building after the earthquake. What is interesting in the report is the level of detailed information it contained. The size of the building; the materials used in the construction; the names and social status of the inhabitants; the classification of the use of the building; the state of damage sustained after the earthquake; and the house number and street name where the building was to be found were all neatly tabulated and compiled. Every building in each street was assessed and evaluated according to the categories set by the authorities: in good condition (*en buen estado*); in good condition with repairs needed (*en buen estado con reparación*); dangerous (*peligroso*); total ruin (*ruinoso*).

The extent of the damage is more manifest when the data set is organized in tabular form. Table 4 makes evident that a small area like Cavite Puerto suffered significant damage to its buildings. Only four out of every ten buildings were classified to be in good condition after the earthquake.



**Table 4. Condition of structures in Cavite Puerto, by street, after the 1880 earthquake**

STREET	BUILDING IN GOOD CONDITION			BUILDING IN GOOD CONDITION WITH REPAIRS NEEDED			BUILDING IN DANGEROUS CONDITION			BUILDING IN TOTAL RUIN			TOTAL		
	NUMBER	%		NUMBER	%		NUMBER	%		NUMBER	%		NUMBER (RT)*	%	RT AS % OF 282
Calle del Baluarte	2	14.3		6	42.9		1	7.1		5	35.7		14	100	4.9
Calle de Novaliches	19	37.3		8	15.7		17	33.3		7	13.7		51	100	18.1
Calle Real	45	50.0		15	16.7		22	24.4		8	8.9		90	100	31.9
Calle del Arsenal	25	41.7		13	21.7		15	25.0		7	11.6		60	100	21.3
Paseo de la Soledad				3	30.0		4	40.0		3	30.0		10	100	3.5
Calle de Colon	4	57.1		1	14.3		2	28.6					7	100	2.5
Calle de Magallanes	3	50.0		2	33.3					1	16.7		6	100	2.1
Calle de Recoletos	3	50.0		1	16.7		2	33.3					6	100	2.1
Calle de San Pedro				2	40.0		3	60.0					5	100	1.8
Calle Telégrafos	2	66.7		1	33.3								3	100	1.1
Calle de Ysabel 2a							3	60.0		2	40.0		5	100	1.8
Calle del Teatro	1	33.3		1	33.3					1	33.4		3	100	1.1
Calle de Cermeño	1	33.3		2	66.7								3	100	1.1
Calle de Joló	2	100.0											2	100	0.7
Calle de Sto. Domingo	2	50.0		1	25.0					1	25.0		4	100	1.4
Calle de Cisneros	2	66.7								1	33.3		3	100	1.1
Calle del Parque	2	25.0		3	37.5		1	12.5		2	25.0		8	100	2.8
Calle del Recinto del Sud	2	100.0											2	100	0.7
Total	115	40.8		59	20.9		70	24.8		38	13.5		282	100.0	100.0

\*RT=row total

Source of basic data: NAP 1880

Thirteen percent of the buildings were in total ruin, while one in every four was considered dangerous. One in every five edifices was classified as in good condition although in need of repair.

Equally important was the difference in the experiences of different streets even within a small area. There were streets that suffered minimal or no damage at all (Calle de Joló and Calle del Recinto del Sud), while other streets suffered significant damage in its buildings, with no single building declared in good condition (Paseo de Soledad, Calle Ysabel Segunda, and Calle de San Pedro). The unevenness of the damage incurred in different streets should be a subject of possible further investigation. Possible reasons—such as the application of different building methods, the use of different materials, and the occurrence of liquefaction becoming more pronounced in some areas than the others within the same locality—were all plausible explanations for differences in the damages experienced in different parts of the same locality.

Facing the Manila Bay and with soft sandy soil as foundation, Cavite Puerto was confronted with two possible hazards resulting from a major earthquake: a tsunami that could come from Manila Bay, and the disturbance of the soil and water balance above the bedrock foundation of the area, resulting in the liquefaction of the soil in the immediate period after an earthquake. In both instances, the capacity of masonry works and woodworks to withstand the calamity could be compromised. Unfortunately, even the most advanced scientific studies have yet to develop a predictive capacity for the occurrence of earthquakes. This phenomenon becomes even more challenging for historians to establish causation for related hazards such as tsunamis and soil liquefaction as these were documented as separate conditions and sometimes presented as different natural phenomena.

Surveying postearthquake building constructions also paved the way for the reemphasis on the protection of both public and private property ownership, with particular reference to building structures. Since earthquakes would most likely affect houses with adobe stones, the regulation and control of building construction based on this material were meant to create a standard practice for these types of edifice and not on the nipa huts of the lower classes that were made of materials that swayed with the ground during earthquake events. Almost all of the surveys done, as well as the catalogs of destructive earthquakes that covered the period, reported the destruction of stone structures.

Xavier Huetz de Lemp (1998, 162) indicated that the colonial preference for stone structures at the time Manila's population outside the walled city was expanding, as well as the class basis in the differentiation of the materials used for the construction of houses in the nineteenth century, was actually indicative of the potential conflict that the inhabitants of the two types would develop. The relocations of nipa houses of the *indio* population and the construction of stone houses in districts outside of the walled city suggested a potential social conflict reflected in the types of materials used in the construction of houses. The earthquakes of the late nineteenth century and the surveys of building conditions that happened afterwards revealed the levels of prioritization of the colonial state in postdisaster rehabilitation; that is, the funds were to be channeled to help the reconstruction of stone structures over other structures that utilized other materials.

This condition did not imply that structures made of nipa and wood were not vulnerable to destruction in a postearthquake scenario. As Bankoff (2007) mentioned correctly, the outbreak of fire was equally important in the destruction of Manila's buildings as other disasters. Unlike earthquakes, fire outbreaks affected both stone houses with wooden haligue and second-floor habitation and the nipa huts of the ordinary people. A combination of the two—fire outbreaks resulting from the collapse of buildings during earthquakes—was more fatal and destructive. The *arrabales* (suburbs) that contained the two building traditions in the nineteenth century would have been exposed to the two disasters that could have originated from the earthquake experience.

### Documentation through State Building Regulations

Perhaps not surprising given the detailed information obtained about the damages sustained by different types of edifices, the most immediate and visible impact of the late-nineteenth-century earthquakes in Luzon was the reorientation in the use of building materials, the furtherance of government oversight over construction plans, and the recommendations concerning the issuance of government permits for the construction of edifices. These measures represented the colonial state bureaucracy's move to mitigate the damage to life and property in case future disasters were to be experienced again.

The Gobierno General de Filipinas (1880) clearly stipulated the policies for building construction, the issuance of permits for construction, and the use of construction materials. For building construction, the 1880 regulation

reiterated that the municipal and city architect should review the plans for construction and the local engineers should examine the construction of the building in the specified locality. Before construction could start information on the type and nature of the soil of the construction site and the depth at which water was found and where filtrations appeared also had to be considered.

In terms of the issuance of permits for building and repairs, the 1880 regulation stated that all building plans must be submitted for approval to the government, regardless of the type of building (whether public or private) and source of funding. Upon completion of building construction, another permit needed to be obtained from the government before the building could be occupied. The structure was subject to inspection and examination by the government architect, with consideration given to the materials used, the type of workmanship applied, and the correct application of the construction method based on the building permit issued prior to construction. The use of construction materials was also regulated as indicated in the 1880 regulation. The quantity and dimension of the cement and stone to be used; the consistency of the mixture of cement with soil and water; the height and thickness of stone walls to be constructed; and the type of wood to be utilized in the buildings were to be described in detail as well.

Ana Ruiz Gutiérrez (2005, 997–98) considers the 1880 regulation as part of the general historical trend toward the professionalization of architecture in the Philippines, the strengthening of the bureaucratic imperative at building inspection and the granting of permits, and the institutionalization of government offices in charge of these regulatory activities, particularly the Junta Consultativa de Obras Publicas under the direction of the Inspector General.

The 1863 and 1880 earthquakes were significant milestones in the development of local architectural styles that were defined by the institutionalization of building regulations by the bureaucracy, which included the development of what may be termed as *arquitectura filipina* or *arquitectura mestiza* that recognized Hispanic, indigenous, and even Chinese traditions in building construction (ibid., 995). The use of wooden *haligue* (columns) and adobe blocks, the latter coming from Guadalupe and Meycauayan for the stone edifices in Manila and environs, was especially significant in this regard (ibid., 996) as it heralded the fusion of building traditions that were coming from many architectural customs. The development of building codes that addressed earthquake hazards started as an institutional and bureaucratic concern with attempts at standardizing

building codes as an aftermath of the 1645 earthquake, with new additions to the rules and the acknowledgement of local building tradition becoming incorporated in the rules developed afterwards (*ibid.*). The guidelines developed as a result of the 1880 earthquake therefore were the fruition of several centuries of the evolution of the codification of rules and regulations governing building construction and repair that were cognizant of the seismic conditions of the islands.

Bankoff (2007, 424) was more explicit in his description of the impact of the 1863 and 1880 earthquakes. He argued that these earthquakes “accelerated the use of timber in buildings,” which gave stone structures greater stability to withstand earthquakes. This development further advanced the earthquake-defined building philosophy and style called “earthquake baroque” or “mestizo architecture,” which became prominent due to a 1645 earthquake. This new philosophy and style deviated from the European baroque, as earthquake baroque used wooden haligue and adobe blocks.

Finally, the shift from tile roofs to galvanized iron sheets was also a turning point in the history of construction that resulted from the 1880 regulations as a response to the devastation of the earthquake of 1880. Damage to life, limb, and property was noted in buildings with roofs that collapsed mainly due to the weight of tiles used as roofing material. Galvanized iron provided an alternative material that was lighter in weight and would not collapse easily if installed properly.

Aside from bureaucratic regulation and postdisaster reporting, institutions were also established to better understand scientifically the phenomenon of earthquakes, among other calamities. The Observatorio Meteorológico de Manila, the precursor of the modern Manila Observatory, was established by the Jesuits in 1865 as a consequence of the 1863 earthquake (Saderra Masó 1895; Bautista and Bautista 2004). New instruments were used and developed to improve the Jesuits’ capability to study earthquakes, and a greater appreciation of the historical records of past earthquakes resulted in a systematic compilation of earthquakes in history (Saderra Masó 1895; Bautista and Bautista 2004; Anduaga 2014; Schumacher 1965). Cartographic maps were made in order to establish the geographical patterns of earthquake intensities across historical time.

## Individual Narratives and Postdisaster Conditions

Late-nineteenth-century earthquakes and the subsequent institutionalization of disaster relief efforts created the possibility of documenting the narratives of individual survivors of the earthquakes. A couple of years after the 1863 earthquake, for example, several individuals were still appealing to the junta, the aid committee that was established to provide help to the survivors of the earthquake, for possible assistance and relief from the conditions they found themselves in (NAP 1863–1892, B5; NAP 1863–1897, B6).

These appeals included notarized documentation submitted by the survivors to the aid committee so that it could evaluate the conditions of the survivors and assess the assistance to be allocated to them. The papers included basic information on the survivors who submitted the appeals—name, age, civil status, address, occupation, and place of birth. Aside from these personal data, the letters also provided details about the individual experiences of the survivors at the time of the earthquake and the description of their subsequent conditions after the quake. Similar to the ethnographic data that present-day social scientists generate in their fieldwork, the bundles of archival materials that contain these appeals provide important information that can be used in reconstructing social conditions and the personal narratives of individuals in postdisaster situations.

The squalid conditions of survivors residing in damaged buildings that were almost ruined made them vulnerable, especially to outbreaks of cholera epidemics recorded in postdisaster areas, making their conditions even more miserable and despondent. The documents revealed not only the appeals of individual survivors justifying their need and eligibility for government assistance, but they also offered a glimpse into some aspects of the individual life histories of the survivors themselves.

Similar to the case of the Francia sisters narrated at the beginning of this article, some of the sample narratives included below indicated the social conditions of some of the earthquake survivors. While it would not be possible to establish the general postdisaster situation based on these appeals, one could deduce that some of these life histories were not unique to the individuals named in these letters. The voluminous records of these appeals to the junta could also serve as an indication of the extent of penury and destitution that the earthquake brought to a significant number of people.

Although voluminous and rich in data, the appeals made by individual survivors were by no means the only documentation that could be utilized in the reconstruction of the social history of postdisaster communities. Ramírez (2006), for example, extensively utilized archival documents in Spain and highlighted the efforts at fund generation conducted by different institutions and regions in Spain to fund the reconstruction programs in the Philippines after the 1863 earthquake. Some of the accounts found in *Islas Filipinas: Terremoto del día 3 de Junio de 1863* (Anon. [1863?]) could also be utilized to reconstruct the social conditions of communities that experienced the calamity.

A great number of the appeals for *subvención* (subvention) were made by *indios naturales* (natives) of the population who, without assistance, were incapable of recovering the loss in livelihood and houses resulting from the earthquake. Illustrative of such appeals was that of Soledad Caviles (1875). A 61-year-old elderly widow residing in the working-class neighborhood of Tondo with no living family listed, Caviles suffered on the night of the earthquake severe injuries that paralyzed her legs. She survived under the wreckage inside the Binondo Market as confirmed by three witnesses who signed and certified that she was a victim of the catastrophe.

Single-mother Yrenea Romero (1878) and her young daughter were injured during the earthquake of 3 June 1863. They were in the Divisoria Market on the night the earthquake occurred, and they both sustained injuries. While there was no mention of the nature of her occupation, her request for assistance until such time as she could find work and gain stability was an indication that she was not gainfully employed at the time of the disaster; she became more needy on account of the injury sustained from the building collapse due to the earthquake.

Alberto Arsadon (1865) was a 21-year-old man who came from Ilocos Norte and migrated to Manila. At the time of the earthquake Arsadon was living in the suburb of Binondo, working as a servant. Because of the injuries he sustained on the night of the earthquake he could no longer return to work. He turned to begging, although he received help from other people. Some documents that certified his employment and residence in Binondo were submitted together with his appeal.

Emiterio Bundoc (1865) was a young man and an orphan under the care of his Aunt Mamerta. On the night of the earthquake his aunt lost her life, leaving him alone and homeless. The “Gobernador de Naturales”

certified his statement to be true, together with the certification of the parish priest of Binondo.

Alexandra Espiritu (no age and work given) (1865) lived in very poor conditions. Her only son, Domingo, who worked as a house servant, died on the night of the earthquake, thus leaving her alone and poor. It was apparent that she was depending on him. She requested assistance and hoped that her name would be included in the roll of aid recipients. Accompanying documents certified her story.

Marcelina and Juliana Custodio (1865) were sisters (both minors, no ages given) who were seen wandering around begging after the earthquake of 3 June 1863. Don Gavino Villareal certified that their mother, Maria Valenzuela, had been buried at the Campo Santo. There was no mention of the identity of their father. The parish priest of Tondo certified them to be orphans.

Esperanza Pangan (1865) was an india naturala who was orphaned when her father died as one of the many victims of the collapse of the Manila Cathedral due to the earthquake.

Manuel Alfonso (1865) was an indio natural, married, and residing in Tondo. He was rendered disabled as a result of the injuries suffered from the earthquake. He filed an appeal indicating that he was the only breadwinner in the family.

Several generalizations can be made based on the appeals for subvention not only by those mentioned above but also by the hundreds of others whose different appeals are found in the archives. First, it is to be noted that the appeals came at least two years after the catastrophe. Because of bureaucratic delays, inefficiency in the handling of relief work, late arrival of funds, and delays in the publication of the availability of funds for financial assistance, the appeals were made at the time when the survivors were already in desperate conditions and in dire need of assistance at least two years after the disaster struck. The conditions of the survivors became even more miserable as a result of the delayed delivery of services. Because the affidavits were written in Spanish, these were composed presumably not by the survivors themselves but by literate individuals, who were mostly the *cabezas* (chiefs) of the communities and who represented the earthquake survivors. The issue of voice, agency, and literacy therefore provides yet another bureaucratic layer in the attempts at state documentation and in the victims' expression of their personal conditions after the disaster.

Second, those already living in austere, if not miserable, conditions even before the earthquake struck represented a significant number of the appeal cases. The disaster made the poor more impoverished, as the casualties were those who enabled the household to subsist: a son working as a servant; working-class parents; a working single father; and a migrant servant from the province. Third, it may be noted that the survivors who appealed were mostly poor and illiterate natives who were already vulnerable to poverty and became even more incapable of mere survival as a result of the disaster.

Finally, women appellants constituted the bulk of those who declared themselves in need of assistance, with widows and orphans comprising a sizeable portion of the surviving population. Equally numerous were those who could not sign their names due to illiteracy (notable because of the mark “X” at the signature portion of the affidavits). Children who were orphaned as a result of the disaster and had no guardians to render assistance were able to submit affidavits with the assistance of the local community leaders’ affirmation of their need. Most of them were unable to cope with the postearthquake conditions and often resorted to begging.

### **Some Concluding Remarks**

The late–nineteenth-century earthquakes in Luzon provided a veritable laboratory for the historian to interrogate the nature of historical sources in the study of a natural phenomenon that led various sectors of society to experience disasters. Some studies mention the impact of the 1863 earthquake on the death of prominent personalities like Fr. Pedro Peláez, who was victimized by the earthquake, thereby passing the baton of the secularization and the movement for Filipinization of the parishes to a new set of leaders like Fr. Jose Burgos (Schumacher 1981). Others assess it in terms of the reorientation of the use of public buildings like the transfer of the residence of the executive to Malacañan Palace outside of Intramuros because of the destruction of the Palacio del Gobernador (Anon. [1863?]). The historical sources themselves indicated that there are other potential narratives that could reveal themselves in various forms by using other historical sources like newspaper accounts, technical reports by engineers and architects, and documentation of international aid efforts from outside the Philippines. The history of materials science development in postdisaster policy formulation; the evolution of earthquake-resilient architecture; the role of media reporting in disaster history; and the involvement of international humanitarian

institutions in disaster relief are possible narratives for historical exposition in the future.

The natural elements of the disaster rendered itself suitable to view the historical experience of earthquakes beyond its single occurrence but rather in its longer term of recurrent patterns and cycles. Despite the limitations of historical data sets and the restrictions in the use of crude instruments by early scientists, the historical catalogs and scientific studies of the earthquakes of the past provide a very good potential for the historian to develop insights on the nature of the long-term recurrence of the phenomenon—a condition that no other discipline can provide.

The historiographic dimension provided in the article offers many possibilities for further studies in the future. The different processes of documentation of the experience of disaster from various institutions, individuals, and communities suggest the potential for multilayered approaches in the reconstruction of the history of disaster experiences. Religious establishments, state agencies, and scientific institutions had developed their own systems of documentation and recording that can potentially serve as the basis for historical elaboration and narration.

The destruction of building infrastructures; the impact of the disaster on the economy and social structure; the development of state policies and regulatory mechanisms in order for society to confront the challenges of disaster presented the second layer of the narrative of the history of earthquakes (Ramírez 2006). While essentially based on the reaction of institutions and state structures to the occurrence of earthquakes, the policies created as well as the social arrangements and reactions of the population to both the disaster and the institutional responses to it indicated a relatively more medium-term rhythm in the cycle of historical time that the structures projected as they developed historically.

Finally, the individual narratives of the impact of the events on ordinary people’s lives reflected the historical experience of the event on the level of the individual. The poor and vulnerable became even more vulnerable as a result of the earthquake. The postearthquake lives of the poor and downtrodden became even more miserable not only because of the experiences they had with the earthquake, but also because of the further pauperization they endured given the difficulty of society in general and the colonial state in particular in addressing the challenges of postdisaster relief and rehabilitation.



## Notes

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- 1 On the international efforts launched in the aftermath of the 1863 earthquake, see Ramírez Martin 2006.
- 2 Although I have copies of the reports of the post-1880 conditions, I do not have anything post-1863. I cannot ascertain if there exists a record series on the aftermath of the 1863 earthquake because the Spanish section of the National Archives of the Philippines has been closed for several months now.

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