

# Fire and Quake in the Construction of Old Manila

Greg Bankoff\*

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*Manila, was one of the grandest early modern European cities in Asia, yet it was destroyed by fire and earthquake on numerous occasions. Over successive reconstructions, it evolved a style of architecture and urban planning that reconciled alien notions about space and place to local environmental realities. The city that materialised over the ensuing centuries was neither wholly European nor Asian, but a rich fusion of the two whose form and substance was ultimately determined by the twin threats of conflagration and seismic activity.*

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Fire was an ever present threat to the residents and authorities of early modern urban areas whose structures were mainly built of wood or other combustible materials. Neo-European cities, those urban centres built outside of Europe in the New World, Africa and Asia were perhaps even more at risk due to the unfamiliarity of their builders with local terrain, climate and natural hazards. Manila, the Spanish capital of the Philippines may have been one of the earliest and grandest of European cities in Asia but it burnt nearly to the ground on numerous occasions within its first 50 years of existence and fires regularly consumed whole sectors of the city right into the nineteenth century. Fire has long been recognised as a significant agent of morphological change, responsible for neighbourhood redevelopment at a local level in the case of a small blaze or even urban renewal on a much grander scale as a result of major conflagrations.<sup>1</sup>

<sup>1</sup> Heyl, 'We Are Not At Home'; Norris, 'Flightless Phoenix'; Pauly, 'The Great Chicago Fire' as a National Event'.

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\*Department of History, University of Hull. E-mail: g.bankoff@hull.ac.uk

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Fire, however, was not the only hazard that Manila had to confront as the city was built in an area of extreme seismic activity where the earth is shaken, on average, five times a day. Most of these are tremors too faint to be felt but others are of a magnitude to cause damage and even, on occasion, more widespread devastation. The residents of early modern Manila had to contend with both fire and earthquake and the city they built was a synthesis of both culture and nature, a complex urban adaptation that continued to evolve over time.

### The Opulence that was Manila

The city that was founded in 1571 on the banks of the Pasig River was constructed on the ruins of a large indigenous settlement. The site was chosen because of its strategic location on one of Asia's premier natural harbours, its proximity to China and the existing trade connections thither, and the ability of its hinterland to produce a sufficient surplus to feed a non-agriculturally productive population, a factor that had eluded the Spanish since their arrival in the archipelago in 1565.<sup>2</sup> Urbanism was the cornerstone of Spanish colonialism, a hierarchy of settlement that extended from the village through the provincial town to the major capital city. The latter functioned as the governmental, religious and commercial centre and it was through this nexus that power was articulated in the incorporated territory. By the time Manila was established, Spaniards were undoubtedly the most proficient builders of new urban settlements in the world, gained through decades of experience in the Americas and centuries of practice during the *Reconquista* of central and southern Spain from the Moors.<sup>3</sup> Alone, too, among European powers, Spain's colonial cities were founded according to a centralised blueprint that was followed with minor variations from the largest capital city down to the humblest mission settlement. Based upon a classical Graeco-Roman model, particularly the writings of the first century B.C. architect, Vitruvius, the city was envisaged as a grid-iron of broad straight streets intersecting one another at right angles to form rectangular blocks centred around a large

<sup>2</sup> Reed, *Colonial Manila*: 18–26.

<sup>3</sup> Violich, 'Evolution of the Spanish City'.

central plaza on which were located the principal governmental and religious buildings.<sup>4</sup> Beginning with a series of royal instructions first codified in 1523 at the time of the conquest of Mexico, this urban plan reached its fullest expression with the royal ordinances concerning discoveries, settlements and pacifications issued by Philip II in 1573 that were incorporated into the Laws of the Indies.<sup>5</sup>

Though founded two years before the royal ordinances were promulgated, Manila generally conformed to this geometric layout. In effect, it was composed of three settlements: a *ciudad* or city reserved for Spanish residents known appropriately as Intramuros (literally within the walls), a district for the growing number of Chinese merchants and artisans who were forced to live in a designated area (within canon range of the walls) called the Parian, and a number of indigenous communities or *arrabales* located more on the outer fringes of the urban area.<sup>6</sup> Despite this social zoning, the grid-iron pattern was strictly adhered to wherever practical in both the Spanish city and Chinese quarter though the pattern was less rigorously enforced among indigenous settlements. About Intramuros, sixteenth- and seventeenth-century observers commented on the similarities it shared with Spanish cities in Mexico with its straight streets and main plaza about which were situated the cathedral, government buildings and the homes of well-to-do inhabitants.<sup>7</sup> An indigenous settlement of perhaps 2,000 people in 1571, Manila grew rapidly to become a cosmopolitan and multi-ethnic colonial capital of over 40,000 by the 1620s.<sup>8</sup> Its wealth and prosperity was predicated on the lucrative galleon trade and the city's role as an entrepôt, where the fine fabrics and crafts of China, especially its silks and porcelain, were exchanged for the silver of the New World.<sup>9</sup> Although this trade was to become increasingly regulated

<sup>4</sup> Smith, 'Colonial Towns': 3–6.

<sup>5</sup> Nuttall, 'Royal Ordinances'.

<sup>6</sup> A fourth, smaller quarter existed at Dilao for the several thousand Japanese who settled in Manila before the Tokugawa shogunate isolated Japan from the outside world in 1639 and the flow of migrants ceased. All settlements outside of the walls were collectively referred to as Extramuros or outside of the walls.

<sup>7</sup> Doeppers, 'The Development of Philippine Cities': 775–77; Kubler, *Mexican Architecture*: 68–102; Reed, *Colonial Manila*: 27–69.

<sup>8</sup> Reed, *Colonial Manila*: 15.

<sup>9</sup> Bernal, *México en Filipinas*: 75–86; Francés, *México y Manila*: 31–36; Schurz, *Manila Galleon*; Williams, 'Tapping the Orient'.

after 1593 as limitations were introduced on the number of sailings (two vessels each year), on their tonnage (not more than 300 tons) and on the value of their cargoes (250,000 pesos on the outward voyage and 500,000 on the return), Manila and her inhabitants experienced unprecedented prosperity. In particular, the colonial officials and merchants who pioneered the trade at the end of the sixteenth and the beginning of the seventeenth centuries were permitted considerable freedom to foster commerce and so enjoyed commensurately sizable profits.<sup>10</sup>

A glimpse of the city at the height of its prosperity is given in an early history of the islands, in the *Sucesos de las Islas Filipinas* (Events in the Philippine Isles) written by Antonio de Morga and published in 1609. Morga was lieutenant-governor and subsequently judge of the royal *Audiencia* (high court and gubernatorial advisory council) who arrived in the Philippines in 1593. He described Manila as the very model of a New World city with its ‘well-arranged streets and squares, straight and level’ and its *plaza mayor* or principal square about which were located the cathedral and municipal buildings. Intramuros also had many other fine churches aside from the cathedral that were attached to the monasteries and acted as the seats of the principal religious orders entrusted with the evangelisation of the archipelago. Thus the monasteries and churches of the Dominicans, Franciscans, Jesuits and Augustinians all numbered among the city’s chief buildings, the latter order’s church in particular being depicted as ‘the most sumptuous in those districts’. Among the other religious buildings of note were the hospitals and charitable institutions for both Spaniards and indigenes alike. Not to be outdone in splendour, the principal royal buildings were observed to be ‘very beautiful and sightly’ with their twin courts surrounded by covered galleries raised on stout pillars and with large and commodious rooms. Other impressive structures included the *cabildo* (seat of municipal government) with its ‘handsome halls’, the royal arsenal, the foundry, the fortress of Santiago and other lesser towers and strong-points. Fronting the intervening streets were the houses of the city’s residents, ‘excellent edifices, lofty and spacious’ with ‘large rooms and many windows, and balconies, with iron gratings, that embellish them’. Morga calculated that there were at least 600 hundred of them and ‘more are daily built and finished’.<sup>11</sup> A later observer

<sup>10</sup> Legarda, *After the Galleons*: 32–50.

<sup>11</sup> Morga, ‘*Sucesos de las Islas Filipinas*’: 136–43.

confirmed the impression of a city with ‘beautifully laid out’ streets, ‘well proportioned’ squares, and ‘large, handsome and very spacious’ royal buildings and favourably compared Manila to Mexico City and Puebla in New Spain.<sup>12</sup> About the streets, squares and churches of this burgeoning metropolis thronged people of all classes, especially Spaniards ‘all—both men and women, clad and gorgeously adorned in silks...because of the ease with which these are obtained’.<sup>13</sup> Without the walls lay an even larger city composed of the ‘orderly and well arranged’ Chinese quarter, the Parian, and the numerous settlements of the indigenous people each with their central squares and parish churches.<sup>14</sup>

### Wood and Stone: Fire and Quake

While Manila may have been a city conceived and laid out according to cultural prescriptions that had their origin in another world and another time, its execution, that is how and with what materials it was built, spoke to quite another set of dictates that were rooted in much more local factors. The Manila that Morga and others lavished so much praise upon was a city of stone, at least, that is, within the walls, but the one that Miguel Lopez de Legazpi founded in 1571 and that grew to be the colonial capital in those first few formative decades of the colony’s existence was built of wood. Timber, bamboo and palm were the primary building materials used prior to the Spanish arrival in the islands. The indigenous house, the so-called *bahay-kubo* was primarily constructed of bamboo (*Bambusa blumeana* Schultes. f.), roofed with nipa palm (*Nipa fruticans* Wurm.), lashed together with rattan (*Calamus maximus* Blanco) and raised on hardwood poles known as *haligues*.<sup>15</sup> Molave (*Vitex parviflora*) was preferred for the latter as it was particularly resistant to attack by *anay* (white ants) and was considered valuable enough to be left as heirlooms to children and even grandchildren.<sup>16</sup> The original settlement upon which Manila was laid was constructed after this fashion with at least a proportion of it surrounded by a wooden palisade. Spaniards continued to use the same materials, adapting them to conform to the architectural forms of their

<sup>12</sup> Letona, ‘Description of the Filipinas Islands’: 203.

<sup>13</sup> Morga, ‘Sucesos de las Islas Filipinas’: 143.

<sup>14</sup> *Ibid.*; Letona, ‘Description of the Filipinas Islands’: 203.

<sup>15</sup> Perez et al., *Folk Architecture*; Alarcón, *Philippine Architecture*: 23–77.

<sup>16</sup> Medina, ‘History of the Augustinian Order’: 241; Scott, *Barangay*: 57–62.

own public buildings, constructing substantial wooden churches and municipal structures roofed with palm thatch. Even quite notable buildings, such as the cathedral in Cebu, the islands' second largest urban area, were entirely constructed of timber.<sup>17</sup> Initially, too, residential dwellings may have remained little changed from their indigenous counterparts if contemporary reports to the effect that 'we have all made use of this method of building' are taken literally.<sup>18</sup> Not only was it 'not convenient' in the words of Juan de Medina 'to build them of other materials' but timber, bamboo and palm were to be found plentifully in the surrounding area.<sup>19</sup> Perhaps, even more tellingly, such dwellings were better suited to the climate; they were cooler, letting the wind blow through them with greater ease and generally considered better for one's well-being. 'When Manila had wooden houses', Medina concluded, 'it was more healthy'.<sup>20</sup>

The consumption of wood during the early decades of the new colony must have been copious. Legazpi wrote to Philip II soon after the establishment of the Spanish colony praising the 'abundance of timber', yet, within a few decades, there were indications of localised deforestation, of mountains 'almost everywhere destitute of forests' and of peaks 'cleared and despoiled of trees'. More tellingly, there began to be complaints about the scarcity of suitable timber obtainable around Manila and the difficulties of transporting it there from elsewhere.<sup>21</sup> Shipbuilding accounted for much of this timber, the fear of Portuguese and more latterly Dutch attack remained constant during the first half-century. Much land, too, was undoubtedly simply cleared for cultivation as the capital's expanding population required a growing agricultural surplus to maintain it.<sup>22</sup> But prodigious amounts of timber were also required for constructing the churches, government buildings, fortifications and homes of the newcomers. Moreover, these structures were expensive to maintain as they

<sup>17</sup> Le Gentil, 'Voyage dans les Mers d'Indie': 207.

<sup>18</sup> Medina, 'History of the Augustinian Order': 241.

<sup>19</sup> Argensola, 'Conquista de las Islas Malucas': 233; Medina, 'History of the Augustinian Order': 217.

<sup>20</sup> Medina, 'History of the Augustinian Order': 242.

<sup>21</sup> Legazpi, 'Letter to Felipe II': 242, and 'Relation of the Philippine Islands': 59; Medina, 'History of the Augustinian Order': 242; Perez, 'Relation of the Zambals': 293; Quirante, 'Expedition to the Mines': 267–68.

<sup>22</sup> Bankoff, 'One Island Too Many': 317–19.

were frequently erected in a hurry, using unseasoned timber that deteriorated rapidly in the tropical climate or were made from the easier to work, softer or lighter-coloured woods that simply rotted away within five to six years and needed continual replacement.<sup>23</sup> And wood, of course, the material from which these buildings were principally constructed, made them highly flammable.

There are numerous reports attesting to the frequency of fires in early Manila, prompting one commentator to lament that 'scarcely has a work been finished than it immediately is burned'.<sup>24</sup> Pre-Hispanic indigenous population patterns were characterised by low density and dispersed settlement that may have acted as natural breaks to the spread of fire.<sup>25</sup> The compact nature of Spanish urbanism, on the other hand, with its intention to concentrate populations around a central location (*plaza mayor* or parish church), the policy of *reducción*, inadvertently created a major fire hazard when coupled with the continuing use of highly combustible materials such as wood, bamboo and palm. Especially during the dry season that extends in central Luzon between the months of November and March or April, any careless action, the thoughtless disposal of smouldering tobacco ('cursed be it, and the harm that that infernal plant has brought, which must have come from hell') or the inadvertent discharge of a loaded harquebus into the thatch, could set a house on fire.<sup>26</sup> Cooking was an especially hazardous activity and so often performed in a small structure separated from the main dwelling. Once alight, a building could rarely be saved and the primary concern was to prevent the flames from spreading to adjacent structures. A fire's spread and path was largely determined by the wind. Already by 1588, fires had menaced Manila three or four times.<sup>27</sup> The conflagration of 1583 was particularly devastating, razing virtually the whole city to the ground including the cathedral, monastery, hospital, fort, government magazine (supplies) and even reducing the artillery to molten metal.<sup>28</sup> Another fire in 1603 was of 'such

<sup>23</sup> Aduarte, 'Historia de la Provincia': 142; Medina, 'History of the Augustinian Order': 283; Salazar y Salcedo, 'Letter to Felipe II': 98.

<sup>24</sup> Medina, 'History of the Augustinian Order': 217.

<sup>25</sup> Junker, *Raiding, Trading, and Feasting*: 62.

<sup>26</sup> Medina, 'History of the Augustinian Order': 144–45.

<sup>27</sup> Salazar, 'Letter to Felipe II': 66.

<sup>28</sup> Felipe II, 'Decree Ordering a Grant to Domingo Salazar': 205; Vera, 'Letter to Felipe II': 301.

magnitude that before nightfall half the city had burnt, including one hundred and fifty-nine buildings'.<sup>29</sup> Again, in 1628, a terrible fire burnt down practically the whole of the Parian, the Chinese quarter, 'since it was at that time built of reeds and nipa, or of dry boards, which burn like a torch'.<sup>30</sup>

Fire was so constant a hazard that it prompted Governor-General Santiago de Vera to prescribe further building in wood, bamboo or thatch in 1587. He found the city plunged into such 'deep affliction and pressing need' on his arrival in the archipelago the year following the great conflagration of 1583 that he mandated that all further houses should be built of stone. Not only was stone easily obtainable with 'native assistance' from nearby quarries at San Pedro Makati and easily transported by river to the city, but it also proved an ideal material for construction purposes 'so suitable that, when wet, it can be worked like wood, and when dry it is very strong and durable'. It was also relatively inexpensive to purchase when produced under these conditions. Vera also ordered the firing of roof-tiles and bricks to replace the use of palm and bamboo. Thus was the characteristic *bahay na bato* or stone house of the Spanish period born. Even during his governorship, the city began to alter from one built primarily of wood to one constructed mainly from stone. Already by 1587, he could boast to Philip II that the number of stone houses had risen from two to 20 and that the monastery and Church of San Augustin had also been erected entirely made from that material. Moreover, 'a considerable number of other buildings, very substantial and well planned' were 'at present in course of construction'.<sup>31</sup> Of course, the process was halting, continually impeded by the ravages of further fires, most notably the one in 1603 when the flames 'leaped' between the remaining wooden structures so that many were still burnt.<sup>32</sup> However, these were not rebuilt in wood so that, already by the time of Morga's history, the 600 dwellings that comprised Intramuros were 'mostly of stone', a truly remarkable transformation.<sup>33</sup> It was the extent of this alteration that prompted the procurator-general, Juan Grau y Monfalcón, to boast in his memorial to

<sup>29</sup> Acuña et al., 'Letter to Felipe III': 129.

<sup>30</sup> Aduarte, 'Historia de la Provincia': 83.

<sup>31</sup> Vera, 'Letter to Felipe II': 298–300.

<sup>32</sup> Grau y Monfalcón, 'Informatory Memorial Addressed to the King': 192.

<sup>33</sup> Morga, 'Sucesos de las Islas Filipinas': 143.



the king three decades later that this 'very sightly' capital now deserved 'equal rank with the greatest and most celebrated cities of the world'.<sup>34</sup>

Fire was principally responsible for transforming Manila from a wooden outpost to a stone metropolis. But other factors also contributed to this change: the growing shortage of timber in the vicinity of Manila, the status that stone buildings conferred on their owners, and the message of permanence that structures made from that material sent about Spanish intentions in the archipelago not only to the indigenous peoples of the islands but also to the Chinese whose trade the colony's prosperity depended upon, and to other European powers, most notably the Dutch. And though fire remained a constant menace to other Spanish settlements across the archipelago and even beyond the walls, for more than four decades following the 1603 fire, the stone city prospered, its inhabitants grew rich and its buildings became more ornate without further apparent incidence of a major conflagration.<sup>35</sup> That is until eight o'clock on the evening of 30 November 1645.

The earthquake that struck central Luzon in 1645 was severe; retrospective calculations assess its magnitude at 7.9 on the modified Mercalli intensity scale.<sup>36</sup> Earthquakes, as has been previously observed, are common in the Philippines, more than three thousand events have been documented during the fifteenth to nineteenth centuries alone.<sup>37</sup> An attempt to assess the strength of these events in the pre-instrumental period was made by Bailey Willis who defined them according to their destructive capabilities. He noted 17 earthquakes between 1600 and 1900 that had either reduced entire towns to ruin or devastated whole districts: six in the seventeenth century, four in the eighteenth century and seven in the nineteenth century. He also categorised a further 36 quakes as capable of causing buildings to collapse.<sup>38</sup> Spaniards, therefore, were not unaware of such seismic movements; it is just that they were not a cause of major apprehension before 1645. As Joseph Fayol, a royal chaplain in the city and an eye-witness to the events that took place explained, they simply

<sup>34</sup> Grau y Monfalcón, 'Informatory Memorial Addressed to the King': 77.

<sup>35</sup> Fayol, 'Affairs in Filipinas': 217.

<sup>36</sup> Bautista and Oike, 'Estimation of the Epicenters': 152. This scale classifies earthquakes according to an intensity of one to 12.

<sup>37</sup> *Ibid.*: 137.

<sup>38</sup> Willis, 'Philippine Earthquakes and Structure': 79–81.

did not have ‘any pressing fear of the earthquakes—which, although they usually occur here every year, have not [before] caused destruction’.<sup>39</sup>

Unfortunately, this earthquake was of an entirely different order to the ones that the Spaniards had experienced previously. The church bells had just fallen silent after the ringing of the *animas* in memory of departed souls. The sky was clear, the moon bright and the air calm and still. ‘Suddenly a frightful crash was heard, and the earth began to quake so violently that it seemed as if it would become a sepulchre for all the inhabitants’.<sup>40</sup> It is not possible to determine the duration of the principal quake though it was described at the time as lasting for the space of ‘four *Credos*’ or professions of the Catholic faith, a span of several minutes that seems unlikely. It was also followed by many aftershocks that continued to shake the ground over the next month, one of which on 5 December was said to have been ‘as violent as the first’.<sup>41</sup> Fayol’s description of the earthquake is graphic and merits quoting at some length in respect to its effect on Manila’s buildings.

The stone walls were shaken and bent like sheets of paper or parchment fluttered by the wind; the towers swayed and bent like trees; and the largest trees [broke] like the mast of a ship in the midst of a fierce hurricane. Nothing could be heard but the crash of buildings mingled with the clamour of voices entreating heaven for mercy.<sup>42</sup>

The main shock totally destroyed 150 of the ‘finest buildings’ and, together with the aftershocks, caused so much damage to the remaining houses that most were considered too dangerous to reoccupy and were subsequently demolished. The gubernatorial palace and royal *Audiencia* were largely reduced to rubble. The cathedral was perhaps hardest hit of all as ‘tower, roofs, chapels, and even the foundations, were overthrown’. Most of the churches, seminaries and hospitals belonging to the religious orders and the principal edifices outside the walls were also severely affected. Nor was the devastation confined to Manila alone but within the surrounding district most of the parish churches and *conventos* in which priests lived were similarly wrecked, as were many of the pleasure houses

<sup>39</sup> Fayol, ‘Affairs in Filipinas’: 217.

<sup>40</sup> *Ibid.*: 218.

<sup>41</sup> *Ibid.*

<sup>42</sup> *Ibid.*: 219.

built along the river banks by Spaniards wishing to escape the stifling summer heat within the city. Summarising the overall extent of the damages wrought by the earthquake, Fayol concluded ‘that the whole of Manila was destroyed; for neither within nor without the city was there a building which did not need a great deal of repair to make it habitable’.<sup>43</sup>

The earthquake, then, had proven as devastating to the stone city as fire had been to its wooden precursor. Moreover, Manila was rocked by two further major earthquakes in the ensuing decades, measuring 5.7 and 7.3 on respectively 19/20 August 1658 and 17 December 1677.<sup>44</sup> Spaniards had purposely begun to construct their houses of stone and tile ‘to provide themselves against these disasters from fire’, transforming the built environment in the process but rendering the city and its inhabitants much more vulnerable to earthquakes. As Fayol so eloquently construed: ‘The result has proven that the inhabitants of Manila, while avoiding in their buildings the activity of fire, fell into the terrible power of the earth’.<sup>45</sup>

### The City as a Complex Adaptive System

The standard Western explanation dating from at least the mid-nineteenth century is to associate the replacement of wood by masonry with notions of cultural evolution, equating the soft, pliable nature of wood with impermanence and decay and the solidity and strength of stone and brick with durability and progress, the march of civilisation.<sup>46</sup> Thus the birth of modern Japan was visually represented in the new Meiji rulers insistence in building in brick and mortar according to European standards. However, as Greg Clancey has shown, it proved to be a much more complicated narrative than that, one in which these new masonry buildings proved very vulnerable in relation to old wooden structures in a seismically active landmass like Japan.<sup>47</sup> Lionel Frost suggests an alternative explanation for the continuing use of highly inflammable materials in crowded urban areas, what he calls an Asian way of coping. People responded to the constant threat of fire by building houses cheaply and furnishing them

<sup>43</sup> *Ibid.*: 224.

<sup>44</sup> Bautista and Oike, ‘Estimation of the Epicenters’: 2000: 152. Casimiro Díaz dates the 1658 earthquake to 20 August, see Díaz, ‘The Augustinians in the Philippines’: 167.

<sup>45</sup> Fayol, ‘Affairs in Filipinas’: 217–18.

<sup>46</sup> Adas, *Machines As the Measure of Men*: 153–77.

<sup>47</sup> Clancey, *Earthquake Nation*.

sparingly: 'These houses were the architectural equivalent of a ballpoint pen: they were functional, but disposable, with their loss causing no great economic harm to their owners'.<sup>48</sup> He went on to note that such structures had an added advantage in that they bent and swayed rather than collapsed during earthquakes.<sup>49</sup>

Manila was Western and, for a period of time around 1600, the premier such city in Asia. Intramuros was certainly laid out according to European notions of urbanism and its trajectory outwardly seemed to conform to culturally-specific notions of progress in which initial structures built from wood were replaced by more permanent ones constructed from stone. Matters were different in the non-European parts of the city. The indigenous settlements, though loosely modelled around a central plaza, were much more in the nature of the Asian cities described by Frost. The Chinese in the Parian were somewhere in between: a rigid conformation to the grid-iron pattern but constructed from combustible materials. And yet the factors behind the transformation of Intramuros from a wooden to a stone city were not primarily cultural ones associated with notions of progress or grandeur, but rather environmental ones determined by the risks of living in an alien setting. In fact, Manila represents a fascinating interplay between culture, architecture and hazard over time. Moreover, it was a process that did not finish with the earthquake of 1645.

Manila as the colonial capital was rebuilt following the devastation of 1645 and the two subsequent major earthquakes of the seventeenth century. And while the city was rebuilt in stone, a subtle change occurred in both the outward form and internal substance of its buildings. Later colonial architecture sacrificed much grace of line for more appropriate form and load-bearing. The extensive use of massive buttresses, low body structures and squat bell towers that are so characteristic of remaining examples of colonial buildings, especially provincial churches, testify to a heightened awareness of the perils of masonry construction in a seismically active area.<sup>50</sup> Rather suggestively, this style has even become known as 'earthquake baroque'.<sup>51</sup> Domestic architecture, too, underwent a similar radical transformation with the incorporation of indigenous

<sup>48</sup> Frost, 'Coping in Their Own Way': 10.

<sup>49</sup> *Ibid.*: 6.

<sup>50</sup> Alarcón, *Philippine Architecture*: 97–101; Bankoff, *Cultures of Disaster*: 163–66.

<sup>51</sup> Rantucci, *Geological Disasters*: 64.

building practices into the internal framework of structures. In particular, the heavy timber work of the roof beams were now supported by a system of trusses and rested on a series of wooden struts that were similar to the *haligues* used in native housing and planted deep into the ground to provide a measure of flexibility in the event of violent seismic movements. The number of storeys was also generally reduced from three to two with the upper one increasingly constructed from lighter materials such as wood and latticework panels, the latter adapted from the Japanese artisans who as Christian refugees or traders had settled in the city at the beginning of the seventeenth century.<sup>52</sup> According to the Augustinian friar Casimiro Díaz, these measures were credited with the little loss of life experienced during the 1677 earthquake despite its magnitude. The situation that the city found itself in, he continued, was ‘greatly improved over former times’ in that its buildings were lower and more compact and used timber frameworks so that: ‘although the earthquake demolished many buildings, breaking open the solid mass of masonry, they did not suffer entire ruin by being thrown down to the ground’.<sup>53</sup>

The gradual reintroduction of wood remains a feature of Spanish architecture in the Philippines during the ensuing centuries. The threat of fire remained ever-present in Manila, whose *ayuntamiento* (town council) progressively extended the prohibition on the construction of houses made from *materiales ligeros* (combustible materials) in the same neighbourhood as those built of *materiales fuertes* (durable materials) to the city beyond the walls as stone dwellings ceased to be the prerogative of only Europeans.<sup>54</sup> Fire continued to be a major hazard well into the nineteenth century, especially during the dry months preceding the monsoons, with devastating conflagrations occurring in 1847 (Santa Cruz), 1854 (Tondo), 1863 (San Nicolás), 1865 (Ermita), 1866 (Meysig) and 1869 (San Miguel).<sup>55</sup> The lack of proper urban planning in the rapidly expanding mid-nineteenth century metropolis, frequently alluded to by the authorities, ensured that

<sup>52</sup> Javellana et al., *Filipino Style*: 49–51.

<sup>53</sup> Díaz, ‘The Augustinians in the Philippines’: 167–68.

<sup>54</sup> Huetz de Lemp, ‘Materiales Ligeros’: 162, 166.

<sup>55</sup> González Fernández, *Manual del Viajero en Filipinas*: 173–78; Huetz de Lemp, ‘Materiales Ligeros’: 170, n22. On the separate but related subject of arson in the city, see Bankoff, *Crime, Society and the State*: 73–75.

once lit the flames spread rapidly so that ‘not a day passes without, unfortunately, a report of fires’.<sup>56</sup> Moreover, the great earthquakes that shook Manila in 1863 and again in 1880 only accelerated the use of timber in buildings.<sup>57</sup> Such was the devastation in the aftermath of 1863 that it prompted a change in house design: timber was further substituted for stone to give structures greater flexibility to withstand ground movement. In particular, the load-bearing role of the stone lower storey was replaced by a wooden framework that was mortised-and-tenoned to the ground posts that now increasingly stood outside and apart from the walls.<sup>58</sup>

The role that fire and quake played in the construction of old Manila has not previously been fully acknowledged. The colonial city constituted an arena in which alien notions about space and place were reconciled to local environmental realities through the medium of architecture and urban planning. As such, the city functioned as a complex adaptive system where control and order emerged largely as a response to the exigencies of hazard rather than to any predetermined principles or policies, especially subsequently to Governor-General Santiago de Vera’s 1587 decree. The form and substance of the city that materialised over the ensuing centuries was neither wholly European nor Asian, but a fusion of both tempered all the while by the necessities of living in a climate where fire spread rapidly at certain times of the year and where the threat of calamity lay constantly in the ground beneath one’s feet. As John Holland notes, ‘a city is a pattern over time’ in which innumerable actors and agents interact in a multitude of diverse ways to adapt to circumstances.<sup>59</sup> In Manila, the pattern of the past that emerged between the substance and material form of buildings and the risks inherent in the natural environment has been subsequently lost. The new metropolis that came into existence during the course of the twentieth century seems heedlessly neglectful of its own history and, perhaps, like the Spanish city prior to 1645, awaits its own nemesis.

<sup>56</sup> *El Comercio* 30 April 1891.

<sup>57</sup> Bankoff, ‘The Tree as the Enemy of Man’: 330.

<sup>58</sup> Zialcita and Tinio, *Philippine Ancestral Houses*: 66–67; Dacanay, *Ethnic Houses*: 170–71; Huetz de Lempes, ‘Materiales Ligeros’: 165. The most comprehensive study on nineteenth-century architecture in Manila is Viana’s *Three Centuries of Binondo Architecture*. Despite its title, the book primarily deals with the last hundred years.

<sup>59</sup> Holland, *Hidden Order*: 1–5.

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