

Post disaster reconstruction, 1755 – 2014

Have we really learned any lessons ?

Kurt Rhyner

Are there lessons to be learnt from past disaster reconstruction? This paper looks at two historical events and tries to make bridges to the situation 250 years later. It focuses on two very different events both of which created new ways of dealing with catastrophes, an earthquake that destroyed a world capital and a fire that destroyed a small rural town. While it is difficult to draw lessons from one historical period to another and from one situation to the next, it is disturbing to see that today we seem to be unable to live up to the proclaimed goals “sustainability” and “build back better” whenever a catastrophe hits.

The Lisbon earthquake, November 1755

“Contemporary reports state that the earthquake lasted between three and a half and six minutes, causing fissures 5 metres wide to open in the city centre. Survivors rushed to the open space of the docks for safety and watched as the water receded, revealing a sea floor littered with lost cargo and shipwrecks. Approximately 40 minutes after the earthquake, a tsunami engulfed the harbour and downtown area.... In the areas unaffected by the tsunami, fire quickly broke out, and flames raged for five days.”¹



Copper engraving dated 1755 (Wikipedia)

The Baixa area (Lower town) with its narrow streets was built on alluvial soils, and the damages caused by the earthquake, the tsunami and the fire were enormous, some 40,000 people dead and around 95% of the buildings destroyed or severely affected. The economic, financial and bureaucratic centre of this world power was in ruins. The church declared the earthquake as a manifestation of divine judgement, others rejected the argument on the base that the red-light district had been spared from disaster. In fact, this became a major discussion around the world, involving most of the contemporary philosophers and theologians.

Amidst calls for prayer, the king appointed his minister of foreign affairs (later to be known as Marques de Pombal) to head operations. Pombal apparently had given the king the advice to “bury the dead and feed the living”. He declared martial law and within a matter of days a food distribution system was established; contrary to all customs and under church protest, they loaded the dead on barges and buried them at sea, thus avoiding a hygienic disaster.

“The army was deployed to prevent people from fleeing the country, looters were summarily hanged, and pleas for special treatment from the nobles and clergy were ignored. Pombal quickly became a heroic figure among the Portuguese people, a phenomenon that has made it exceedingly difficult to ascertain what he actually accomplished during the immediate aftermath of the earthquake. However, there is no doubt that his efforts started Lisbon on the road to recovery.”²



Marquês de Pombal by Louis van Loo, 1766

¹ http://en.wikipedia.org/wiki/1755_Lisbon_earthquake

² Mullin, “The reconstruction of Lisbon following the earthquake of 1755: a study in despotic planning”, University of Massachusetts – Amherst, 1992

Pombal ordered all able men to work in the clearing of the city, they erected tents and provisional quarters in the public spaces to house the survivors. The city was divided into 12 areas with one magistrate each, military engineers took the command in clearing the rubble and, at the same time, an inventory was made of all properties. Although many families wanted to reconstruct or build provisional shelters, two months after the earthquake the king prohibited building anything before the new plans were approved, or to erect new shanty towns on land outside the town, rules which were strictly enforced by the military. Eleven months after the event a new law allowed building if it was within the plans and if it complied with the new building laws, which did not really open the doors for much construction as the plans were not yet complete. A special 4% tax was introduced for all manufacturing and merchandising.

“Thus, in these early stages Pombal began to procure information, to protect undeveloped areas, to ensure orderly, planned development in the Baixa, and to obtain funding to finance the reconstruction effort. The seeds for the reconstruction were quickly planted and began to bear fruit rapidly.”³

Planning to rebuild Lisbon

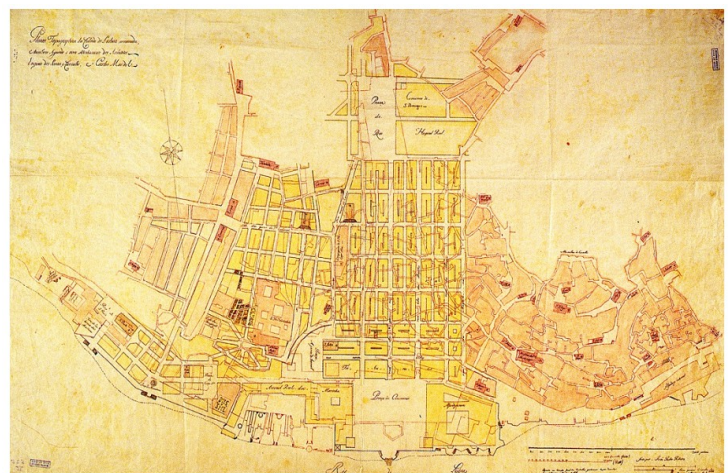
Several architects were invited to present their ideas for reconstruction and from them the most radical idea was chosen, levelling the Baixa, raising the lower parts with rubble to build a modern city with wide streets and large public spaces, to provide open areas to where people could escape in a future earthquake. Land ownership of course was a major concern. Pombal realized that the traditional landowners were not the driving forces in society and through a series of decrees he moved power from the old nobility and the church towards the merchants and manufacturers. The resulting political unrest of the traditional elites culminated in an assassination attempt against the king and eventually led to banning the Jesuits.

The new design took into account the main wind directions and the path of the sun and included an integrated sewage and water system, thereby improving the hygienic situation and the well being of the public. This new city infrastructure occupied more land than before and for the re-allocation of plots all properties suffered a proportional reduction in size. Families who did not want to or were unable to rebuild were compensated in cash or with land in other areas.



Lisbon at the turn of the 16th century

“Land within the Baixa was immediately appropriated by the state and re-allocated, with preference given to existing land owners, leaseholders or administrators for nobles, the church or the crown. Compensation was based only on site area, and not the post-earth-quake building condition. New lots were allocated on the condition that redevelopment would be completed within five years, effectively rendering the exercise a land readjustment operation rather than an exercise in eminent domain, while preventing longterm speculation of development leapfrogging.”⁴



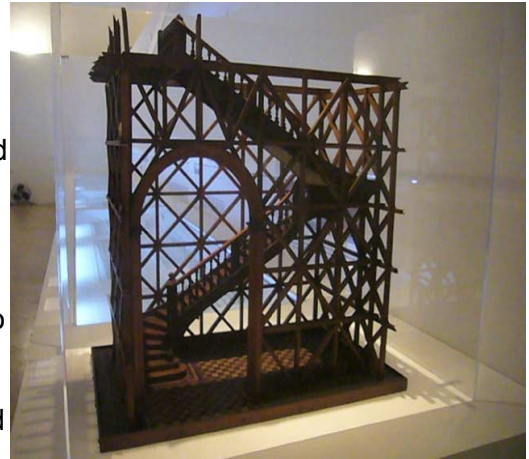
Design of the city of Lisbon , Museu da cidade de Lisboa1756

³ idem

⁴ Brand and Nicholson, “Learning from Lisbon: Contemporary Cities in the Aftermath of Natural Disasters”, Victoria University of Wellington, New Zealand, 2013

The first documented seismic design

The Marques de Pombal and his architects are credited with the beginning of seismology, and “Pombalino architecture” was coined and is still used today. A questionnaire sent to all affected towns in Portugal included questions about how damage had occurred, in which directions the buildings had fallen and what had withstood the tremors. The team of military engineers and architects with much construction experience in Portugal and its colonies even made models of buildings and shook them to study their performance. It was decided to build up to four stories with well braced wooden structures, which would allow the buildings to shake but not fall. However, they had to rest on a solid foundation and in some cases timber poles were rammed into the earth to fortify the base.



Model of the wooden structure called "gaiola"

In order to reduce the fire hazard, all buildings had to be enclosed by stone walls up to the roof. Stone walls divided intersections of buildings and extended above the roof line. The load bearing timber structures were independently inside the stone cage. Outside of town workshops were established where the timber elements were prefabricated and then brought to the site to be assembled. Young professionals were trained in a novel dual education program at the university of Coimbra where they learned the construction trade.

Resuming the facts

Two months after the disaster the cleanup was well underway, the survivors lived in tents or had found shelter in the neighborhoods on the hillsides. After five months the basic decision had been taken to build a modern city on top of the debris. Legalization of land ownership began two months later and concluded 30 months after the disaster. Massive reconstruction began one year later. It took a total of about 40 years until all the plans were implemented.



Baixa 2014, Many buildings are under restoration



Insight into restoration of a gaiola (Foto R. Langenbach)

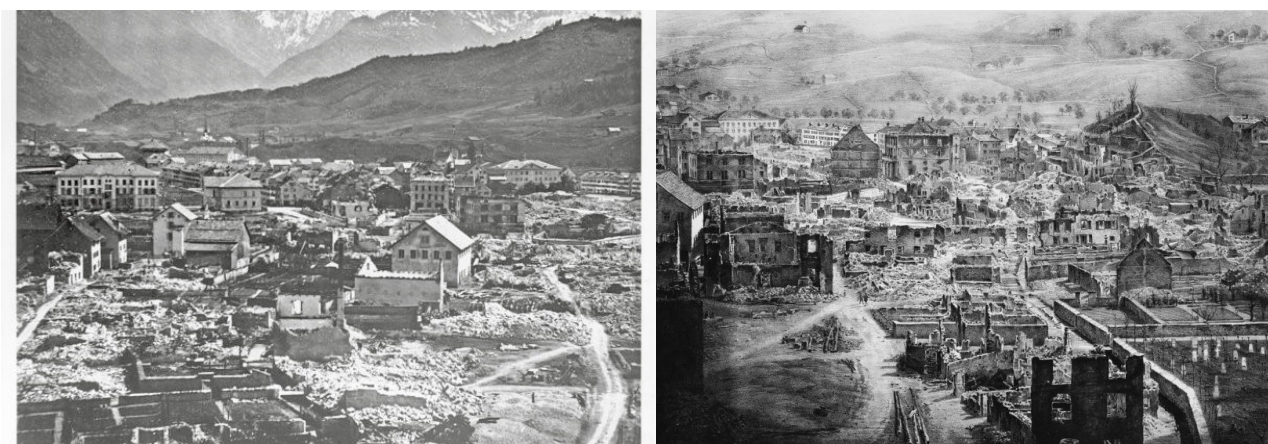
Today, after 250 years, the Baixa district is under renovation, and is the centre of a city that has expanded far into the countryside, largely following the same patterns of urban design. The artisans have disappeared and given way to shops and commerce, the streets filled with shoppers and people dining in the many restaurants that have extended into the pedestrian zone.

There is no doubt that the reconstruction of Lisbon placed much hardship on people, and Pombal was what Mullin calls an “*enlightened despot*”, with a “*despotic but utopian and progressive plan*”⁵ Pombal was given power by a weak king, and he assembled the best available men into a team that went ahead with decision. Of interest is that one of the few houses not affected by the disaster was that of Pombal, and it was demolished and rebuilt in another location like the others. In retrospect, the results justify the hardship.

5 Silva R. “Lisbon rebuilt and expanded 1758 – 1903”, (Lisbon Municipal council)

The fire of Glarus, May 1861

With a strong wind blowing, an enormous fire broke out in Glarus and destroyed some two-thirds of the town. The fire broke out in a shingle-roofed stable and was fanned to catastrophic proportions by a strong, hot wind, turning the night into one of "misery and terror, woe and helplessness" for the citizens of the town. By about 10 pm, half an hour after the fire broke out, at least 150 houses were in flames. Despite enormous efforts, the fire could not be brought under control. Sparks leapt from one roof to another through the town. The fire raced through the settlement, not stopping until it had reached the periphery. An hour and a half later, over 600 buildings were already in flames: Glarus was a sea of fire. The basin of the valley was lit up as if it were broad daylight, and the light could be seen as far away as Ravensburg, Basel and Neuchâtel. Over 2000 men from different fire brigades rushed to the scene on foot or by rail, bringing with them over 30 fire engines. The fire threatened to engulf the factories at the edge of town and the residential areas to the west and south. The brigades fought the blaze to the point of exhaustion. The following day, the town presented a dreadful sight; two-thirds had been reduced to ashes. Glarus was now a ghost of its former self, and around it camped over 2000 homeless people, some 47% of its total population. Eight people lost their lives. The fire had covered an area measuring approximately 570 metres by 450. ⁶



Images from the damage caused, the unharmed buildings in the back are south of the place where the fire started

Glarus is a small industrial town in an alpine valley and is the political and social centre of the canton. A few times a year a strong warm and dry wind, called Föhn, races down the valley from the south. During those days it was prohibited to light fires as sparks from chimneys had often started fires, the town having suffered four such events over the last centuries. Nevertheless, in the night of May 10 it happened again. Most houses were built of timber, and about half were roofed with wooden shingles that, once set on fire, were blown like torches over the neighboring houses. However, a few houses did withstand the fire. The southern part of town was unharmed as it was not in the path of the winds, and a few houses in the north were also spared.

The church sounded the alarm bells and the man at the telegraph station sent out the alarm. By the time the firefighters from neighboring towns arrived either with horse-drawn pump engines or by train, not much remained to be saved. However, they did succeed in keeping human casualties to a minimum, rescuing people who had sought refuge, many of them in the public fountains.

The town council called an assembly for the third day after the fire. The mayor, Niklaus Tschudi, had already contacted two leading Swiss architects, Caspar Wolff from Zurich and Bernhard Simon, a Glarus-born architect who had begun his career in St Petersburg. Thus, Tschudi presented the eligible voters of Glarus with far reaching proposals for the clean-up and reconstruction of the cantonal capital. The citizens raised their hands in approval of proposals from contracting the architects, surveying all properties, drawing a cadaster of the town, to expropriating all affected plots.

⁶ http://history.swissre.com/item_detail.php?id=8&comefrom=item*9

One week later those decisions were supported by a higher level meeting of all voters of the entire canton, at which assembly an unlimited budget was approved and the regional parliament instructed to prepare new building regulations. An unprecedented wave of solidarity poured in from everywhere in Switzerland as well as countries, among them from the pockets of Glarus emigrants in Russia, South America and the USA, and helped to overcome the emergency needs of clothing, food, cooking utensils and so on.



A replica of old Glarus with a marker where the fire started and then was driven by the south wind over the center to the north



The town meeting on the third day, where far-reaching decisions were taken

Planning to rebuild Glarus

Two days after the fire the two architects were contacted and on the fourth day they received the official approval to plan a new town. The architects decided to plan a modern town with a grid of straight wide roads and sidewalks, a total contrast to the old town with its narrow winding streets. The main axis lead from the courthouse to the cantonal government palace to the town hall, the church received a special place in the grid out of the centre. While this new idea was criticized by many at the time, 150 years later with new types of vehicles and increased levels of traffic, it still is functional

Throughout the centre of town, the houses were to be three and four storeys high, mainly grouped around an interior patio with a public fountain. There is always an access from outside, so the fountains provide convenient service to the apartments, as well as ensure a water supply to extinguish fire. Commercial establishments were to be on the ground floor and apartments in the upper floors.

The architects presented their layout on July 18, just ten weeks after the fire! One month earlier the regional parliament had approved laws for expropriation of the burned zone and reassignment of new plots to the owners. Whoever was not in condition to build received indemnity in cash or plots outside of the centre, a jury was set up to deal with the issues arising from there. The cadaster plan was also finished with some 600 plots measured. The mayor had ordered the railway to be extended to the place chosen for the materials preparation and two lime kilns and a brickyard were established nearby.

In September, 261 plots had been assigned and the new construction bylaws approved and implemented, so construction could start. Meanwhile most affected families and the workers lived in makeshift wooden huts or had found shelter with neighbors and family in surrounding villages.

The reconstruction

Workers from all over Switzerland and neighboring countries gathered in Glarus. A hill in the centre of the old town was leveled and the material used to fill in the lower areas of town. The mountain rivers that had been tamed centuries ago and were used to drive the engines of industry, now were channeled into subterranean beds.

All structures had to be built in stone and the walls joining houses had to be extended over the roof line. All roofs were covered with clay tiles.

By the end of the year the first three houses were finished. At the end of 1863, 30 months after the fire, 288 houses with a total of 518 apartments had been built, as well as more than 60 workshops and the first public buildings. As the cantonal insurance institutions had insufficient capacity to cope with the consequences of the calamity, the need for more insurance and reinsurance coverage became apparent and the public insurance system was extended. In order to cover the enormous debt the canton had assumed, new taxes were levied on industry and commerce as well as on private households.

As a response to the emergency the church was rebuilt only after the dwellings had been completed, between 1863 and 66. The house of worship was to serve both the protestant and catholic faiths, a custom that continued until a separate catholic church was built a century later.

Resuming the facts

It is outstanding that in such a short time it was possible to reorganize and rebuild a town in a truly revolutionary manner. In contrast to the experience in Lisbon, it happened in Glarus within a democratic system, which for its time was exemplary. While the mayor assumed responsibility and was a strong driving force, all major decisions were presented to the citizens for a public vote and the regional parliament played its role to elaborate the new laws and bylaws that afterward were debated and approved by the voters.

The new construction standards influenced the national standards which were revised a few years later. The cantonal insurance system is still today the most complete of Switzerland. The wide roads and pedestrian sidewalks are able to digest the traffic of a vibrant economy and highly mobile population 150 years later.



Glarus 2014 with its characteristic grid, the fire had started at the place marked with the red star



Wide roads and sidewalks were in stark contrast to the old town and caused criticism in 1861

The Haiti earthquake 2010

The response to the 2010 earthquake in Haiti perhaps is the strongest contrast to success. A weak government with a president who went into hiding for three days combined with an unprecedented amount of international aid set the stage. The international “emergency business” invaded Haiti which even before the earthquake had been described as “a country run by NGO's”. Hundreds of solidarity actions tried to start their programs, all called for coordination, but there was no entity to take the lead. The government was unable to respond because of its historical inherent weakness. This, together with a pending election whereby politicians and business leaders openly sought personal gains, opened the door to total chaos. Most funds were spent on provisional shelters, and of course on salaries for the thousands of expat helpers and experts. Extremely few solid shelters were built, likely no more than 13,000 vs 115,000 temporary shelters (T-shelters).



Destruction hit formal buildings as well as self-built ones



The result of decades of unregulated building

Property of land is always an overriding problem, and more so in Port au Prince with its incomplete cadastre, with thousands of apartments built on the steep hillsides with no records. There was no real effort made to tackle the problem and in many cases even public plots are claimed by private people.

Four years after the earthquake a comprehensive cadaster still does not exist and there has been no serious attempt to discuss or draw up a master plan for reconstruction. Self-builders and construction companies alike are busy, seldom it is “building back better” but rather building cheaply and building higher. Tens of thousands Haitians have squatted in the northern foothills and are starting to build permanent structures, without consideration of disaster prevention or alleviation, and with no apparent order nor infrastructure. The next gigantic slum is being created.

“Meanwhile, many families have returned to houses that are damaged or threatened with collapse and/or have reconstructed their houses with their own means. Since many constructions do not respect the minimum security standards, this situation increases the risk of a new catastrophe”.⁷



A nightmare for earthquake resistance

Most international organizations have retired from Haiti and it is difficult to find somebody who is happy with what they achieved. They (we) are licking their (our) wounds and pronounce: “Never again transitional shelters”.

Surprisingly enough, in the “Shelter Cluster meetings” in Geneva in 2013 new designs for T-shelters were among major presentations, as if those lessons had not been learned. It seems in the reconstruction of Cyclone “Haiyan” in the Philippines many have renamed T-shelters as “semi permanent houses”.....



Many shelters are low quality and badly built

⁷ “Observatory on public policies and on international cooperation”, Centre de recherche, de réflexion, de formation et d’action sociale, June 2012, Port au Prince

“We learn from history that we do not learn from history”

These famous words of the German Philosopher Friedrich Hegel seem to describe the results of reconstruction after recent earthquakes, tsunamis and hurricanes. Is it so much more difficult to plan and rebuild today than it was 250 or 150 years ago? Of course, Lisbon and Glarus are two “showcases” that worked, but also there have been numerous “failures” in the past. After the great fire of London (1666) revolutionary plans also existed to rebuild, but there was no power brave enough to implement it.

The great fire of San Francisco in 1906 was dealt with rather efficiently, in total contrast to the inundation in New Orleans 99 years later.

In recent times it is difficult to find disaster reconstructions that responded swiftly and brought long-lasting improvements to the affected society. A significant exception is the Sichuan earthquake in 2008, which killed some 80,000 people. The Chinese government put forth a 3-year plan and more than 200'000 solid houses were built, 30 towns were redesigned for earthquake resistance. Farmers were reassigned new land away from the landslide-endangered sites and large reforestation projects to mitigate the danger were begun. ⁸

There are lessons to be learned from Lisbon and Glarus and others. During the emergency phase it needs strong and clear decisions, it was martial law in Lisbon or special powers to the democratic government in Glarus. Looters were apprehended and the work force mobilized, special conditions applied for a limited time. Land reform was implemented, regardless of protests from the elite and special taxes were imposed. Local leaders surfaced and gained the confidence of the king or the population.

The Indonesian researcher Annye Meilani ⁹ makes a differentiation between “survivors and victims”, talking about people and societies who behave like victims, and those that immediately take action to resolve their plight. The choice for decision makers in emergency and reconstruction programs can be compared to the situation of medical doctors in war situation....the triage to decide whom to attend and whom not....spend funds in helping the victims or plan with the survivors.

In Lisbon and Glarus (as well as San Francisco and Sichuan) the emphasis was on reconstruction for the future. Most modern emergency actions focus upon the present, greatly influenced by the media which concentrates on the “victims” and expects the solidarity actions to provide quick results. A great amount of money is exhausted in the first weeks after a catastrophe. While much of the available funds are used for the immediate emergency response, a great amount is used for desk jobs, often combined with an invasion of outsiders which confuses the local population. Thus, few financial resources remain to introduce real changes for the future, for the “survivors”. It is a short term vision. The media is generally not interested to report two or three years after a catastrophe and show lasting results, nor in the creative responses of the local survivors. “Good news” is not in demand.

Over the last decades most post-emergency reconstructions concentrated on re-establishing “courant normal” at a lower level, not on structural improvements. It seems that modern life and its complexities prevent our societies from taking brave decisions. Governments are afraid to tackle the “land issue”. Is it that the modern conception of society places the right to property higher than the right to life and makes it impossible to expropriate land and redistribute it in a way that makes a safe and functional habitat ?

Are we bound to accept property deeds and court decisions as being superior to the common good or is it simply that we do not care ? That would be the behavior of victims, not survivors.

Kurt Rhyner, August 2014

⁸ “Rising from Rubble”, China Daily, May 12, 2013

⁹ Annye Meilani, presentation at the “Looking back at reconstruction” conference, Coventry, January 2014