Considering that all these actions can prove to be effective and useful in relation to high-quality conservation of the site, it is desirable to consider a preventive-conservation approach as part of the site's management plan. It is appropriate to remember the cultural significance and the attractive features of a site to be conserved, and that these are crucial for a correct identification of the conservation aims, the activities and measures adapted to the conservation of the site in question and their prioritization. Finally, over and above the elaboration of such a plan, only a dynamic vision of the future is effective. It is, therefore, appropriate to periodically revise the plan so as to adapt decisions and objectives in light of research being carried out and results obtained. If the site evolves, the interest in it will also rise. One also needs to take into account the evolution of the site's physical, social and cultural context.

6. CONCLUSION

As long as preventive measures are very common in the traditions of building and living in earthen buildings, preventive conservation appears to be naturally suited to the conservation of earthen architectural heritage. In our changing world, and more specifically, with regard to climatic changes, such a preventive approach also appears to be very compatible, as it can easily include the risks linked to it (risk management). In the context of a possible long-running economic crisis, its capacity to lead to low-cost solutions is also a very strong advantage.

This paper has proposed a methodological approach for its implementation and provides a list of points that probably needs to be considered when trying to apply it. Through the reflections presented herein, one can realize that preventive conservation cannot be implemented without putting it into context of a larger management scope, which obviously also implies the involvement of stakeholders and, to a certain extent, sharing decisions with them.

Furthermore, we also need to realize that in its basic concept, preventive conservation may lead us to freeze heritage in the state in which we found it. But as developed herein, the very nature of this heritage might evolve and freezing it might not be the right way to respect its authenticity. In the same vein, especially when dealing with living heritage (historic centers, cultural landscapes), it is also important to take into account the other recommendations that have recently been established by the conservation community (e.g. the Vienna Memorandum) that opens the reflection on the need for changes (acceptable changes) to ensure that living in heritage remains possible, a primordial condition for its conservation.

Preventive conservation cannot be applied strictly in every situation, but it is a very useful concept for all those who wish to conserve earthen architecture but have limited means available to them. It also often leads to decisions that had naturally come to those who built and, later on, maintained these heritage structures, ensuring the authenticity of the interventions.

Notes

(1) A partnership between ICCROM and CRAterre was established in the framework of the PREMA program (Prevention in Museums in Africa) at the occasion of a major field project at the Royal Palaces of Abomey, Bénin, a World Heritage Site.
(2) The GAIA project was a joint initiative by ICCROM and CRAterre developed between 1988 and 1998, which included advocacy, research and training activities.

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INTERNATIONAL HERITAGE CONSERVATION PRINCIPLES IN EARTHQUAKE ZONES, JAPAN

Kanefusa Masuda, Olga Keiko Mendoza Shimada

Theme 8: Charters, Standards and Guidelines for Conservation of Heritage and Construction
Keywords: Lima Declaration 2010, Venice Charter 1964, Nara Document 1994, World Heritage

Abstract

The Lima Declaration, adopted at the "International Symposium on Disaster Risk Management of Cultural Heritage; Sustainable Conservation of Urban Cultural Heritage in Seismic Zones" on December 3, 2010, says at its beginning that "*World is divided into seismic and non seismic areas. Earthquakes occur mainly along two big circles: The Circum-Pacific where more than 95% of seismic energy is dissipated and the Eurasian circle. Following the International Conservation Charters and conservation policies, now we address the cumulative damage to cultural heritage associated with severe earthquakes prone areas.*"

Japan and Peru are both located on the Circum-Pacific Seismic Zones, and also have rich cultural heritage, including many UNESCO World Heritage cultural sites. The structures of these heritage are mainly constructed with earthen, stone or wooden material, all ecological and natural materials, easy to reuse again for the reconstruction works after the earthquake disasters. For their sustainable protection and safety for human life, we need to constantly take care for the structures and be prepared for the next earthquake disasters based on management plans. Heritage values after reconstruction deeply depends on craftsmanship, one of the four tests of authenticity in the evaluation of World Heritage sites. Our heritage values are thus deeply related with intangible values, like techniques and community traditions.

The Venice Charter in 1964 and the Nara Document on Authenticity in 1994, both guiding principles for the World Heritage system, and both adopted in seismic countries like Italy and Japan, do not have enough tools necessary for sustainable protection against earthquakes. We need careful understanding of existing conservation principles, but if they are not enough, we have to examine a new principle to solve this problem. This paper intends to clarify the above points, introducing recent disaster experiences in Japan, especially the case of East Japan Great Earthquake in 2011 and Kobe Earthquake in 1995.

1. INTRODUCTION

East Japan Great Earthquake, which occurred at 14:46 on the afternoon of March 11, 2011, with a magnitude 9.0, caused great tsunami disasters along the northeast coast of Japan. There was almost 19,000 victims from the tsunami, with the visual images of the devastation dramatically broadcasted through TV news to all over the world. The people in the affected areas are now slowly rehabilitating near their old towns and villages, and they have huge works to reconstruct their own houses in a safer way and also to re-start their industry, with the help of central and local governments and many volunteers. But they also need the recovery of communities and cultural traditions, through the reconstruction of tangible and intangible cultural heritage for their own sustainability.

This paper intends firstly, to introduce Japanese experiences in the recovery restoration of Western-style historic buildings after the Kobe earthquake disaster in Japan on 1995, and then to investigate the fact that so many World Heritage sites are

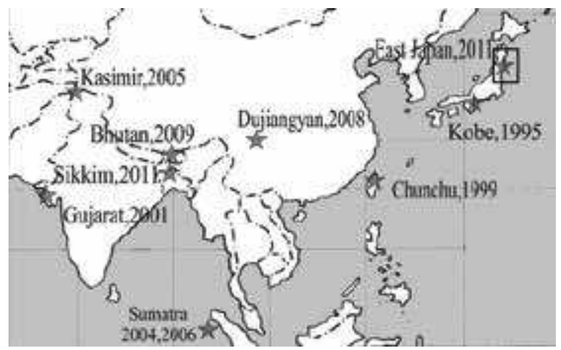


Fig.1 Recent big earthquake disasters in East and South Asia (credits: Mendoza Shimada, 2011)

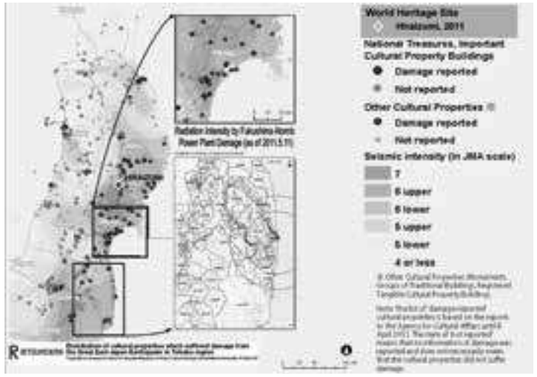


Fig.2 The distribution of cultural heritage damaged by the East Japan Great Earthquake (credits: Ritsumeikan University, modified by Mendoza Shimada and Masuda, 2011)

Fig.3 Kobe 15th Mansion (protected heritage) destroyed by Kobe Earrthquake, M.7.3, January 17, 1995 caused liquefaction of the ground (credits: K.Masuda 1995)

located in the earthquake zones of the world, and finally, to propose a re-thinking of the international conservation doctrinal texts for the sustainable protection of heritage values of fragile but ecological structural materials like wood and adobe.

2. SEISMIC DISASTER AND CULTURAL HERITAGE RECONSTRUCTION IN ASIA

2.1 Earthquake disaster and cultural heritage in Asia

In these decades, Eastern and Southern Asia region have experienced many big earthquake disasters and many cultural resources, including several World Heritage sites, were affected. In China, for example, Dujiangyan, inscribed in 2000, was badly damaged by the earthquake in 2008. The Old Town of Lijiang was listed in 1997, immediately after a big earthquake damage in 1996. The town has been impacted five times from earthquakes in the 20th century, including 1933, 1951, 1961, 1977, and 1996. Periodic reconstruction here is a long cultural tradition (ICOMOS-Japan, 2011).

2.2 East Japan Great Earthquake in 2011

In the case of the East Japan Great Earthquake in 2011, a Japanese World Heritage-nomination site, Hiraizumi, situated in the central inland part of the affected area, was inscribed on the list just after the disaster in the same year. There was not any severe damage at the main wooden gilt pavilion building built in the 12th century in Hiraizumi, but the World Heritage Committee could have been influenced indirectly by the severe Tsunami image in the region. There are several National Treasure buildings in the high seismic intensity area, but their damage was not so great, because they are located in places that traditional knowledge indicates as safer.

Another more serious problem is the radioactivity influence spread by the nuclear-power plants' accident in Fukushima, caused by the attack of the Tsunami of 11-meter high wave. Many populations are prohibited from entering the high-radioactivity area. Not only did they lose their hometowns, but also their own community memories and heritage. As the half-time period of Cesium 137 radioactivity is over 30 years, people cannot come back to their homeland anymore until the next generation. No one can take care of the fragile wooden heritage in the area for such a long time, and the heritage may lose its meaning as memory for the local people. The most serious damage is to humans, especially in young children. Cultural heritage cannot be inherited here for the future. Earthquake can be a trigger to cause the next various serious disasters.

2.3 Kobe earthquake disaster in 1995

The Kobe earthquake occured at 5:46 in the early morning of January 17, 1995, with a magnitude of 7.3 that killed some 6,600 people (ICOMOS-Japan, 2011). The magnitude is smaller than that of the East Japan Earthquake in 2011, but the epicenter or the seismic fault was just under the large city of Kobe, and the fault break happened at a shallow depth in the ground. Many wooden houses and modern concrete structures were destroyed and many people were killed while they while sleeping. Modern structures, like other types of buildings, as well as highways and railways, were also badly destroyed.

3. DAMAGE OF WESTERN-STYLE BUILDINGS AFTER THE KOBE EARTHQUAKE

3.1 Damage and reconstruction of the 15th mansion in Kobe foreign settlement

Kobe city started its modern history as a habortown open to foreign countries in the middle of 19th century. A foreign-settlement area was prepared by the Japanese government near the harbor, and many Western-style office buildings were constructed by different foreign marchants or traders. Those foreigners built their residences on the backside of the hill area called Kitano town, from which they could look down their ships in the harbor, as well as the settlement area. The settlement system was cancelled at the end of 19th century, but these foreign western style buidings became an important cultural character of modern Kobe city.

Kobe city suffered an air-bombing attack in 1945 during the Second World War, and a large area of its downtown burnt down. Most of the collapsed buidings during the 1995 earthquake were those built quickly after the World War II fire, and the structural quality was not enough to protect inhabitants against the earthquake and its after fires. But many Western-style wooden buildings fortunately survived these disasters, and are contributing to the historical character of Kobe city.

The 15th Mansion was constructed in the foreign settlement in 1881 as the US Consulate office and it was built in American east-coast style, with timber-frame structure and brick wall. In 1989, it was designated as an Important Cultural Property building by the central government. The owner was a private company, and constructed a new high-rise office tower next to the historic protected building. As it is located in the central downtown area, the building had been used as a Chinese popular restaurant.

Fortunately, the collapse of 15th Mansion did not kill nor injure anybody, because the earthquake occurred in the very early morning. But if it had happened at lunchtime, for example, some 50 people might have been killed by the collapse of this historic structure. If anyone was killed in this building, the government would not have been able to escape from its responsibility. During the Kobe earthquake, hundreds of historic protected buildings were damaged, but none caused death or injury. Several historic buildings collapsed as a result of this strong earthquake; however, 15th Mansion was the one most severely damaged. The central government started immediately to make the recovery plan of cultural heritage, and the reconstruction of 15th Mansion became a symbol of the cultural heritage recovery projects.

The reconstruction of 15th Mansion had to keep the authentic value of the original design, material, craftsmanship and setting, but also to achieve enough structural safety to be used as a popular restaurant. The only possible way was to combine several new structural reinforcements, utilizing firstly, base-seismic isolation below basement floor, secondly, replacing the dangerous brick chimney with reinforced-concrete pillars on the new basement, and lastly, inserting steel frames supported by the new chimney pillars into the roof space for capping the heavy brick-wall top so that it will not break down during the next earthquake of the same level. As the result, in this reconstruction, 75% of the old wooden material was reused and installed in its original position, respecting the authenticity of building fabric.

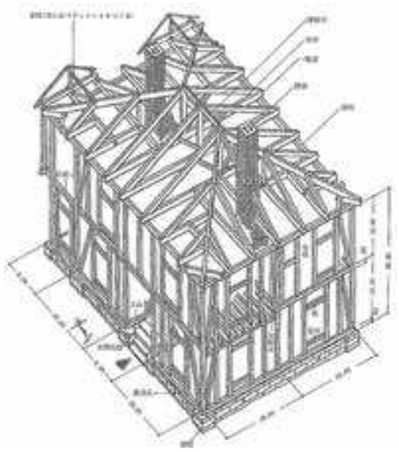


Fig. 4 The original wooden-timber structure and chimney, all typical of US east coast non-seismic region, was restored. (credits: K. Masuda & O. Mendoza, 2011, edited from the conservation report 1998)

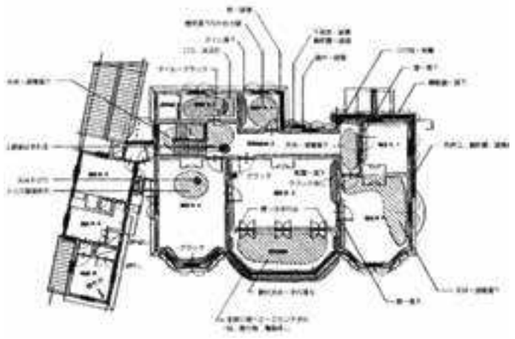
3.2 Damage and restoration of western-style houses after the Kobe earthquake

Another big recovery project was in the Kitano foreign-residential area, which is protected as a townscape conservation district by the central government since 1980. In a rather small area of 9.3 ha, 65 protected buildings are listed, and many of them were partially damaged by the earthquake, especially at their heavy brick chimneys.

These houses were built before the 1920s, when brick structures became forbidden in Japan. The free-standing upper part of the chimney on the roof, with a weight of almost 1 ton, is considered a dangerous structure for earthquakes, when most of them are shaken, then fall down, destroying the roof, ceilings and floors all the way to the ground, making big holes at every level. Several brick chimneys came down beside the bed where house owners were sleeping, like a kind of air bombing.

But the building structures in this district were generally safe, because the main wooden-structural frames were built by Japanese traditional carpenters, and the walls were strong enough to resist an earthquake force with plaster on wooden

a) The Former Hunter House (A), 1903 and its fallen chimney in the garden.



b) The Former Hansel House (B), up & left, constructed in 1986, was destroyed by free-standing heavy brick chimneys falling down at many rooms.

c) The Kobe-townscape conservation district, with many Western-style rich houses, was also damaged by Kobe Earthquake 1995.

Fig.5 Earthquake Damage and Reconstruction of Kobe 15th Mansion (credits: Masuda & Mendonza Shimada, edited from the Conservation Reports of Kobe Kitano District)

lathing. This is a type of Colonial-style building structure, and came to Japan after Colonialists had experienced several seismic-prone countries, like India, Indonesia, and the Philippines.

3.3 Seismic safety as a conservation priority in seismic-zone countries

What is the difference between the damage and their repair work of the 15th Mansion and the Colonial-style residential houses? They are similar as foreign Western-style buildings with structural timber frames. The main difference is the wall structure, heavy brick versus light plaster on lathing, or where the technology came from – a non-seismic region or a seismic zone. The brick chimney and fireplace in the Colonial-style house were added in cold Japan, as the latitude is far north, like the US East Coast or England. They were not used in southern hot countries, but they are dangerous in seismic Japan. The seismic safety is the priority here even in cultural heritage conservation.

4. WORLD CULTURAL HERITAGE IN THE EARTHQUAKE ZONES

4.1 Regional distribution of world heritage sites in the earthquake zones

World Heritage sites are increasing every year, but the characteristics of this distribution map and 2008 chart are similar even now. 27% of cultural heritage is within 200 km from past main epicenters. In the earthquake zones, including the Southern European region, about half the sites are within 200 km. But it is true that earthquake zones are a relatively very small area on the earth, and many ICOMOS leading countries, like France, UK and Germany are located outside of the dangerous zone where post disaster reconstruction is cultural tradition. The world is divided into seismic and non-seismic areas. Here we need a bridge between the two areas to build a worldwide risk-preparedness policy, based on the conservation principles.

5. CONCLUSION: NEED FOR A NEW INTERNATIONAL CONSERVATION PRINCIPLE FOR THE SUSTAINABLE PROTECTION IN EARTHQUAKE ZONES

5.1 Existing conservation principles are not effective in earthquake zones

The Venice Charter (ICOMOS, 1964) and Nara Document on Authenticity (ICOMOS,1994) are both main doctrinal texts within the World Heritage system and both adopted in seismic countries, but neither have enough tools necessary for the sustainable protection in earthquake zones. There is a need to carefully understand existing conservation principles, but if they are not enough, a new principle has to be examined to solve this problem. We are always between two earthquakes, past and future. Periodic recovery is essential and to ensure life safety conservation techniques have to be found.

5.2 Rethinking keywords from the Venice Charter related to earthquake zones

The Venice Charter is a basic doctrine. We can find many keywords, which need rethinking from the view of sustainable protection in earthquake zones as illustrated in Table 2. Reconstruction, for example, is forbidden, but is essential in earthquake zones after disasters. The disaster-affected place is not an ancient archaeological site, and communities and people need heritage reconstruction for their own collective memory and their sustainability. In the rethinking process, we will find many valuable concepts or frameworks in the existing doctrinal texts for a new risk-management doctrine concept. The rethinking viewpoints in Table 2 are some examples as a first step. Fragile building materials, like wood and adobe, are popular because for easy recovery in earthquake zones. This means our heritage sustainability is deeply dependent on traditional craftsmanship and its supporting social system; intangible values based on community.

Fig.6 Map of UNESCO World Heritage sites located in earthquake zones (credits: UNESCO-WHC)

Region/ Distance from the epicenters	0-100 km	100-200 km	within 200 km		far than 200 km		total	
Cultural /Mix	100	91	191	27%	513	73%	704	
Australia/ New Zealand		1	1	14%	6	86%	7	
Caribbean	2	3	5	45%	6	55%	11	
Central America	10	10	20	59%	14	41%	34	N°5
Central Asia	2		2	22%	7	78%	9	
Eastern Africa	2	1	3	14%	18	86%	21	
Eastern Asia	10	11	21	42%	29	58%	50	N°3
Eastern Europe		1	1	2%	56	98%	57	
European Russia			0	0%	14	100%	14	
Melanesia	1	1	2	100%		0%	2	
Middle Africa		1	1	100%		0%	1	
Northern Africa	3	4	7	21%	27	79%	34	
Northern America	1		1	7%	13	93%	14	
Northern Europe	1		1	2%	49	98%	50	
South America	8	16	24	57%	18	43%	42	N°2
Southeastern Asia	6	1	7	39%	11	61%	18	
Southern Africa			0	0%	7	100%	7	
Southern Asia	6	8	14	29%	34	71%	48	
Southern Europe	35	23	58	45%	70	55%	128	N°1
Western Africa			0	0%	16	100%	16	
Western Asia	13	8	21	40%	31	60%	52	N°3
Western Europe		2	2	2%	87	98%	89	
Natural	36	18	54	31%	120	69%	174	
total	136	109	245	28%	633	72%	878	

Table 1. The regional distribution of World Heritage sites located in earthquake zones (World Heritage sites; total 878 sites as of June of 2008)

Keywords in English (used place in the Venice Charter text, 1964)		New rethinking view points on heritage conservation in earthquake zones
Concepts & Heritages	Authenticity (Preamble, P)	The Nara Document 1994, diversity
	Historical evidence (Article 3, A)	History coexisting with earthquake
	Living witness (P)	Witness of earthquake disasters
	Message from the past (P)	Earthquake-disaster history
	Own culture and traditions (P)	Culture coexisting with earthquake
	Principle (P)	Principle prepared for disaster
	Traditional techniques (A10)	Techniques prepared for disaster
	Modest Works of the Past (A1)	Sustainable living heritage
	Monument (P, A2, 4, 5, 6, 7, 9, 11, 14, 15)	Periodic earthquake recovery
	Urban or Rural Setting (A1)	Sustainable living heritage
Conservation Actions	Anastylosis (A15)	Earthquake disaster and recovery
	Conservation (A2, 4, 5, 6, 10, 14, 15)	In history, coexisting with disaster
	Restoration (P, A2, 9, 11, 12, 14, 16)	Periodic earthquake recovery
	Consolidation (A10, 16)	Periodic earthquake recovery
	Construction (A6, 10)	Conservation work for the next quake
	Indispensable extra work (A9)	Periodic earthquake recovery
	Modification (A6)	Consolidation for the next quake
	Reconstruction work (A15)	Sustainable living heritage
	Replacement of missing part (A12)	Periodic earthquake recovery
	Replacement of missing part (A12)	Consolidation for the next quake
	Use of any modern technique (A10)	Periodic earthquake recovery

Table 2. A proposal of rethinking the meaning of key words in the Venice Charter in 1964, respecting the disaster-recovery history of heritage located in earthquake zones (credits: Masuda and Mendoza Shimada, 2011)

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HARNESSING POLITICAL AND TRADE STRUCTURES TO ACHIEVE STANDARDS FOR EARTHEN BUILDING IN SOUTHERN AFRICA AND BEYOND

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Theme 8: Charters, Standards and Guidelines for Heritage and Construction
Keywords: Standards, acceptability, low carbon, emissions

Abstract

Following the adoption of the Code of Practice for Rammed Earth Structures by the Standards Association of Zimbabwe, it was decided to harmonize Standard by two regional blocs. Both COMESA (1) (19 countries) and SADC (2) (15 countries) agreed to do so but in practice, SADC was chosen to move the process forward. Four years on and the group is working with 10 of the 15 countries and have brought the process to the final voting stage for harmonization. On acceptance, people in 15 countries will for the first time be able to build earthen structures in urban areas under standards published by their own country.

It seems that using the existing trade and political structures of regions is easier than single countries, and that earthen construction has to learn the language of international-trade agreements. It was decided to look at changing the restrictive building codes and building regulations through the language of global-standards systems; concepts such as Technical Barriers to Trade (TBT's) may prove easier instruments to change than previous work with organizations already in the field of construction and materials.

However, this approach requires that members of states and of regions take up their position as stakeholders and use the existing apparatus to change the regulatory scenario, which has prevailed up till now. In this way, the acceptance of earth can be changed, as a useful economic tool, a viable construction material, a mean to increase employment and of reducing harmful greenhouse gases, from one of negative perceptions to one of positive adoption.

Much of the groundwork has been laid out, not just by people working with earthen architecture but also by international institutions, such as the International Organization for Standards that needs to be engaged.

1. INTRODUCTION

Rammed Earth Consulting CIC, an independent earthen-building company in the UK, and the School of Architecture at the University of Pretoria have been collaborating on the SADCSTAN (3) harmonization process for the Zimbabwe National Code of Practice for Rammed Earth Structures since 2008. In the Southern African region, there is still an extant knowledge base of earthen building in rural environments and urban peripheries, but apart from Zimbabwe, planning and legal systems in built-up urban areas of the SADC region legally prevent people from using any earthen-building technology, in this way not only preventing tenure and access to financing of built property, but also any chance of effective inter-generational transfer of vicarious knowledge and skills of a range of earthen construction.

From different perspectives, the authors have come to a shared realization of the urgency to create the legal environment for the use of rammed-earth technology, on the one hand as a conservation strategy to provide a supportive-future context for a range of tenuous indigenous-knowledge systems relating to all forms of earthen construction to survive and be transmitted into the future, and on the other hand as a strategy to allow these technologies to play their part in a global strategy towards achieving urban densities using low-carbon emission construction methods. At present, the main thrust of these strategies is directed towards the regulatory environment in earthen construction. This paper demonstrates the complexities of achieving the legal right to build, live and work in earth in urban areas.

2. BACKGROUND

Following the adoption of the Code of Practice for Rammed Earth Structures by the Standards Association of Zimbabwe (SAZ, 2001) (Keable, 2011), there was a six-year hiatus in