Proceedings of

UNESCO Chair Programme on
Cultural Heritage and Risk Management

INTERNATIONAL TRAINING COURSE (ITC) on DISASTER RISK MANAGEMENT of CULTURAL HERITAGE, Ritsumeikan University

2018, 13th year

From 29th August to 19th September 2018

At Kyoto, Hirafuku and Kobe, Japan

Organized by Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH), Kyoto, Japan,

In Cooperation with UNESCO, ICCROM, ICOM, ICOMOS / ICORP

The damage assessment exercise on the Ponto-cho,
where is the one of famous Kagai (Geisha`s blossom district) in Kyoto, Japan.

DM UCH
Institute of Disaster Mitigation
for Urban Cultural Heritage,
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Preface

The “Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)” was established as a permanent research institution in 2013 and has handed over activities from former organization as “Research Center for Disaster Mitigation of Urban Cultural Heritage” which was started by Prof. Kenzo TOKI from 2003.

The “UNESCO Chair International Training Course on Disaster Risk Management of Cultural Heritage” started from 2006 as one of our important educational activities, and fortunately we can continue it up to this year supported by UNESCO, ICCROM, ICOM, ICOMOS/ICORP, Ritsumeikan University and many national and international organizations. And we are very much fortunate for that NICH (the Independent Administrative Institution National Institutes for Cultural Heritage in Japan) has supported to collaborate us with the part of moveable heritage for integrated protection. I would like to thank these colleagues for supporting us and participants from all over the world. The purposes of this training course are education of practical experts in each field of cultural heritage conservation and disaster risk management, and development of draft plan for disaster risk management to secure the safety of people and cultural value in each cultural heritage site and historical city. I hope these plans to be actual projects in each country and contribute to cultural advancement in the world.

Through the ITC in 2018 with theme as “Integrated Protection of Immovable and Movable Cultural Heritage from Disasters”, most of participants thought about developing their case project toward multiple and simultaneous disaster risk, and both immovable and movable heritage. The outcomes were remarkable although the training is short period, and some of participants already began their project in their site. Moreover, we already have started the discussion with the 2018 participants to develop the international projects which are great initiatives by the participants

And International Symposium of the Working Internationally toward the Integrated Protection of Cultural Heritage from Disasters was held in the last day of ITC. Two of ITC 2018 participants made a wonderful presentation on this symposium and all the participants positively made poster presentation to the audiences. Through this symposium, all the speakers, audiences and staffs who are the important participants on this symposium, could share the lessons and experiences of past disasters and we could constructively discuss about future goals.

Thank you all again for supporting this activity, and please keep in touch with us for inheriting cultural heritages for next generation.

Takeyuki OKUBO
Director, R-DMUCH
Professor, Department of Civil Engineering, Ritsumeikan University

Preface

The devastating fire on 3rd September 2018 that destroyed much of the priceless collection of the historic national museum of Rio in Brazil has reminded us again about the increasing vulnerability of cultural heritage to disasters caused by natural and human-caused hazards. Prior to this, there are many global examples that demonstrate the impact of disasters on cultural heritage properties. In Korea, arson damaged the Sunraemon Gate in 2008, which is designated as cultural property number one and massive fires destroyed the famous Glasgow school of art located in historic Mackintosh Building in 2014 and 2018. Other damages to heritage worldwide due to disasters include Historic Settlements in Central Italy and Bagan Archaeological Site in Myanmar due to earthquakes in 2016, World Heritage Monument Zones of Kathmandu Valley due to 2015 earthquakes in Nepal; Fires in the World Heritage Town of Lijiang in China in 2013 and 2014; and the Old Town of Edinburgh in the United Kingdom in 2002. Cultural heritage sites have also suffered enormous damages due to human induced hazards like conflicts and vandalism, such as in the case of Aleppo and Palmyra in Syria and Timbuktu Shrines in Mali and Bamiyan Buddhas in Afghanistan.

Climate change is increasing the number of disasters and their devastating impacts. From 1988 to 2007, 76 per cent of all disaster events were hydrological, meteorological or climatological in nature. These hazards are adversely impacting on natural and cultural heritage. Take for example the case of forest fires in Eastern Europe in 2008, which posed a high risk to the archaeological site of Olympia in Greece. Flash floods due to unprecedented heavy rains in India's Uttarakhand State in 2013 destroyed many heritage structures in the region, while storms in Western Europe in 2010 flooded many historic town centres such as Rome. Also heavy rains in Thailand caused the World Heritage Site of Ayutthaya to remain submerged in water thereby causing insurmountable loss to the foundations of historic built structures. The likelihood of increased weather extremes in future therefore gives great concern that the number or scale of weather-related disasters will also increase thereby dramatically increasing their impact on heritage in not too distant future.

Each year cultural heritage including historic buildings, urban areas, museums, libraries and archives depriving communities of their irreplaceable cultural assets. Moreover, damages to cultural landscapes and local flora and fauna in general cause loss of valued ecosystem services thereby putting sustainability of local communities at risk. Often disasters also affect the intangible cultural heritage of traditional knowledge, practices, skills and crafts that ensure cultural continuity, as well as the means for its protection and maintenance. Needless to say, disasters not only cause material damage but also put the lives of visitors, staff and local communities in and around Cultural heritage Properties at risk. These also affect the livelihoods linked to heritage and the revenues generated by the local government and the private sector through tourism. Finally, the psychological impact on communities due to loss of heritage to which they are closely associated cannot be underestimated.

Considering the above mentioned challenges, disaster risk management of cultural heritage is need of the hour. On one hand, this would necessitate each heritage site and museum to have its own disaster risk management plan that is tailored to its specific characteristics. On the other hand, cultural heritage needs to be well integrated into overall disaster risk management policies and plans at national, regional and local levels. Moreover heritage sites and museums should undergo integrated risk assessment that takes into account multiple hazards / threats, multiple physical, social, economic, institutional and attitudinal vulnerabilities and exposure and consequent potential impact on heritage attributes and the associated values, people's safety, economy and livelihoods and on the social structure. Various components of disaster risk management plan of cultural heritage before, during after disaster would include prevention, mitigation and preparedness measures, emergency response procedures, and recovery and rehabilitation

process. However investing in disaster risk reduction through mitigation and preparedness makes much more economic sense than investing heavily on response and recovery as previous experience in Nepal, Myanmar and Italy have aptly demonstrated. Going by the widely accepted principle of 'Building Back Better', recovery and rehabilitation process should incorporate mitigation of risks and better preparedness for future disasters.

There also needs to be greater cooperation between agencies and professionals from heritage and disaster management fields. For emergency response, heritage professionals and agencies should work closely with civic defence organizations. Sendai Framework on Disaster Risk Reduction adopted in 2015 has clearly advocated reducing risks to cultural heritage in the national policies on disaster risk management. Moreover DRM for cultural heritage should be integrated into various development sectors such as sanitation, water supply, housing, environment, infrastructure and services. Close engagement of local communities is also crucial as they can effectively assist as volunteers during emergency situations. Moreover, local Nongovernmental Organisations (NGOs) can play very important role in bridging the gap between government and local communities.

The above mentioned challenges and needs necessitate building the capacity of heritage managers, civic defense/emergency response agencies as well as decision makers from heritage as well as disaster management fields on reducing disaster risks to cultural heritage. In this direction, a pioneering initiative has been undertaken by the UNESCO Chair established within the Institute of Disaster Mitigation for Urban Cultural Heritage at Ritsumeikan University, Kyoto (Japan), which in cooperation with ICCROM, ICOMOS-ICORP and the UNESCO World Heritage Centre has been organizing international training course on disaster risk management of cultural heritage every year since 2006. The target groups for this course include government institutions, departments, universities, NGOs and private consultants from cultural heritage, as well as relevant disaster management fields. The three week course is based on lectures by eminent experts, field visits, exercises and discussions. Nearly 200 professionals from more than 40 countries have been trained through this annual course that is held in Kyoto and other historic sites in Japan.

The 13th International Training Course (ITC) on Disaster Risk Management of Cultural Heritage once again focused on an integrated disaster risk management of movable and immovable heritage. This is increasingly being recognized as an important area since during disasters, museum collections, many of which are housed in historic buildings and artefacts of social and religious values located in living heritage buildings and sites have suffered enormous damages. This requires integrated approaches for risk assessment and management that consider the values, vulnerability and capacity of both movable and immovable heritage. Moreover there needs to be greater collaboration between heritage professionals and organization from the fields of collections and sites management.

The proceedings of the 13th ITC also contains brief reports on disaster risk management plans for case study sites from the home countries of the participants based on the outlines prepared by them during the course. Besides valuable experience of the learnings from 2017 Mexico earthquakes have been shared by one of our former participants from ITC 2016, who was closely engaged in the response and recovery of cultural heritage following this disaster.

The importance of this training course has been globally recognized as seen with increasing number of applicants from all over the world and our institute hopes to continue this initiative in the future.

Rohit JIGYASU
UNESCO Chair Holder, Professor,
Institute of Disaster Mitigation for Urban Cultural Heritage Ritsumeikan University, Kyoto

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1 Introduction

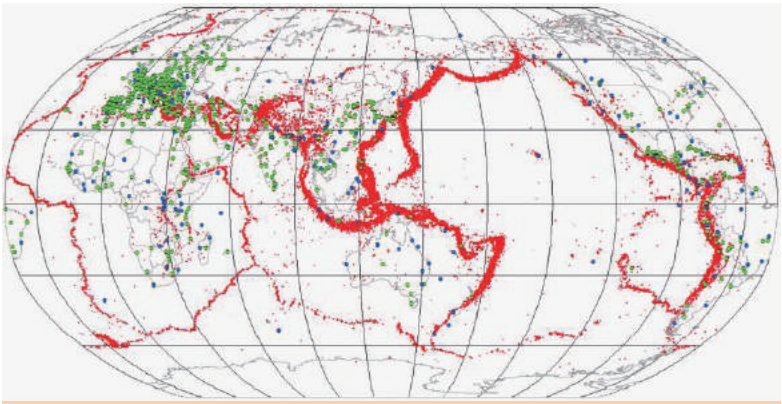
1.1 Background and Objectives of the 13th International Training Course 2018

Disasters and Cultural Heritage

Recent disasters such as earthquakes in Central Mexico in 2017, Myanmar and Italy in 2016, Nepal in April and May 2015, Haiti and Chile in 2010, earthquake and cyclones in Philippines in 2014, fires in Lijiang, China in 2013 and 2014, the devastating tsunami in North East of Japan in 2011 have caused enormous loss of life, property and cultural heritage, both in its tangible and intangible as well as movable and immovable manifestations. This disaster has once again shown that cultural heritage is highly vulnerable to disasters caused by natural and human induced hazards such as earthquake, the Tsunami, fire, floods, cyclones/typhoons, armed conflict and terrorism. Climate Change is further causing increase in the frequency and intensity of hydro-meteorological hazards such as floods, typhoons, cyclones. These may also cause secondary hazards such as landslides and thereby exacerbating the damage to cultural heritage.

Therefore it is important to undertake proactive measures that can reduce risks to cultural heritage from these catastrophic events through adequate mitigation and preparedness measures. In the post disaster phase, the challenge is how to stabilize built heritage properties, which are at risk of demolition as well as salvage movable heritage fragments and to assess their damage. The long term challenge during recovery phase is how to repair and retrofit them and undertake reconstruction that respects tangible as well as intangible heritage values while reducing vulnerabilities.

In the light of these challenges, comprehensive disaster risk management is essential for the protection of cultural heritage from disasters. Therefore Cultural Heritage and Risk Management project of Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH) aims to organize the International Training Programme to build the institutional capacity needed to formulate comprehensive disaster risk management plans that are based on the characteristics of cultural heritage and nature of hazards in the regional context.



(●:Earthquake, ●: Cultural and Mixed Heritage, ●: Natural Heritage)

By Research Center for Disaster Mitigation of Urban Cultural Heritage,
Ritsumeikan University, Kyoto Japan, 2008

Fig.1 World Heritage Sites Located in the Earthquake Zones 2008

Table 1 Regional Distribution of World Heritage sites located on the Earthquake Zones

Region	0-100 km	100-200 km	Within 200km		Over 200km		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
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
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
Southeastern Asia	6	1	7	39%	11	61%	18
Sothern Africa			0	0%	7	100%	7
Southern Asia	6	8	14	29%	34	71%	48
Southern Europe	35	23	58	45%	70	55%	128
Western Africa			0	0%	16	100%	16
Western Asia	13	8	21	40%	31	60%	52
Western Europe		2	2	2%	87	98%	89
Natural	36	18	54	31%	120	69%	174
Total	136	109	245	28%	633	72%	878

Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University and Its Training Course

The International Training Course on Disaster Risk Management of Cultural Heritage is a follow-up of the recommendations adopted at the Special Thematic Session on Risk Management for Cultural Heritage held at UN-WCDR (World Conference on Disaster Reduction) in January 2005 in Kobe, Hyogo, Japan. One of these recommendations advocated the need for the academic community to develop scientific research, education and training programs incorporating cultural heritage in both its tangible and intangible manifestations, into risk management and disaster recovery. The importance of strengthening knowledge, innovation and education to build a culture of disaster prevention at WH properties was reiterated also by the World Heritage Committee at its 30th session (Vilnius, Lithuania, July 2006).

Furthermore, the "Declaration", adopted at the International Disaster Reduction Conference (IDRC) of Davos (August 2006) confirmed that "concern for heritage, both tangible and intangible, should be incorporated into disaster risk reduction strategies and plans, which are strengthened through attention to cultural attributes and traditional knowledge." The Sendai Framework on Disaster Risk Reduction recently adopted at the World Conference on Disaster Risk Reduction in Sendai, Japan has further highlighted the importance of protecting cultural heritage from disasters. Cultural heritage has also been included one of the sectors in the new ten essentials that have been adopted by UNISDR's resilient city campaign.

In response to these recommendations by the international community, the Institute of Disaster Mitigation for Urban Cultural Heritage at Ritsumeikan University (R-DMUCH) has been acting as a focal point for organizing international research, training and information network in the field of cultural heritage risk management and disaster mitigation. Besides R-DMUCH also functioned as the international secretariat for ICOMOS-International Scientific Committee on Risk Preparedness (ICORP) from 2011 to 2014 and many resource persons of the course are expert members of the Scientific Committee.

The past training courses have been attended by 140 participants in total from 60 countries; East Asia (China, Indonesia, Malaysia, Myanmar, Philippines, South Korea and Thailand), South Asia (Bangladesh, Bhutan, India, Laos, Maldives, Nepal, Pakistan, Sri Lanka and Vietnam), Oceania (Australia, Fiji, New Zealand and Palau), Central and South America (Brazil, Chile, Colombia, Ecuador, Haiti, Honduras, Jamaica, Mexico, Panama and Peru), Europe (Albania, Belgium, Bosnia and Herzegovina, Croatia, France, Georgia, Italy, Moldova, Netherlands, Romania, Serbia and Spain), Middle East (Afghanistan, Iran, Iraq, Jordan, Palestine, Syria and Turkey), Africa (Egypt, Ethiopia, Ghana, Kenya, Malawi, Morocco, Nigeria, South Africa, Tanzania, Uganda and Zimbabwe).

Objectives and Methodology of the Training Course

The main objective of the course is to provide an overview of the various aspects of disaster risk management of cultural heritage. In particular, the course provides interdisciplinary training to:

- ✓ Undertake an integrated risk assessment of tangible and intangible, immovable and movable cultural heritage by analyzing their vulnerability to disasters caused by natural and human induced hazards;
- ✓ Build integrated system for disaster risk management of cultural heritage, incorporating various measures aimed at reducing risks, responding to disasters and recovering from them.
- ✓ Formulate disaster risk management plans for cultural heritage that correspond to the local / urban and regional disaster management and development plans and policies and humanitarian response and recovery mechanisms;
- ✓ To learn practical tools, methodologies and skills for disaster risk management of cultural heritage such as cost benefit analysis, value assessment, budgeting and communication methods with decision makers such as mayors; and
- ✓ Reinforce the international scientific support network in order to build the institutional capacity needed to formulate comprehensive disaster risk management plans that are based on the characteristics of cultural heritage and nature of hazards in the national and regional context.

The course comprises lectures, site visits, workshops, discussions, team projects and individual/group presentations. Participants are expected to actively participate throughout the course. The course aims at promoting the development of collaborations and network building among scholars and professionals in cultural heritage protection. This course is provided scientific support by UNESCO and the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM).

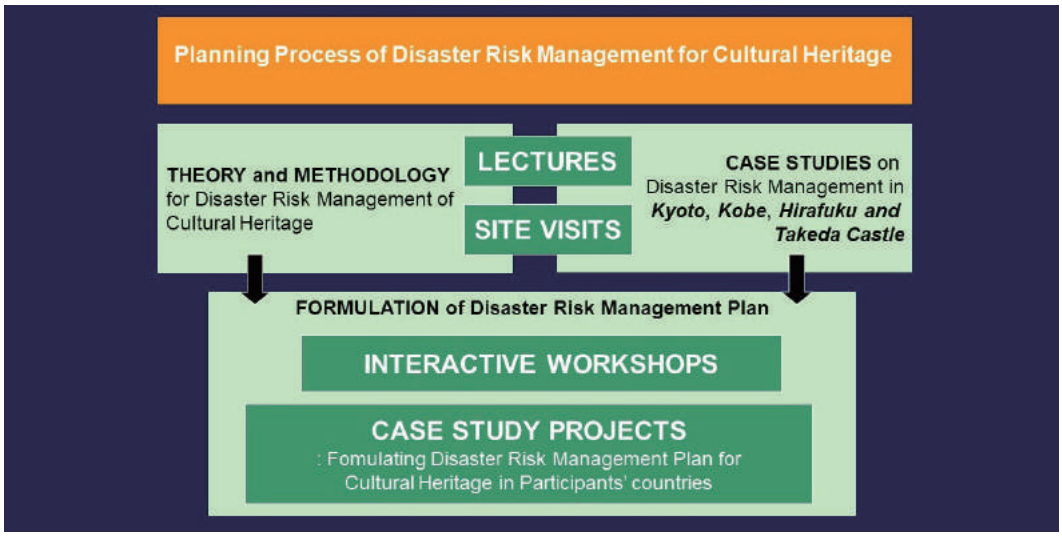


Fig.2 13th International Trainig Course on Disaster Risk Management of Cultural Heritage 2018

Based on the knowledge obtained from lectures, site visits, and exercises through interactive workshops, the training course also sets the goal of raising planning skills in disaster risk management of cultural heritage, by having each participant formulate outline of a DRM plan of a case study site or museum from the participant's home country in line with the country's respective social and economic situation. In order to do so, the Institute has asked the participants to collect relevant materials/data/information related to the cultural heritage and hazards before coming to Japan

Sub Theme of 2018 International Training Programme:

Towards Integrated Protection of Immovable and Movable Cultural Heritage from Disasters

Disasters not only effect the immovable heritage components such as monuments, archaeological sites and historic urban areas but also cause damage to the movable components that include museum collections and heritage objects that are in active use such as religious and other artefacts of significance to the local community. Both these movable and immovable components are exposed to various hazards that necessitate appropriate measures to reduce disaster risks. Also in the aftermath of a disaster many architectural fragments of damaged or collapsed buildings need documentation, handling and storage similar to movable heritage collections. Therefore an integrated approach for movable and immovable heritage is needed for risk assessment of heritage sites as well as museums and its collections before, during and after a disaster situation. Limited availability of human and financial resources also calls for closer coordination between professionals and institutions dealing with heritage sites, museums and the external agencies. Moreover integrated disaster risk management involves appropriate mitigation and adaptation strategies to reduce various risks to movable and immovable heritage components by taking into consideration their heritage values that are often interdependent. It is also important to recognize many examples of traditional knowledge evolved by communities through series of trials and errors that demonstrate that movable and immovable cultural heritage can be an effective source of resilience against disaster risks and integrate these in larger disaster risk management strategies.

Japan is home to a variety of frequently occurring disasters, which can cause wide-ranging damage to its cultural resources. For this reason, the country has taken specialized measures in establishing a disaster risk management system and methodology for post-disaster emergency response and recovery.

Together with the conservation of historical townscapes and buildings, we aim to protect the objects and implements long used in the daily lives of people of the region, as well as objects that serve as clues to understanding the lives and achievements of past generations. For this reason, we consider both movable and immovable cultural property to be essential subjects of our disaster risk management efforts.

Seasonal festivals and rituals as well as local celebrations and customs also help to make people's lives more abundant in the local community. Thus, another significant task is the safeguarding of intangible cultural heritage from natural hazards. These various cultural heritage disaster mitigation measures, many developed in response to Japan's special circumstances, will be shared in this training.

However, until now disaster risk management for movable and immovable cultural heritage have largely been undertaken as parallel initiatives without much interaction. However experience has shown that in reducing disaster risks in heritage sites and museums would entail consideration of both the built fabric as well as the collections in a coordinated manner. This is important as heritage values and risk pathways of both movable and immovable heritage are closely linked. Considering these issues, the 13th International Training Course on Disaster Risk Management of Cultural Heritage will specifically focus on **"Integrated Protection of Immovable and Movable Cultural Heritage from Disasters"**.

Fig.3 National Museum in Kathmandu, Nepal was heavily damaged due to 2015 earthquakes. Salvage of collections from the damaged buildings was hugely challenging task

Fig.4 Earthquake struck Central Italy on 26th August, 2016 causing extensive damage to historic settlements in the region

Fig.5 Earthquake hit heritage site of Bagan in Myanmar on 26th August, 2016 causing damage to many monuments and historic buildings.

Previous International Training Courses (2006-2017)

ITC 2006

In 2006, which was the first year for this course, eight participants from four countries were invited; namely India and Pakistan, which were struck by a great earthquake in 2005 in Kashmir; Indonesia, which suffered the Indian Ocean Tsunami triggered by the Sumatra Earthquake in 2004 and the Earthquake on the Javanese Island in 2004; and Korea, which had suffered a big forest fire.

ITC 2007

In 2007, R-DMUCH exchanged MOU with ICCROM and established a criterion for choosing participants with the support of ICCROM. As a result, eight trainees from Bangladesh, China, Peru and Philippines were invited for the training course.

Based on the experience of 2006 training course, it was decided to make closer relation between the lectures, site visits and workshops. Therefore in 2007, several related sets of lectures were held in the mornings and workshops in the afternoons. Based on these, discussions were facilitated by the instructors so that the trainees were able to reflect more effectively on the challenges for cultural heritage disaster management within their own context.

ITC 2008

The 2008 training course actively built upon the rich experience gathered during the courses held in the previous two years. This year had participants from five countries from Asia and Europe, namely Nepal, Bhutan, Iran, Serbia and Chinese Taipei. Effort was made to make this year's course, more field-based by drawing upon the unique opportunity offered by the location of important World Heritage Sites in Kyoto such as Kiyomizu-dera and Ninna-ji temples. Most of the workshops were, therefore, based on field work undertaken by the participants in these sites. This year's course also put greater emphasis on exposing the participants to the **methodology for undertaking disaster risk assessment for cultural heritage sites.**

ITC 2009

The 2009 training course further evolved on the basis of rich feedback provided by the participants of the training courses from previous years. In response to the need for making the course more relevant to specific requirements and constraints of the developing countries, it was decided to organize the course partly in Japan and partly in Nepal.

Moreover, for the first time, the training course had a specific theme, namely **"Earthquake risk management of Historic Urban Areas."** For this purpose, Kyoto and Kathmandu; two historic cities with rich cultural heritage but extremely vulnerable to earthquakes, were chosen as the case study sites for undertaking field exercises during the training course.

The first week of the course was organized in Japan and it focused on familiarizing the participants with the basic methodology for risk assessment and management for cultural heritage properties. The participants were shown various disaster prevention facilities developed for numerous cultural heritage sites in Kyoto. Second week in Kathmandu focused on the earthquake vulnerability and capacity of the World Heritage Monument Zone of Patan and its surrounding historic urban area, both at building and area levels.

The UNESCO Chair programme intends to build upon the four years of very rich experience gained through very active participation of lecturers from Japan and abroad, as well as the international participants from various countries from Asia, Europe and the Caribbean and further enrich the contents of the training course in subsequent years.

ITC 2010

Fifth UNESCO Chair International Training Course on Disaster Risk Management of Cultural Heritage 2010 was held from 13 to 26 September 2010 in Kyoto, Kobe and Sasayama, Japan. In the light of destructive Haiti earthquake on January 2010, this fifth International Training Course especially focused on **emergency response and long term recovery of wooden and masonry composite Cultural Heritage from disasters**. It was attended by 11 participants from 5 countries; Bhutan, Palau, Peru, Serbia and Turkey.

On the final day of the course, the international symposium titled "How to protect Cultural Heritage from Disaster; Risk Preparedness and Post Disaster Recovery" was organized by Ritsumeikan University and the ICOMOS International Committee on Risk Preparedness (ICORP). In the symposium, the current challenges for protection of cultural heritages taking into account the context of post disaster recovery was discussed

in great depth with international experts from UNESCO, ICOMOS, ICORP and a representative of Kyo-o-Gokoku-ji Temple; World Cultural Heritage site in Kyoto.

ITC 2011

Sixth UNESCO Chair International Training Course on Disaster Risk Management of Cultural Heritage was held from 10 to 24 September 2011 in Kyoto, Kobe and Tohoku area of East Japan. In the light of increasing vulnerability of rapidly urbanizing settlements, the course focused on **"Integrated Approach for Disaster Risk Mitigation of Historic Cities"**. The course was attended by 11 participants from 8 countries; Columbia, Jamaica, Kenya, Uganda, China, Mexico, India and Bangladesh.

ITC 2012

Seventh International Training Course on Disaster Risk Management of Cultural Heritage held during September 2012 in Kyoto, Kobe and Tohoku area of East Japan focused on sustainable recovery of cultural heritage. Accordingly the theme of the course was **"From Recovery to Risk Reduction for Sustainability of Historic Areas"**.

ITC 2013

The theme of the 8th UNESCO Chair International Training Course on Disaster Risk Management of Cultural Heritage was **"Reducing Disaster Risks to Historic Urban Areas and Their Territorial Settings through Mitigation"**. The course focused on policies and planning measures for mitigating risks to cultural heritage from multiple hazards such as earthquakes, floods, landslides and fires, especially in rapidly urbanizing context of developing countries. Special techniques for mitigating risks from earthquakes and fires were also highlighted besides policies, planning and design interventions for long term restoration and rehabilitation of cultural heritage following disaster through a special workshop in the area affected by the Great East Japan Disaster in 2011.

ITC 2014

One of the main reasons for extensive damage to cultural heritage is due to fires resulting from natural (bush/forest fires) or human induced causes (arson, chemical or bomb explosion, poor electric wiring or during renovation works). Also fires can result from earthquakes as was the case during 1995 Great Hanshin Awaji earthquake in Japan. Considering these issues, the 9th UNESCO Chair International Training Course on Disaster Risk Management of Cultural Heritage focused on **"Protecting living cultural heritage from disaster risks due to fire"**. Policies and planning measures for reducing fire risks to cultural heritage especially in rapidly urbanizing context of developing countries, special techniques for fire prevention and mitigation, emergency response as well as interventions for long term restoration and rehabilitation of cultural heritage following disaster were discussed during 2014 course.

ITC 2015

Earthquakes and floods cause immense damage to cultural heritage. Recently devastating earthquakes in Nepal in 2015, 2013 earthquake in Philippines, North Italy earthquake of 2012 caused vast damage to cultural heritage. Moreover 2014 floods in Balkan region, 2011 floods in Thailand and 2010 floods in Pakistan also caused damage to historic towns and archaeological sites such as Ayutthaya. While

vulnerability of cultural heritage to earthquake and floods is increasing more than ever before, there are many examples of traditional knowledge systems developed by communities for mitigating against earthquakes and floods. Considering these issues and challenges the 10th International Training Course focused on **the protection of cultural heritage from earthquakes and floods, and other associated hazards**.

ITC 2016

Climate change is increasing the frequency of disasters caused by hydro-meteorological events such as heavy rainfall, flash floods, cyclones, typhoons and storm surges. As a result, many heritage sites located in global hot spots such as coastal areas especially below sea level are exposed to risks of inundation greater than ever before. Also, there might be low frequency high intensity incidents of flooding that may trigger landslides along mountain slopes. Moreover, climate change is resulting in higher temperatures are also resulting increased incidents of wild fires putting cultural heritage located in forested areas to greater risk than ever before. The 11th International Training Course specially focused on the **protecting cultural heritage from risks of natural disasters including those induced by climate change.**

ITC 2017

The course focused on **the integrated approach for movable and immovable heritage for disaster risk management of heritage sites as well as museums and its collections before, during and after a disaster situation.** Limited availability of human and financial resources during emergency situation calls for closer coordination between professionals and institutions dealing with heritage sites, museums and the external agencies.

From this year, Ritsumeikan University also started cooperation with the Japanese National Institutes for Cultural Heritage (NICH) so that trainees could learn risk management for both immovable and movable cultural heritage. Special lectures and practical exercises related to disaster risk management of movable heritage were conducted by the renowned museum experts at Kyoto National Museum, ICCROM and the Smithsonian Institution. International Symposium "Working Internationally toward the Integrated Protection of Cultural Heritage from Disasters" was held on the final day of the course and it was attended by approximately 75 Japanese and international experts and public.

Organizers and Participants

The training course is organized from the cooperation with the UNESCO, ICCROM, ICOM, ICOMOS/ ICORP, and relevant institutions of the government of Japan. In specially, NICH (the Independent Administrative Institution National Institutes for Cultural Heritage in Japan) has supported us to introduce the many lecturers who can collaborate the part of moveable heritage protection.

Participants List of the Previous Training Courses

ITC 2006, the 1st year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Poonacha KODIRA	INDIA	Director (Conservation), Ministry of Tourism and Culture Archaeological Survey of India	Qutb Minar and its Monuments, Delhi, WHS
2	Anup KARANTH	INDIA	Project Coordinator, Urban Earthquake Vulnerability Reduction Project, United Nations Development Programme (UNDP) India	
3	Sektiadi	INDONSESIA	Lecturer, Dept. of Archaeology, Faculty of Culture Sciences, Gadjah Mada University	Prambanan Temple Compounds, WHS and its Surrounding Environment
4	Manggar AYUATI	INDONESIA	Supervisor of Rescue on Preservation Division, Dept. of Cultural and Tourism, Center for Preservation of Cultural Heritage of Yogyakarta Province	
5	Fauzia QURESHI	PAKISTAN	Head of the Department of Architecture, National College of Arts, Lahore	Rohtas Fort, WHS
6	Hussain KHADIM	PAKISTAN	Coordinator, Disaster Management Desk RDPI, Rural Development Policy Institute	
7	Seok JEONG	KOREA	Government employee of Modern Construction Field, Tangible Cultural Heritage Bureau, Cultural Heritage Administration, Republic of Korea	Historic Villages of Korea: Hahoe, WHS in Andong City
8	Woongju SHIN	KOREA	Concurrent Professor, Dept. Interior Architecture, Chosun College of Science and Technology	

ITC 2007, the 2nd year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	A.K.M. Monowar Hossain AKHAND	BANGLADESH	Deputy Secretary, Ministry of Home Affairs, GOVT. of Bangladesh	Lal Bagh Fort, Dhaka, Bangladesh
2	Md. Rafiqul ALAM	BANGLADESH	Executive Director, DWIP UNNAYAN SONGTHA (DUS)	
3	Shijun HE	P. R. CHINA	Protection and Management Bureau of World Cultural Heritage Site - the Old Town of Lijiang	Old Town of Lijiang , WHS
4	Cuiyu HE	P. R. CHINA	Protection and Management Bureau of World Cultural Heritage Site - the Old Town of Lijiang	
5	Maria Del Carmen CORRALES PEREZ	PERU	Instituto Nacional De Cultura Architect of the conservation and Restoration Sub Direction	Historic Centre of Lima, WHS
6	Partricia Isabel GIBU YAGUE	PERU	Chief of Laboratory of Structures, Japan-Peru Center for Earthquake Engineering Research and Disaster Mitigation	
7	Glen CONCEPCION	PHILIPPINES	City Disaster Action Officer and City Environment & Natural Resources Officer, City Government of Vigan	Historic Town of Vigan, WHS
8	Eric QUADRA	PHILIPPINES	Architect, LGU-Vigan City	

ITC 2008, the 3rd year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Choening DORJI	BHUTAN	Architect, Division for Conservation of Heritage Sites, Department of Culture, Ministry of Home & Cultural Affairs Royal Government of Bhutan	Tashichho Dzong
2	Karma TENZIN	BHUTAN	Civil Engineer, Tashichhodzong Maintenance Division, Dzongkhag Administration	
3	Mahmoud NEJATI	IRAN	Deputy of Research & Technical Consultant, Recovery Project of Bam's Cultural Heritage	Bam and its Cultural Landscape, WHS
4	Fatemeh MEHDIZADEH SARADJ	IRAN	Assistant Professor, Department of Conservation, Iran University of Science and Technology	
5	Kai Ube Prasad WEISE	NEPAL	Architect, Planners' Alliance for the Himalayan & Allied Regions	Patan Durbar Square Monument Zone in Kathmandu Valley, WHS
6	Suman Narsingh RAJBHANDARI	NEPAL	Assistant Professor, Nepal Engineering College	
7	Ivana FILIPOVIC	SERBIA	Architect Conservationist, Cultural Heritage Preservation Institute of Belgrade	Lower Town in Belgrade Fortress

Observers

No	Name	Country	Work Position and Affiliation
1	Shang Chia CHIOU	TAIWAN	Professor, Department of Architecture and Interior Design, National Yunlin University of Science & Technology
2	Shen Wen CHIEN	TAIWAN	Associate Professor, Department of Fire Science, Central Police University

ITC 2009, the 4th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Rong YU	P. R. CHINA	Lecturer, Wenhua College, Huazhong University of Science and Technology	Dujiangyan, WHS
2	Yuan DING	P.R.CHINA	Researcher, Tongji University, National Historic Cities Research Center	
3	Ramesh THAPALIYA	NEPAL	Architect, World Heritage Conservation Section/Ministry of Culture and State Restructuring, Department of Archaeology	Patan Durbar Square Monument Zone in Kathmandu Valley, WHS
4	Suresh Suras SHRESTHA	NEPAL	Archaeological Officer, Ministry of Culture and state Restructuring, Department of Archaeology	
5	Pauline BROWN	JAMAICA	Senior Director, Office of Disaster Preparedness and Emergency Management	Port Royal City
6	Audene BROOKS	JAMAICA	Senior Archaeologist, Jamaica National Heritage Trust	
7	Sergius CIOCANU	MOLDOVA	Head Scientific Researcher, Institute of Cultural Heritage of the Academy of Science of Moldova	National Museum of Fine Arts (Buildings and Collection)
8	Valeria SURUCEANU	MOLDOVA	Curator, National art Museum of Moldova	

Observers in the Kathmandu Part of the ITC 2009

No	Name	Country	Work Position and Affiliation
1	Keshab P. SHRESTHA	NEPAL	Chief, National History Museum
2	Punya Sagar MARAHATTA	NEPAL	Lecturer, IoE, tribhuvan University
3	Ajay LAL CHANDRA	NEPAL	Assistant Professor, Department of Architecture and Urban Planning, IoE
4	Gyanin RAI	NEPAL	Chief (Administration, Information & Public Relation Section), Lumbini Development Trust

5	Inu PRADHAN SALIKE	NEPAL	Lecturer, Khwopa Engineering College
6	Saubhagya PRADHNANGA	NEPAL	Head of Culture and Archaeology Unit, Lalitpur Sub Metropolitan City Office
7	Chandra Shova SHAKYA	NEPAL	Head of Heritage Section, Lalitpur Sub Metropolitan City Office
8	Prabin SHRESTHA	NEPAL	Head of Urban Development Division, Lalitpur Sub Metropolitan City Office
9	Ashok SHRESTHA	NEPAL	Head of Administration Division, Lalitpur Sub Metropolitan City Office
10	Sainik Raj SINGH	NEPAL	Head of Earthquake Safety Section, Lalitpur Sub Metropolitan City Office

ITC 2010, the 5th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Dechen TSHERING	BHUTAN	Structural Engineer, Division for Conservation of Heritage Sites, Department of Culture, Ministry of Home & Cultural Affairs, Royal Government of Bhutan	Wangduephodrang Dzong
2	Junko MUKAI	BHUTAN	Deputy Chief Conservation Architect, Division for Conservation of Heritage Sites, Department of Culture, Ministry of Home and Cultural Affairs, Royal Government of Bhutan	
3	Alexander G DWIGHT	PALAU	Director, Historical Preservation Officer, Bureau of Arts & Culture, Ministry of Community & Cultural Affairs	Bai: Traditional Meeting House
4	Sunny NGIRMANG	PALAU	Palau National Registrar, Bureau of Arts & Culture, Palau Historic Preservation Office	
5	Teresa VILCAPOMA HUAPAYA	PERU	Professor, Sagrado Corazon University	City of Cuzco, WHS
6	Olga Keiko MENDOZA SHIMADA	PERU	JSPS Research Fellow, Graduate School of Science & Engineering, Ritsumeikan University	
7	Marilene TERRONES DIAZ	PERU	Professor, Sagrado Corazon University	

8	Milica GROZDANIC	SERBIA	Director, Cultural Heritage Preservation Institute of Belgrade	Kosancicev Venac, Belgrade
9	Svetlana Dimitrijevic MARKOVIC	SERBIA	Architect - Conservator - Senior Associate, Cultural Heritage Preservation Institute of Belgrade	
10	Zeynep GUL UNAL	TURKEY	Assistant Professor, Dr. Yildiz Technical University, Faculty of Architecture, Restoration Department	Eskigediz Heritage Site
11	Meltem VATAN KAPTAN	TURKEY	Research Assistant, PhD Student, Yildiz Technical University, Faculty of Architecture, Structural Systems Division	

ITC 2011, the 6th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Celina RINCON	COLOMBIA	Assessor for the Heritage Director Office, Ministry of Culture	History center of Santa Cruz de Mompox, WHS
2	Cheryl NICHOLS	JAMAICA	Training Manager, Office of Disaster Preparedness and Emergency Management	The Holy Trinity Cathedral
3	Jose Ramon PEREZ OCEJO	MEXICO	Part-time Teacher, Universidad de las Américas (Puebla, MEXICO)	Colonial City Centre of Puebla, WHS
4	Julius MWAHUNGA	KENYA	Senior Cultural Officer, Ministry of State for National Heritage and Culture, Department of Culture	Lamu Old Town, WHS
5	Remigius KIGONGO	UGANDA	Conservator Sites and Monuments/ Site Manager, Department of Museums and Monuments	Kasubi Tombs, WHS
6	Janhwij SHARMA	INDIA	Director (Conservation and World Heritage), Archaeological Survey of India, Ministry of Culture	Taj Mahal, WHS
7	Md. Aamir Hussain SHIKDER	BANGLADESH	Urban Local Body Coordinator, Bangladesh Municipal Development Fund (BMDF)	Historic Mosque City of Bagerhat, WHS

8	Qing WEI	P. R. CHINA	Deputy Director, Cultural Heritage Conservation Center, THAD	Kulangsu
9	Yu WANG	P. R. CHINA	PhD Candidate, Urban Design and Planning Department, Norwegian University of Science and Technology (NTNU)	Taoping Qiang Village

ITC 2012, the 7th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Suzie YEE SHOW	FIJI	Secretary General, ICOMOS PASIFIKA	Levuka Town, WHS
2	Vikas LAKHANI	INDIA	Sector Manager, Gujarat State Disaster Management Authority	Champaner - Pavagadh Archaeological Park, Panchamahal District, Gujarat, WHS
3	Sang sun JO	KOREA	Research Associate and Curator, Heritage Repair Division, Cultural Heritage Administration of KOREA	Jongmyo Shrine, WHS
4	Rosli BIN HAJI NOR	MALAYSIA	Head of Melaka World Heritage Office, Melaka World Heritage Office	Historic City of Melaka, WHS
5	Ni LEI WIN	MYANMAR	Communications Officer at World Concern Myanmar, Relief, Recovery and Development Project in Myanma	Bagan located in Manadalay Division, Myanmar
6	Helen McCRACKEN	NEW ZEALAND	Policy Adviser - Heritage, Ministry for Culture and Heritage	Cuba Street Historic Area, Wellington
7	Usman SHAMIM	PAKISTAN	Programme Officer, Kuchlak Welfare Society (KWS)	Mehrgarh, lies on the "Kachi plain" of now Balochistan, Pakistan
8	Poorna YAHAMPATH	SRI LANKA	Consultant - External Resource Person, Disaster Risk Management & Climate Change for GIZ	Sacred City of Kandy, Sri Lanka, WHS
9	Sibel YILDIRIM ESEN	TURKEY	Conservation Architect, Ministry of Culture and Tourism	Agora Archeological Site in the Historic City of Izmir

Observers

No	Name	Country	Work Position and Affiliation
1	Dong Seok KANG	KOREA	A Section Chief of GIS, Cultural Heritage Administration
2	Thi My Thi TONG	VIET NAM	PhD Student, International Environmental and Disaster Management Laboratory, Graduate School of Global Environmental Studies, Kyoto University

ITC 2013, the 8th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Saleh Mohammad SAMIT	AFGHANISTAN	National Manager, Community Development Programme, Aga Khan Foundation- Afghanistan	Cultural Landscape and Archaeological Remains of the Bamiyan Valley, WHS
2	Dian LAKSHMI PRATIWI	INDONESIA	Head of Archaeological Section, Division of History, Archaeological and Museum, Cultural Service Office, Government of Yogyakarta Special Territory	Kotagede Heritage Area, Yogyakarta Historic City
3	Kambod AMINI HOSSEINI	IRAN	Director, Risk Management Research Center (Associate Professor) Risk Management Research Center, International Institute of Earthquake Engineering and Seismology	Golestan Palace, Tehran Bazaar and their surrounding old urban fabrics, Tehran
4	Barbara CARANZA	ITALY	MEC srl Italian Army "LIGURIA" ARMY MILITARY COMMAND	Monumental Cemetery of Staglieno, Genoa
5	Paola MUSSINI	ITALY	Researcher, SiTI-Instituto Superiore sui Sistemi Territoriali per l'Innovazione	Portovenere, Cinque Terre, and the Islands (Palmaria,Tino and Tinetto), WHS
6	Zaha AHMED	MALDIVES	Assistant Architect, Heritage Department, Male' Republic of Maldives	Laamu atoll Isdhoo Old Friday mosque in Maldives

7	Arjun KOIRALA	NEPAL	Advisor, Urban Planning and Infrastructure Development, GFA Consulting Group (Nepal Office), on behalf of GIZ/Nepal Municipal Support Team, Ministry of Urban Development, Department of Urban Development and Building Construction	The city core area of Tansen Municipality
8	Kenechukwu Chudi ONUKWUBE	NIGERIA	Director of Programs, Development Education and Advocacy Resources Initiative for Africa (DEAR Africa)	Sukur Cultural Landscape, WHS
9	Muhammad Juma MUHAMMAD	TANZANIA	Director, Urban and Rural Planning Department of Urban and Rural Planning	Stone Town of Zanzibar, WHS
10	Hatthaya SIRIPHATTHANAKUN	THAILAND	Landscape Architect Ministry of Culture, Fine Arts Department, Office of Architecture	Historic City of Ayutthaya, WHS

ITC 2014, the 9th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Elena MAMANI	ALBANIA	Project Manager, Deputy Head of Office, Cultural Heritage without Borders (CHwB)	Gjirokastra, WHS
2	Catherine FORBES	AUSTRALIA	Built Heritage Advisor, GML Heritage; Australia Institute of Architects, Australia ICOMOS	The Rocks Historic Urban Precinct
3	Sasa TKALEC	CROATIA	Head of Office of Director, Croatian Conservation Institute	Castle Batthany in Ludbreg
4	Juan Diego BADILLO REYES	ECUADOR	Architect Conservator freelance, Volunteer South America Coordinator	San Antonio del Cerro Rico de Zaruma
5	Abdelhamid SAYED	EGYPT	Chairman, Conservator in the Ministry of Antiquities, Egyptian Heritage Rescue Foundation (EHRF); Training & Capacity Building Unit Manager, Egyptian Earth Construction Association (EECA)	Bab El-Wazir, El-Darb Al-Ahmar District, Historic Cairo, WHS

6	Anaseini KALOUGATA	THE FIJI ISLANDS	Senior Project Officer Levuka, Department of National Heritage, Culture and Arts	Historical Port Town of Levuka, WHS
7	Cinthia CABALLERO	HONDURAS	Urban control and planification unit, Alcaldia Municipal Del Distrito Central (Gerencia Del Centro Historico)	Central District Historic Area
8	Jyoti PANDEY SHARMA	INDIA	Professor, Department of Architecture, Deenbandhu Chhotu Ram University of Science & Technology	Fatehpur Sikri, Agra District, Uttar Pradesh, WHS
9	Saut SAGALA	INDONESIA	Senior Fellow, Resilience Development Initiative	Gedung Sate Building, Governor office of West Java Province
10	Alaa HAMDON	IRAQ	University Lecturer, Researcher and Earthquake Expert, Remote Sensing Center, Mosul University	Al-Hadba Minaret and Nirgal Gate / Mosul City
11	Richard NESTER	NEW ZEALAND	Technical Advisor – Historic, Department of Conservation	Government Buildings Historic Reserve
12	Zafar SHAH	PAKISTAN	Regional Emergency Officer (South Punjab), Punjab Emergency Service (rescue1122), Emergency Services Academy	Lahore Fort, WHS
13	Hussain SALEH	SYRIA	Head of the scientific research commissions department, Higher Commission for Scientific Research	Crac des Chevaliers (in Arabic: Castle Alhsn), WHS
14	Kaichard RUTTANAWONGCHAI	THAILAND	Captain assistant, Klongtoey fire station, second operation, fire department, Bangkok metropolitan	Vimanmek Palace, WHS

ITC 2015, the 10th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Marcela HURTADO SALDIAS	CHILE	Assistant professor, Departamento de Arquitectura, Universidad Técnica Federico Santa María	Historic Centre of Valparaíso
2	Benjamin Kofi AFAGBEGEE	GHANA	Assistant Conservator of Monuments, Ghana Museums and Monuments Board	Asante Traditional Buildings

3	Stephan DONA	HAITI	Disaster Risk Reduction Advisor, Plan Consult	Citadelle, Sans Souci, Ramiers
4	Mohamad Faruk MUSTHAFA	INDIA	Chief Executive Officer, RAPID RESPONSE	Mahabalipuram
5	Mohammad RAVANKHAH	IRAN	Teaching/research assistant in Department of Environmental Planning, Ph.D. Candidate in International Graduate School: Heritage Studies, Brandenburg University of Technology Cottbus	Bam and its Cultural landscape
6	Aurelio DUGONI	ITALY	Regional Director of ANPAS Sicily Committee, National Association for Public Assistance (ANPAS)	Archaeological Area of Agrigento
7	Hisila MANANDHAR	NEPAL	Urban planner, Kathmandu Valley Development Authority	Patan Durbar Square
8	Sonam LAMA	NEPAL	Assistant professor, Nepal Enginnering College	Boudhanath Stupa and surrounding area
9	Ilse Anne Elisabeth DE VENT	NETHERLANDS	Senior inspector, Geo-Engineering, the Dutch State Supervision of Mines	Hogeland, Groningen, the Netherlands
10	Bashar Ibrahim HUSSEINI	PALESTINE	Senior Project Architect & Fast Track Coordinator, Welfare Association – Old City of Jerusalem Revitalization Program "OCJRP"	Old City of Jerusalem
11	Gerald Vallo PARAGAS	PHILIPPINES	Urban and Environmental Planner (Licensed), City Government of Tacloban	The Sto. Niño Shrine and Heritage Museum, and the People's Center and Library
12	Marko ALEKSIĆ	SERBIA	Associate, Central Institute for Conservation in Belgrade	Serbian Orthodox Monastery Žiča
13	Pamela Jane MAC QUILKAN	SOUTH AFRICA	Programme Officer, The African World Heritage Fund (AWHF)	Robben Island
14	Witiya PITTUNGNAPOO	THAILAND	Lecturer, Faculty of Architecture, Naresuan University	Ban Pak Klong Village, Bangrakham, Phitsanulok Province, Thailand
15	Ngoc Phu PHAM	VIETNAM	Vice Director, Hoi An center for Cultural Heritage Management and Conservation	Hoi An Ancient Town, Vietnam

Observers

No	Name	Country	Work Position and Affiliation
1	Satoko TOYODA	JAPAN	Student, Stuttgart State Academy of Art and Design, Germany

ITC 2016, the 11th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Maria Cristina Vereza LODI	BRAZIL	Architect Preservationist, Rio de Janeiro Municipal Government / Rio World Heritage Institute	Carioca Landscapes Between the Mountain and the Sea
2	Fatma Saidi TWAHIR	KENYA	Architect, Sites and Monuments; & Mombasa Old Town Conservation Office, National Museums of Kenya	Mombasa Old Town Conservation Area
3	Muhammad Fathi Hasan AL-ABSI	JORDAN	Associate conservator Architect, Engineering and conservation department/ Department of Antiquities (DOA)	Petra or Karak castle
4	Dulce Maria GRIMALDI SIERRA	MEXICO	Senior conservator for conservation and research of decorative elements at archaeological sites, Coordinación Nacional de Conservación del Patrimonio Cultural (CNCPC), Instituto Nacional de Antropología e Historia (INAH)	Zona Arqueológica de El Tajín, Veracruz (Tajín Archaeological Site)
5	Barbara MINGUEZ GARCIA	SPAIN	Consultant, The World Bank	Antigua Guatemala
6	Vanessa Anne TANNER	NEW ZEALAND	Senior Heritage Advisor, Wellington City Council,	Newtown Shopping Centre Heritage Area
7	Nermina KATKIĆ	BOSNIA AND HERZEGOVINA	Associate for archaeology, Commission to Preserve National Monuments of Bosnia and Herzegovina	Old Bridge Area of the Old City of Mostar
8	Mihaela HĂRMĂNESCU	ROMANIA	Lecturer, PhD Architect, 'Ion Mincu' University of Architecture and Urbanism, Faculty of Urbanism	(Part of) Delta Dunarii, Romania – Tulcea city and surroundings proximity

9	Alberto Enrique PASCUAL	PANAMA	Director, Fundation CoMunidad	Fortifications on the Caribbean Side of Panama: Portobelo – San Lorenzo
10	Sherwynne Bagaoisan AGUB	PHILIPPINES	Legislative Staff Officer IV, Senate Economic Planning and Policy Office, Senate of the Philippines	Historic Town of Vigan
11	Mohamed ROUAI	MOROCCO	Professor – researcher, Earth Sciences Department, Faculty of Sciences, University Moulay Ismail, Meknes, Morocco.	Volubilis Archaeological Site (Morocco)
12	Navneet YADAV	INDIA	Associate Director, Disaster Risk Management	Shimla City, Himachal Pradesh
13	Claudia Cecilia GONZÁLEZ MUZZIO	CHILE	Partner at Ambito Consultores, Ambito Consultores Ltda.	Qhapaq Ñan, Andean Road System
14	Amna SHUJA	PAKISTAN	Assistant Director -Recovery & Rehabilitation, National Disaster Management Authority,	Mohenjo-Daro archeological sites
15	Maria Elena ALMESTAR URTEAGA	PERU	Senior Auditor – Specialist in Culture Management and Cultural Heritage, Contraloria General de la Republica	Chan – Chan Archaeological Zone. (La Libertad, northern coast of Peru).

Observers

No	Name	Country	Work Position and Affiliation
1	Sakiko OSHIBA	JAPAN	Undergraduate Student, Toyo Institute of Art and Design

ITC 2017, the 12th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Dorji WANGCHUK	Bhutan	Conservator, National Museum of Bhutan	National Museum of Bhutan (Ta Dzong)
2	Abner Omaging LAWANGEN	Philippines	Local Disaster Risk Reduction and Management Officer, Local Government of Tublay, Benguet, Philippines	Banaue Rice Terraces
3	Hamit BİRTANE	Turkey	Technical Expert, Directorate of Gallipoli Historical Site	Gallipoli Historical Site
4	Innocent Hudson MANKHWALA	Malawi	Archivist (Conservation Section), Department of Culture, National Archives of Malawi	Museum of Malawi
5	Ming Chee ANG	Malaysia	General Manager, George Town World Heritage Incorporated	George Town UNESCO World Heritage Site
6	Victor MARCHEZINI	Brazil	Researcher, National Centre for Monitoring and Early Warning of Natural Disasters (CEMADEN)	São Luiz do Paraitinga town, state of Sao Paulo, Brazil
7	Virasith Sith PHOMSOUVANH	Lao PDR	Acting Deputy Director of Remote Sensing Center, Ministry of Natural Resource and Environment (MONRE)	The Town of Luang Pra Bang
8	Saima IQBAL	India	Lead Conservation Consultant, INTACH, Kashmir Chapter	Shri Pratap Singh Museum
9	Bertrand Pascal LAVEDRINE	France	Director of the Centre de recherche sur la Conservation, National Museum of Natural History	National Museum of Natural History
10	Domenico GRECO	Italy	Civil Engineer - Young Researcher at University of Salerno, ICOMOS/ICORP Italy	Cilento National Park and Vallo di Diano with The Archeological Sites of Paestum and Velia
11	Khin Aye YEE	Myanmar	Operation Officer, Social, Urban, Rural and Resilience Global Practice, World Bank Group, World Bank, Myanmar	Yangon or Bagan (tbd)

Observers

No	Name	Country	Work Position and Affiliation
1	Chan Min PARK	KOREA	Curator, National Research Institute of Cultural Heritage
2	Sophie ABRAHAM	Switzerland	Junior Professional Officer, Disaster Risk Reduction, Emergency Preparedness & Response Unit, Culture Sector UNESCO

1.2 Timetable of International Training Course (ITC) on Disaster Risk Management

Timetable of International Training Course (ITC) on Disaster Risk Management of Cultural Heritage 2018, 13th year, Ritsumeikan University

	8/28 Tue	8/29 Wed	8/30 Thu	8/31 Fri	9/1 Sat	9/2 Sun	9/3 Mon	9/4 Tue	9/5 Wed	9/6 Thu	9/7 Fri	9/8 Sat
THEME	Arrival	Introduction and Participants` Presentation	Core Principles of Risk Analysis at Site	Value Assessment at Site and Key Terminology	Disaster Imagination Game	Urban Disaster Risk Reduction, Integrated Risk Assessment and Community Engagement	Scenario Making and Self Study	Quantifying Disaster Risk and Understanding the Risk Assessment	Vulnerability and Risk Assessment	Emergency Response and First Aid to Cultural Heritage	DRM System of Cultural Heritage Site and Kyoto City	Coping Method for Movable Heritage/ prevention and mitigation
Venue		DMUCH	Ponto-cho	Ponto-cho	DMUCH	DMUCH	DMUCH	Peace Museum	Kyoto Museum	Ponto-cho	Ninna-ji	DMUCH
9:00			Recap	Recap		Recap			to Kyoto Museum	to Ponto-cho Introduction to scenario	Recap to Ninna-ji	
10:00		Registration Opening Address Orientation of the Course (R.JIGYASU)	Lecture 2 Core Principles of Disaster Risk Management for Cultural Heritage (R.JIGYASU)	Lecture 3 Assessing the Values of Cultural Heritage (R.JIGYASU)	Recap Lecture 6 Introduction to the Context of Kyoto (D. KIM)	Lecture 8 Multiple Hazards and Urban Areas : Urban planning and DRM, or Urban planning for DRM? (L. BOSHER)	Lecture 11 Formulation of Scenarios (R.JIGYASU)	Case Study Project Work	Lecture 13 DRM System in Kyoto National Museum (J. FURIHATA, Kyoto National Museum)	Exercise 4-1 and Workshop/ Simulation 6-1 Emergency Preparedness and Response: Built Component and First Aid to Cultural Heritage "Situation Analysis, Site damage and Risk Assessment, and Debrief and Prepare" (A. TANDON)	Lecture 15 and Site Visit 6 Fire Prevention Facilities at Ninna-ji (H.OMORI)	Lecture 17 Quantifying Disaster Risk to Cultural Heritage Assets (R. GUNASEKERA)
11:00		Lecture 1 The Need for Disaster Risk Management for Cultural Heritage in Historic Cities: The Case of Kyoto (K.TOKI)	to Ponto-cho (field work aiming at developing observation) Site Visit 1 and Field Work 1 Ponto-cho Townscape Improvement Area (A KANBE, R NISHIMURA, R. JIGYASU, A. TANDON and D. KIM)	Lecture 4 The Value of Movable Heritage in the Historical Context of Built Heritage (D. SATO,Tohoku UNIV.)	Lecture 7 Introduction of Disaster Imagination Game (T.OKUBO)	PAR Model Exercies Lecture 9 Disaster Risk Reduction and Integrated Risk Management of Historic Cities: Who is Responsible? (L. BOSHER)	Workshop 3 Scenario Making for the Individual Cases	to Peace Museum Field Work 3-1 Peace Museum: Risk Assessment for Museums (A. TANDON)	Site Visit 4-1 Kyoto National Museum Site Visit 4-2 Exhibition Rooms of Kyoto National Museum		to DMUCH	Lecture 18 Dynamic Analysis of Earthquakes and Seismic Performance of Japanese Historical Structures (S.YOSHITOMI)
12:00		Lunch and Vulnerability Game	Lunch	Lecture 5 The Loss of Value in Objects (A. TANDON)	Lunch	Lunch		Lunch	Lunch	Lunch	Lunch	Lunch
13:00			Lunch	to Ponto-cho	Workshop 1 Discussion and Presentation on Disaster Imagination Game (DIG) (T.OKUBO and D.KIM)	Workshop 2 Applying Integrated Risk Management Process (L. BOSHER)		Field Work 3-2 Peace Museum: Risk Assessment for Museums (A. TANDON)			Lecture 16 Disaster Prevention for Cultural Heritage by Kyoto City Fire Department (K. MEKATA, Kyoto City FD)	Lecture 19-1 Climate Change and Risk Prevention (Y.SATOFUKA)
14:00		The First Presentations and Discussion by the Training Participants/ Cultural Heritage and Disaster	Exercise 1 Terminology and Initial Risk Assessment (R.JIGYASU, A. TANDON and D. KIM)	Site Visit 2 and Field Work 2 Ponto-cho Townscape Improvement Area (A KANBE, R NISHIMURA, R. JIGYASU, A. TANDON and D. KIM)		Discussion 1 Stakeholders Engagement Session - Including Communities		to DMUCH	Lecture 14 and Workshop 5 Making Coordinated DRM Plans: Introduce First Aid and the Method for Situation Analysis Based on the Scenario (A. TANDON)	Exercise 4-2 and Workshop/ Simulation 6-2 Emergency Preparedness and Response: First Aid to Cultural Heritage "Salvage" (A. TANDON)	to Education Center	Lecture 19-2 Flood Prevention and Mitigation Techniques (K.SAWAI)
15:00								Workshop 4 Vulnerability and Risk Assessment Exercise for Museums (A. TANDON)			Site Visit 5 Exhibition of Disaster Reduction Education Center of Kyoto	
16:00				Exercise 2 Assessing the Values (R.JIGYASU, A. TANDON and D. KIM)		Lecture 10 GIS for Disaster Management (K.YANO) Exercise 3 GIS for Disaster Management of Historical Cities and Cultural Heritage (K.YANO)						Case Study Project Work
17:00			to DMUCH	to DMUCH	Case Study Project Work			Lecture 12 Mitigation Strategies for Museums (A. Tandon)	to DMUCH	to DMUCH	to DMUCH	
18:00		to Dinner Venue	Case Study Project Work	Case Study Project Work		Case Study Project Work		Case Study Project Work			Case Study Project Work	
19:00		Welcome Dinner										
Accommodation	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto

# of Cultural Heritage 2018, 13th year, Ritsumeikan University

9/9 Sun	9/10 Mon	9/11 Tue	9/12 Wed	9/13 Thu	9/14 Fri	9/15 Sat	9/16 Sun	9/17 Mon	9/18 Tue	9/19 Wed	9/20 Thu	
Self Study	Middle Presentation	Kiyomizu-District	The Practice of DRM Plan, Awareness Rasing and Recovery from Typhoon	Visit to Cultural Heritage Areas Affected by Typhoon	Planning for Recovery: Lessons from Kobe	From Response to Recovery: Great East Japan Disaster	Recovery of Cultural Heritage Resilience	International Involvements and Frameworks for DRM	Prepartion for the Final Presentations	The Final Presentation	The International Symposium	THEME
DMUCH	Kyoto	Kiyomizu-District	DMUCH	Hirafuku and Takeda	Kobe	DMUCH	DMUCH	DMUCH	DMUCH	DMUCH	Soshi-kan	Venue
		to Kiyomizu-Dera	Recap			Recap	Recap					9:00
	Discussion and Case Study Project Work	Lecture 20 Environmental Water Supply System in Kiyomizu Area (T.OKUBO)	Lecture 22 The Lessons from Respons and Recovery Process of Mexico Earthquakes (D.GRIMALDI, INAH)	Recap	Site Visit 9-1 Exhibition of Disaster Reduction and Human Renovation Institution	Lecture 27 PDNA and Post Disaster Recovery Frame Work (E. SELTER, UNESCO)	Lecture 31 Principle for Sustainable Recovery of Cultural Heritage (R. RANJITKAR)	Lecture 34 Emergency Response and Recovery Involvement by Smithsonian Museum at National and International levels (C. WEGENER)	Case Study Project Work	The Final Presentation	The International Symposium	10:00
		Lecture 21 Landslide Assessment (M. FUJIMOTO)	Lecture 23 The Progress of DRM Plan for George Town World Heritage City (M.ANG, George Town)	Site Visit 8-1 Post Disaster Recovery from Typhoon and Land Slide: Hirafuku Area (Sayo Town Local Municipality and D. KIM)	Lecture 26 Planning for Disaster Mitigation of Cultural Heritage Training of Heritage Manager (Y.MURAKAMI, Kyoto Tachibana University)	Lecture 28 Thinking About Disaster Through a Social Science Lens (W.CHEEK)	Lecture 32 Rescue, Conservation and Preparedness for Movable Heritage (Y. KOHDZUMA, Nara NRICP)	Lecture 35 Blue Shield and Hague Convention (C. WEGENER)				11:00
	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch		12:00
												13:00
	The Middle Presentations of Case Study Project by the Training Participants	Site Visit 7-1 Introduction to the Maintenance System in Kiyomizu-Dera World Heritage Site (A.KOMIYA, Kyoto Pref.)	Lecture 24 Disaster Mitigation and Awareness Raising for Tourists (Y. ISHIDA)	Site Visit 8-2 Post Disaster Recovery of from Typhoon and Land Slide: Takeda-Castle Site (Asago City Local Municipality and D. KIM)	Site Visit 9-2 After the Kobe Earthquake Site	Workshop 7-1 Group Work for Designing the Recovery Process (W.CHEEK)	Workshop and Discussion 7-2 Group Work for Designing the Recovery Process (W.CHEEK, L.BOSHER, Y.HIRAOKA, N. ITAYA and G.TANIBATA)	Lecture 36 The Roll of Intangible Cultural Heritage on the Recovery (H. KUBOTA, Tokyo NRICP)	Preparation for the Final Presentation	The Final Presentation		14:00
		Site Visit 7-2 Landslide Damaged Area (M. FUJIMOTO)	Lecture 25 2011 Typhoon and Landslide on Kii Area, Nachi-shrine and Historical Disaster of Kumanohongu-shrine (M. FUJIMOTO)			Lecture 29 Post Disaster and Recovery Process by the Government and Community in Case of Minami Sanriku Cho (Y.HIRAOKA)		Lecture 37 Management Systems and Management Planning for Heritage Sites (J.KING, ICCROM)				15:00
		to Sannei-zaka	to Hirafuku									
		Site Visit 8 Sannei-Zaka Important Preservation District: Observation of Fire Mitigation Strategies (T.OKUBO)		to Kobe		Lecture 30 Lessons from Post Disaster Recovery of Intangible Heritage (G.TANIBATA and N.ITAYA)	Lecture 33 Recent Development and Emergency Response to Cultural Heritage in Crisis Situations (E. SELTER and G.BOCCARDI, UNESCO)	Lecture 38 Governmental Policies of Disaster Risk Management for Cultural Properties under the Legislative Protection in Japan (S. UMEZU, ACA Japan)				16:00
		to DMUCH			to Kyoto	Case Study Project Work	Workshop 8 Mapping International System of Aid	Case Study Project Work				17:00
										Closing Ceremony		18:00
										Farewell Party		19:00
Kyoto	Kyoto	Kyoto	Hirafuku	Kobe	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	

Organized by Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University, Kyoto, Japan
In Cooperation with UNESCO, ICCROM, ICOM and ICOMOS/ICORP

2 Outline of Disaster Risk Management Plans for Case Study Projects by ITC 2018 Participants

2.1 Formatting a Disaster Risk Management Plan for the House of Rui Barbosa Foundation – Rio de Janeiro – Brazil

Marcia FURRIEL RAMOS GALVEZ
Architect at the Architectural Preservation Group at the House of Rui Barbosa Foundation – Ministry of Culture

1. Introduction

This article presents Disaster Risk Management (DRM) Plan for the House of Rui Barbosa Foundation (HRBF), Brazilian cultural Institution located at the city of Rio de Janeiro. It was developed during the 13th ITC course at Ritsumeikan University Currently, the Institution does not have any plan that takes into consideration the conservation and safeguard of all the collections. Only the historic house Museum holds a plan for preventive conservation of the historic building and its collections .

The main purpose is to create the basis of a new DRM plan that can involve all the assessed values of the Institution in order to continue its further development along with various actors and stakeholders. The final goal is to implement the Institutional plan and share the knowledge acquired with other fellow partners, disseminating the work to help in understanding and protecting cultural heritage from disasters.

2. Brief History of the Institution

Fig.1 The historic Garden and historic building of the House of Rui Barbosa Foundation. The Institution is located in Rio de Janeiro, Brazil (geo-coordinates: 22o56'56.1"S and 43o11'12.3"W). Photo by Ivo Gonzalez (HRBF)

The House of Rui Barbosa Foundation originated from the Rui Barbosa's Historic House Museum. The government bought the building in 1924, and, in august of 1930, it was opened as a Museum-Library, devoted to its patron, preserving his familiar ambience, his books and documents, becoming the first house museum of Brazil. The museum and its site are listed as the national heritage since 1938. Nowadays, it is part of the Brazilian Ministry of Culture, devoted to the development of Culture, Research, Teaching, especially related to the Works and life of Rui Barbosa.

Rui Barbosa (1849-1923) was a Brazilian polymath, diplomat, writer, jurist and politician. He was known by the nickname "Eagle of the Hague", because of his participation in the second Conference of the Nations, that took place in Hague, Netherlands. He was also one of the writers of the first Brazilian republican constitution. His house has many rooms that represents the style of a specific time in Brazilian history, as well as a historic garden showing features of landscape design of 19th century.

3. Value Assessment

Cultural Heritage is composed of a group of attributes that contribute towards authenticity, integrity and particular narratives, within a given context. Only with a complete evaluation of the valuable attributes of the HRBF it would be possible to draw a full value assessment, leading to a complete DRM plan. Initially, seven major attributes were chosen to start the assessment: the historic building, historic rooms, historic library rooms, the archival collection, the bibliographic collection, the archive of Brazilian literature and the historic garden. For each of them, different aspects and values were assigned, such as historical, artistic or social values and such as form, function, materials as major aspects. Along with those different aspects and values, each attribute was also evaluated for its inherent vulnerabilities. A description was made for each of these seven attributes, as represented in Fig. 2:

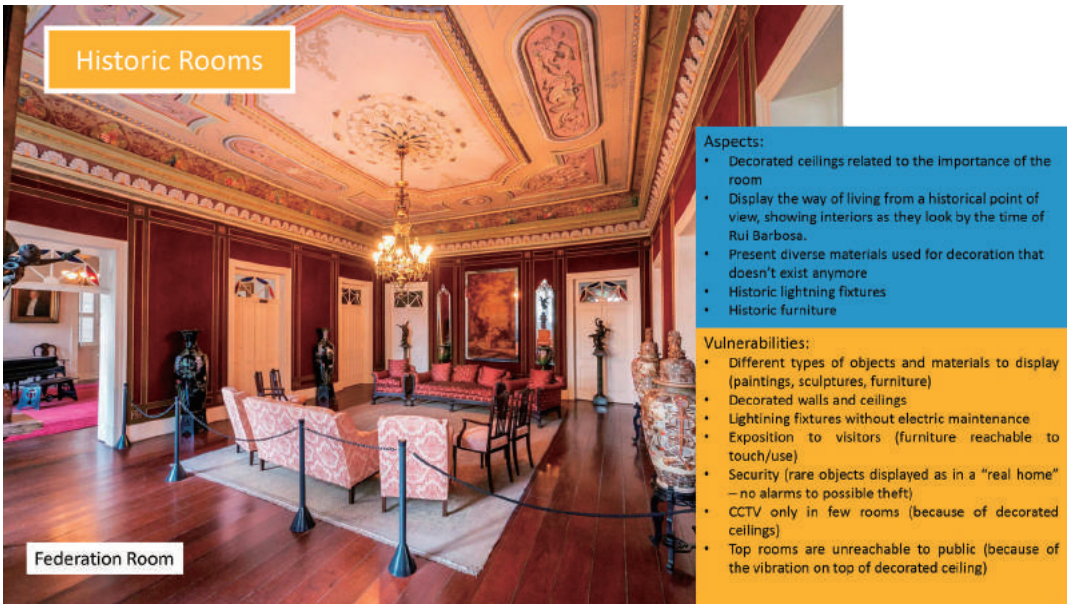


Fig.2 Presentation slide of one of the seven attributes assessed to the House of Rui Barbosa Foundation, presenting main aspects and related vulnerabilities to Historic Rooms.

4. Risk Assessment – Past Disaster Events

About 85 per cent of disasters in Brazil are caused by flash floods, landslides and prolonged droughts . At Rio de Janeiro, majority of heavy rains occur during the summer months (December to March), and these could lead to major risks to HRBF's historic house Museum, built with wooden roof and flooring structure. Fire is also a major hazard that could lead to complete destruction of the Museum and the collections. The Institution already experienced past disasters related to these risks, such as localized flooding in the historic garden (2005), fire at the administration building (2018) and water leakage in the storage rooms of archive and bibliographic collections (2017).

All this information helped to build a table where possible hazards (of natural or anthropogenic sources) relate to the vulnerabilities assessed, in order to estimate possible impacts on the HRBF. Results showed on Fig. 3:

RISK ASSESSMENT

HAZARDS	VULNERABILITIES	IMPACTS
• **Heavy Rains** • **Flood** • **Localize flooding (inside building)** • **Fire** • **Theft** • **Vandalism**	• No Management Plan (only for the Historic Building)/ No DRM Plan • Lack of trained staff related to first aid procedures regarding fire or localize flooding • **Water pipes passing through historic garden** • **Lack of maintenance of electric system** • Not enough security staff (no night guards inside the historic building) • Lack of lightning protection system • Workspace (with electric tools) inside the historic building basement • Lack of documentation of past disasters • Conflict between Heritage Institution (IPHAN) and the Institution • Lack of trained staff to guide tours (the Museum only take guided visits) • **Government issues (political instabilities)**	• **Partial or total destruction of the historic library rooms (due to localize flooding/ heavy rain/ fire/ theft/ vandalism)** • Lost of objects from the museum/ archive/ bibliographic collection (due to theft) • Impact on the relationship between the Foundation and local community (due to flood/ vandalism/ fire) • **Increase in the degradation of the historic book collection (due to heavy rains/ secondary hazard – material deterioration by fungus)** • Transformation of the Foundation into a private organization (due to government issues)

Fig.3 Table presenting hazards, vulnerabilities and possible impacts as the combination of these items, in a general view.

5. DRM Plan for Possible Impacts – Drawing Risk Scenarios

After risk assessment, the nest step taken on the developing of the DRM plan to the HRBF was drawing a risk scenario. With this methodology, it is possible to simulate (hypothetically) a disaster, describing a sequence of possible events, triggered by primary hazard resulting in diverse impacts on one of more attributes.

Although the HRBF relates to different natural hazards in the area, the presented risk scenario started with the rupture of two water pipes of 500 mm in diameter, built in the 1920 ´s, crossing the site through the historic garden and passing less than 10 meters from the west façade of the Historic building. The West façade is where the main windows of the historic library rooms are located. Old and in an unknown state of maintenance, a possible rupture of the pipes would affect not only the Museum collection and Historic Building, but also the visitors, as the garden is much used by the local community, especially by children and the elderly. In this case, the presence of the buried pipes turned out to be the vulnerability that may cause the disaster scenario, though not a natural one.

On a Sunday evening, due to the leakage from the rupture, pressurized water hit the west part of the historic garden, five historic rooms of the historic building and the basement, causing localized flooding. No security guard was present in the west wing of the Museum at the time due to lack of security staff. Water in the basement causes electric short circuit, initiating a fire right next to the wooden floor structures as secondary hazard.

With this drawn scenario, it is possible to predict the impacts generated and to elaborate measures to respond to the disaster case before or after it eventually happens. Figure 4 presents part of the impacts imagined from the scenario, from high to low risk.

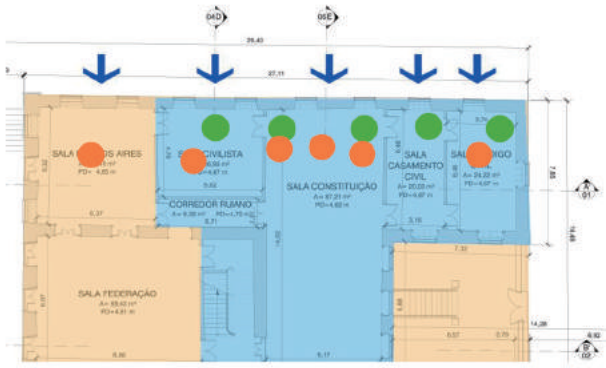


Figure 4 – Map of the 1st floor, showing the rooms affected by the rupture of the water pipes. It includes historic rooms and historic library rooms, managed by 2 different stakeholders (museum collection manager and books collection manager).

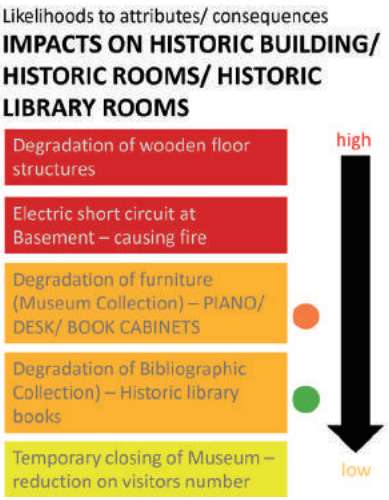


Fig.4 A slide presenting the areas possibly damaged by the rupture of the water pipes, consequence of a drawn risk scenario, where historic rooms and historic library rooms are affected by localize flooding. The orange and green dots show the location of important objects of the museum and bibliographic collection.

6. Proposal of Mitigation Measures for PREVENTION, RESPONSE and RECOVERY – Action Plans and Table of Stakeholders

For each drawn scenario, a list of possible impacts is given and associated measures of prevention, response and recovery were proposed :

For PREVENTION (actions to prevent this risk to happen):

- Develop plan for the complete renewal of electric system
- Update fire protection systems
- Increase security staff
- Training of Foundation staff/ raise awareness within local community
- Produce safety cards for fire department
- DIG – Disaster Imagination Game to engage community with Foundation Staff
- Develop a visitor management plan and facilitate online access

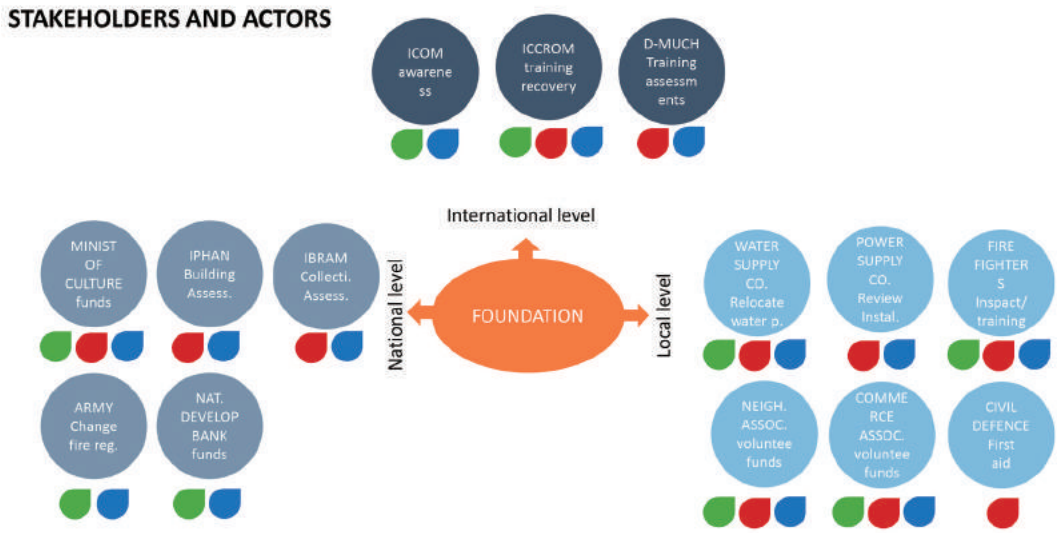
For RESPONSE (immediate actions at first-aid moment):

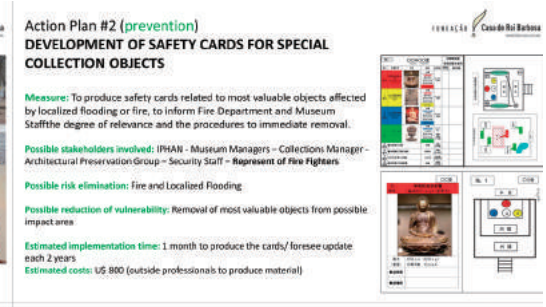
- Develop plan for the immediate protection of most valuable objects localized in the west wing of the Museum
- Create a direct communication with the water supply company to immediately turn off the water flow in case of rupture.
- Undertake damage assessment to estimate funds
- Develop first aid procedures such as salvage and evacuation of most valuable objects
- Alternate storage rooms in safe locations

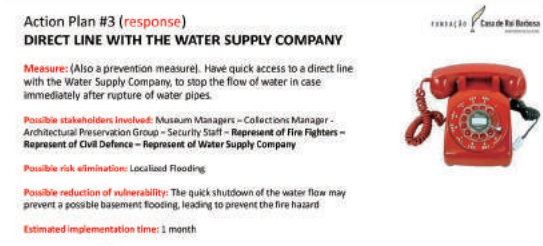
For RECOVERY (after the event, actions to bring back or restore attributes possibly lost):

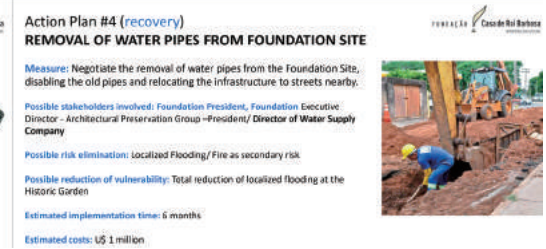
- Demand actions from the water supply company to eliminate this stretch of water pipes inside the Foundation site
- Restoration of possible damages objects for fire or localized flooding.

For every measure, there are different stakeholders and actors involved, being responsible for needed actions of prevention or response and recovery. That means that different stakeholders participate during different phases of the DRM plan, and it is important to know all of them. In addition, the HRBF staff is part of internal actors and should know their position in this table/scheme, presented on Fig. 5:









After the simulation of a large number of risk scenarios (involving all possible hazards and attributes), and associating measures and stakeholders to each one, it is possible to design the final content of the DRM plan, proposed actions to mitigate and/or eliminate those risks in their totality.

In this first attempt, action plans were created to understand, in a practical way, how measures against risk of disasters could be implemented. This DRM plan started with four action plans, listed below:

7. Conclusion

Formulating a DRM plan is a continuing exercise that requires detailed understanding of Cultural Heritage context, values, vulnerabilities and possible affecting hazards. To reach a solid plan for the House of Rui Barbosa Foundation it is key to complete the value assessment, in order to fulfill possible risk scenarios and propose various measures. To raise awareness on this work is important now, after the fire that consumed a great part of the National Museum, the first Brazilian museum in Rio de Janeiro. Implementing actions against disasters, especially prevention ones, is a major goal to cultural Institutions, and the House of Rui Barbosa Foundation can develop a DRM plan that works as a model to them. There is a lot of work still to do, related to the assessments and engagement of actors and stakeholders, but the work developed at the 13rd ITC course on Disaster Risk Management of Cultural Heritage at Ritsumeikan University is certainly a great starting point.

References

1) In 2012, a Risk Management plan was made for the Foundation. See article "RISK MANAGEMENT FOR THE HOUSE OF RUI BARBOSA FOUNDATION'S CULTURAL HERITAGE", CARVALHO, C. R.. Available in: http://www.casaruibarbosa.gov.br/conservacaopreventiva/arquivos/file/Downloads/Gerenciamento%20de%20Riscos%20para%20o%20patrimonio%20cultural%20FCRB.pdf . Article in Portuguese.
2) The Mission of the Institution is "to promote the preservation and research of memory and literary and humanistic production, as well as bring together initiatives for reflection and debate on Brazilian culture".
3) "In Rio de Janeiro, thousands at risk from disasters", Andrade, R. – Available in: https://scidev.net/global/environment/news/in-rio-de-janeiro-thousands-at-risk-from-disasters.html?utm_source=link&utm_medium=rss&utm_campaign=/global/global_rss.xml&

2.2 Disaster Risk Management Plan for Nobgang Cultural Site, Bhutan

Jamyang Singye NAMGYEL
Conservation Architect at the Department of Culture, Ministry of Home and Cultural Affairs.

1. Introduction

Nobgang (the mount of precious jewels) is a historic village located in Talo sub district of Punakha. The village is situated on a hilltop at an altitude of 2000 mts above sea level. The settlement developed after the establishment of the Nobgang Tsuglakhang (temple) built by the ninth Je Khenpo (chief abbot) Gyalwa Shacha Rinchen in 1756. The houses were built as meditation houses by monks who came from all over the country and later settled in the same area. The village of Nobgang has been identified as an important cultural site under the framework of the Cultural Heritage Bill (CHB) of the Kingdom of Bhutan, 2016.

2. Sustainability and Existing Values and Attributes

The village fulfills all eight criteria listed under section 51 for "Registration and Designation of Cultural Heritage" of the Rules and Regulations of the Cultural Heritage Bill of Bhutan. A draft stewardship plan for Nobgang has been prepared under which:

The five key defining elements of the Nobgang cultural site and its cultural landscape that make the site geographically, historically and visually unique in Bhutan are:

• Its location in Punakha, one of the most naturally spectacular and historically significant valleys in Bhutan.

• Its sacred natural surroundings and assets. The settlement is also characterized by several natural features such as rocks and gorges which are believed to be inhabited by spirits. Offerings to the spirit gods annually is an important intangible culture of Nobgang and its residents.

• Its distinct housing architecture called kabu-dharcham.

• Its linkage with eminent historical figures. In addition to the 9th Je Khenpo of Bhutan (Chief Abbott) Je Shakya Rinchen, Nobgang village has also a special connection to the historical Royal Family of Bhutan.

•Its traditional agricultural practices.

However, for the purpose of this assignment; the tangible attributes of the site which are of heritage value and attributes connected with the intangible culture of the community have been focused to develop the disaster risk management plan.



Fig. 1,2 and 3 Nobgang Temple, Kabu Darcham houses and Stupas

3. Value Assessment:

The following tables describe in detail the various built and natural attributes of the site, their significance and their vulnerability to hazards.

Table 1 Built attributes of the site, their significance and vulnerability to hazards.

Attributes	Values	Significance	Associated Intangible values	Level of Significance	Vulnerability to hazards
Kabu Darcham	Architectural	The typology of houses which are called Kabu Darcham is unique to Nobgang and about 13 houses retains the original 18th century design.	None	High	Highly vulnerable to Fire, Earthquake and Windstorms
Nobgang Temple	Religious Cultural Social	Built in the year 1757 by Je Shakcha Rinchen, this temple was the first permanent structure built in the village. The temple is highly revered not only by the residents but also by all Bhutanese and is a popular place of pilgrimage for the Bhutanese.	Yearly festivals and Daily rituals	High	Highly vulnerable to Fire, Earthquake and Windstorms
Zimchung Gom	Religious Cultural Social	Built in the 18th century by 10th Je Khenpo Penchen Tenzin Chogyal, it is another temple which holds high spiritual value to the residents and the Bhutanese	Yearly festivals and Daily rituals	High	Highly vulnerable to Fire, Earthquake and Windstorms
Relics	Religious Cultural Social	The statue of Lord Buddha in the main Lhakhang has a sparkle of light on its forehead which is believed to be a relic from which the name Nob (Jewel) and Gang (ridge) of the village has derived	Yearly festivals and Daily rituals	High	Highly vulnerable to Fire, Earthquake and vandalism
Stupas	Religious Cultural Social	The stupa which originally was a water-fed prayer wheel structure back in the olden days also served as a landmark and nodal point for the original settlement	None	Medium	Vulnerable to vandalism as sacred and valuable objects are hidden in the stupas

Table 2 Natural attributes of the site, their significance and vulnerability to hazards.

Attributes	Values	Significance	Associated Intangible values	Level of Significance	Vulnerability to hazards
Surrounding forests	Environmental Social	The community forests and pastures are important assets for the livelihood of the community	Farming, agricultural and daily livelihood activities	Medium	Forest fires especially during the dry winter season
Agricultural Fields /practices	Cultural	Agriculture is the basic source of livelihood and the traditional practices of shared labour keeps good community bonds	Shared labor within the community and use of traditional farming practices	Medium	
Abode of Bayga Lung Due	Social Cultural	An area where the spirit called Peb Dhargay, is believed to reside. A large old tree is the object of worship. Residents perform an offering ritual to the spirit every year before they begin the major plantation in their fields around him.	Important aspect of the communities beliefs and daily life.	Medium	Forest fire

4. Hazards/Threats:

The hazard mapping and other related information regarding hazards are very limited. Except for GLOF, there are no hazard maps or zones for other hazards such as earthquakes, fire, etc. Therefore, the hazard and threat to the site have been studied from past history of disasters in and around the Nobgang site.

The following are the highly probable threats and the impact it could have on the heritage attributes of the site:

• Forest fire – The deciduous coniferous forest surrounding the village and the presence of other settlements around the village makes the likelihood of forest fires very high especially during the dry winter season.

• Structural fire – The material of the houses and temples being mostly of timber makes it highly vulnerable to structural fires. The practice of lighting butter lamps inside the altar and the poor condition of electrical fixtures and installations might lead to structural fires.

• Earthquake – Bhutan is located in a very highly seismic prone zone. Secondary hazards such as fire due to earthquake could cause high damage to the houses and the temples.

• Windstorm – Punakha region is frequented with seasonal windstorms. Severe windstorms could result in structural fires and physical damage to the structures.

• Vandalism – The temples and stupas house important relics and valuable items. This poses high risk of vandalism and destruction.

5. Risk Analysis vis-à-vis the Heritage Attributes of the Site

The table below shows the risk analysis of the various attributes and their vulnerability to certain hazards due to their material characteristics and other factors.

Table 3 Risk Analysis.

***It is found that Fire, earthquake and windstorm which are the most common and impactful hazards would hugely affect the most significant attributes of the site.

Attributes	Level of Significance	Vulnerability factors	Highly Vulnerable to	Impact of Hazards
Kabu Darcham houses	High	1)Poor electrical wiring systems 2)Timber is used as a major construction material 3) Vicinity to exposed electrical lines 4) Exposed butter lamps lit daily in the altar	Fire, Earthquake and Windstorm	Complete or partial destruction by fire, earthquake and windstorms.
Nobgang Temple	High	1)Poor electrical wiring systems 2)Timber is used as a major construction material 3) Vicinity to exposed electrical lines 4) Exposed butter lamps lit daily in the altar	Fire, Earthquake and Windstorm	Complete or partial destruction by fire, earthquake and windstorms. Loss of relics/texts due to vandalism
Zimchung Gom	High	1)Poor electrical wiring systems 2)Timber is used as a major construction material 3) Vicinity to exposed electrical lines 4) Exposed butter lamps lit daily in the altar	Fire, Earthquake and Windstorm	Complete or partial destruction by fire, earthquake and windstorms. Loss of relics/texts due to vandalism
Relics	High	1) Religious texts (nature of materials) 2) Statues made of mud 3) Stored/displayed in the vulnerable areas 4) No security systems	Fire and Vandalism	Complete or partial destruction by fire and destruction by vandalism
Stupas	Medium	1) Located in open areas 2) No security system	Vandalism	Complete or partial destruction.

6. Plausible Disaster Scenario

Drawing from the risk analysis, fire is the most plausible threat that can have major impact on the important attributes of the site. The scenario is set during the dry and windy winter season on an auspicious day for Buddhists. During the day time, a lot of people from the community and other places come to pay offerings in the main temple. A lot of butter lamps have been lit and by 4 PM in the evening, all the people have left and the caretaker of the temple is also quite tired with the hectic day. The butter

lamps which are placed very near to the timber altar causes the fire. Since there is no fire alarm system installed in the temple, the caretaker remains unknown of the fire until it becomes too huge. There are also no fire-fighting system installed for the temple and by the time people become aware of the fire, the temple structure with all the movable property inside the temple is destroyed.

7. Disaster Risk Mitigation and Preparedness

The disaster risk mitigation and preparedness for fire have been developed for the site. Relevant stakeholders for carrying out the activities and the financial resource required for the activities have also been outlined.

Table 4 Risk Mitigation and preparedness against Fire.

	Activities	Stakeholders	Responsibility	Impact	Cost	Finance
Mitigation	Revive the practice of 'Mero' - A traditional practice whereby the local community get together to clear the bushes and dry vegetation around heritage/religious structures to prevent the spread of forest fires.	The Temples Local Government Stewardship Committee The residents	Temple & SC to coordinate Local Government to finance Residents to participate	Spreading of forest fire is greatly reduced and community bond is enhanced	Low	CH Fund
	Yearly monitoring and maintenance of electrical wiring and fixtures in the houses and temples	SC The Residents The Temples	Stewardship Committee to coordinate	Negates electrical short circuiting	Low	CH Fund
	Use of Glass enclosed butter lamp stands in the houses and the temples	SC The Residents The Temples	Stewardship Committee to provide free glass enclosed butter lamp stands	Secondary hazard of fire after earthquake is eliminated	Low	CH Fund
Preparedness	Fire hydrants to be supplied to all houses and temples. Basic fire-fighting equipment's such as oxygen mask, water bags helmets for each households to be procured and stored near the Nobgang Tshuglakhang.	SC The Residents The Temples The Royal Bhutan Police	Stewardship Committee to finance and provide all the equipments	Alarm systems enhances quick response and the CCTV reduces the risk of vandalism of the temples and the stupas Better equipments enhances efficient response	Medium	CH Fund
	Fire alarm system to be installed in all Important houses and temples. CCTV to be installed in the two temples and the areas near the stupas.	SC The Residents The Temples The Royal Bhutan Police	SC to coordinate with the RBP for the installations		Medium	CH Fund The Temples
	Emergency Drills focused on resource management, call for help, man power mobilization during response.	SC The Temples The residents Local & Dist Govt RBP	SC to coordinate Temples, Local Govt, District Govt and residents to participate	Improved coordination and response mechanism during emergencies	Low	CH Fund
	Fire proof display shelves to be installed in the two temples for storage and display of religious texts and important relics	Dratshang Lhentshog DoC	DoC to provide the design and implement the installations	Ensures the safety of relics during fire	Medium	CH Fund

At the site level, it was also found important to have an established disaster response system for efficient early response to disasters. The installation of state of the art fire-fighting and alarm systems for the temples and the important kabu darcham houses would be too expensive. Further, the distance and time for the fire-fighting trucks to reach the site on time during a disaster is very long. Therefore, a first responder team comprising of the whole community with an established system of communication and emergency drill would serve more efficiently to respond to a disaster.

It is also found sustainable and cheaper to install portable fire-fighting equipment's especially at critical places in the temples and the Kabu darcham houses. The emergency drills should focus on the use of these fire hydrants and the system to share these resources whenever a fire occurs. The figure below shows a basic layout at the site with locations of emergency response area and strategic points for installation of fire hydrants and CCTV for surveillance.

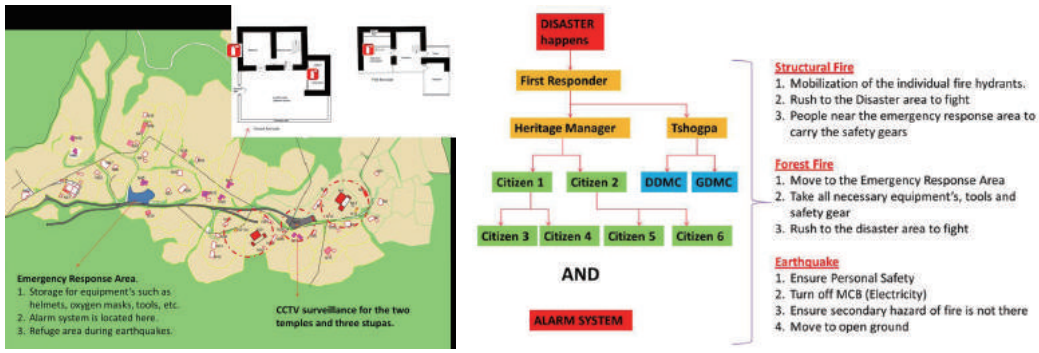


Fig. 4 and 5 Site plan with location of Emergency response area and diagram showing system of communication for efficient first response at site.

8. Recovery

For recovery, a series of actions also has to be carried out at the earliest. Documentation of all the Kabu Darcham houses and the two important temples have to be carried out.

Post disaster, recovery at two stages have been outlined in the table below.

Early Recovery (Stewardship Committee, Local/District Govt)	Long term recovery (Department of Culture)
•Ensure safety of the Disaster scene. •Carry out the immediate disaster assessments. •Inform the DoC (Situation Analysis)	•Coordinate with relevant stakeholders for recovery plans. •Consult with Central government for recovery funds. •Implementation by the District govt.

Table 5 Early and long term recovery plan.

References

1) The Cultural Heritage Bill of Bhutan, 2016.

2) Draft Nobgang Cultural Site Stewardship Plan.

2.3 Disaster Risk Management Plan for Taitu Hotel: Addis Ababa/Ethiopia

Abel Assefa GIRMAY
Heritage Conservator and Archeologist

1. Background

Addis Ababa is comparatively young city, dating from the end of the 19th century; however it has undergone several changes. All these developments have left their traces in the city's fabric. The city gathers a rich and unique urban heritages dating back to its origin. Early historic buildings of the city in particular, have a document with a century and quarter of settlement, development and change of the city.

Among the diverse and unique urban heritages Addis Ababa City possesses, Taitu Hotel is one of the important built up heritage which is associated with the city's early development. The Hotel was the first hotel to be opened in the country in 1907. The Hotel and other various public buildings constructed during the period were associated with the introduction of modern technologies and institutions to the country and a witness for transformation in architectural elaboration from tents and huts to complex buildings. The building present design is still the original and it is characterized by a two-tier roof and by verandas running all around the two floors.

The hotel reflects the traditional Ethiopian tastes, but also represents the hybrid style that developed in Addis Ababa in the early twentieth century, when European and Indian craftsmen worked on homes, businesses and places of worship for wealthy Ethiopian and foreign client. In addition to being the first building of its type in Ethiopia; e.g., a hotel, the hotel two-story, rectangular design reflects the introduction of a new design concept in a region of the country, where buildings were traditionally round or oval, one-story structures. The building, which continues to operate as a hotel a century after its founding, anchoring its historic district, is one historical landmark in the city's life and architecture. Apparently, the hotel has 83 bed rooms and is renowned for being the destination for foreigners and backpackers. The hotel is a place where paintings, photos and art works are portrayed and once part of the hotel serves as a gallery.

Fig.1 Taitu Hotel Building

2. Location and Context

Taytu Hotel is situated in the southern section of the Piazza district of Addis Ababa, Ethiopia. Arada/Piazza was one of the earliest settlements of Addis Ababa established at the turn of the 19th century. The area had very vital city wide functions serving as a center of business and a place for cultural activities in the first few decades of the city. Due to its historical significance as a commercial and cultural center in the early formation of the city, apparently the area comprises abundant number of built up heritages. Among 150 elements selected and incorporated in the master plan of the city, 27 building structures which implies 18% of the overall cultural heritages the city are located in Piazza area.

This Hotel has been registered as one of a significant built up heritage of the city by the present ARCCH (Authority for Research and Conservation of Cultural Heritage) the successor of CRCCH (Center for Research and Conservation of Cultural Heritage), in 1990; by the Master Plan of the City in 2001; AACTB (Addis Ababa Culture and Tourism Bureau) in 2010 & 2015; also in 2008 by local NGO Addis Woubet in collaboration with GTZ.

3. Heritage Analysis: Attributes and Values

The hotel has two possible attributes which are directly or indirectly related to the hotel's development/ passage along its history and structure. The first attribute is in the Hotel structure itself and its use which has two sub-attributes i.e. the whole structure and decorative architectural elements located in the west section of the building.

The second attribute is a group of buildings that were constructed during the Italian Occupation. Those groups of buildings (eight annexes) are significance property supporting historical values through their direct association with the Fascist regime. But, due to their ordinary design and materials, are not contributing factors to the architectural significance of the property. Therefore for the purpose of this study only the hotel structure has been selected and studied because of its significance and multi-dimensional value.

Table 1 The hotel values and level of scale

Dimension of the Heritage (from 1(Low) to 5 (High)				
Aspects	Artistic	Historic and Political	Social	Scientific
Form and Design	5	3	2	4
Materials & Substances	5	1	1	4
Use and Function	1	3	4	2
Tradition, Technique, & Workmanship	5		2	3
Location and Setting	4	3	2	1
Sprit and Feeling	2	2	3	1

4. Disaster Risk Assessment:

4.1 Contextual Background of Human-induced Disaster/January 11/ 2014

The historic structure has undergone on various changes and challenges that has shaped and influenced to maintain its original semblance and to remain as the city fabric. One of the major challenges the Hotel ever encountered was in January 11/ 2014, when a fire accident partially destroyed its structure. The fire was originated from inside the building and has damaged many of the hotel's rooms, its historic pieces & artifacts and wooden structures before it was put under control. Many of the hotel's rooms, its historic pieces and a bank office were completely burned down before firefighters put out the fire. The City's Police Commission disclosed that the cause of the fire accident that devastated the historic Taitu Hotel was a faulty of electric wiring.

Fig. 2 The Hotel during and after the fire accident in January 11/ 2014

4.2 Threats and Hazards /Vulnerability/Impact

Table 2 Potential threats and hazards /vulnerability/impact

Threats	Vulnerability	Impact
Earth quake/ Seismic hazard	• The city lactation in the seismic region of the Country. Since its founding a century ago, a number of seismic activities have occurred. • Current state of preservation (Lack of regular maintenance) • Construction material/wood • Lack of DRM in case of emergency	Loss/Damage on the structure
Urbanization	• The city is rebuilding itself around its urban core. There is major construction going on in near to the hotel area. (Land Value) • Owner interest to expand and to construct new building	Lose of Visual Integrity
Landslides/ landslips (land movement)	• Massive undergoing construction in Surrounding the area	Structural instability
Fire Accident	• Poor and old electrical wire installation • Proximity to kitchen • Poor safety procedures and lack of fire prevention equipment and measure • Lack of DRM even after the fire accident	Damaged on many of the hotel's rooms, its historic pieces & artifacts and wooden structures

4.3. Risk Analysis

The probability of fire accident originated from either inside the building as a result of faulty of wire or from the kitchen which is in a few (1-m) distances from the main hotel building could cause a severe damage. Also hence the urban settlement of the surrounding is congested and the hotel and other nearby structures were built by timber/wooden material the probability of spreading fire from surrounding neighborhood is underlying.

Probability of Fire caused due to human errors and subsequently its spread due to strong wind is almost certain and its consequence will be high. Likewise its degree of impact on heritage values associated with key attributes will be high. However its degree of impact on safety of visitors and staff is rare.

5. Disaster Risk Management Plan

5.1. Objective

Major objective of the DRM plan is:

• To reduce the possibility of risk of fire that could be caused human error and its possible impact on the historic asset's values associated with key attributes visitors

• To react to the disaster occurred to a pre-plan and organized action plan by involving different stakeholders

• To have an exemplary DRM plan that could be caused as a good lesson.

5.2. Mitigation and Prevention Measures

Table 3 Action plans for Mitigation and Prevention Measures

Action Plan	Major Activities
Planning	• Documentation with detail decorative details and materials/ state of conservation (disseminating the inventory document for various stakeholders including museums and libraries and archive agency • Stakeholders meeting for the preparation of Management plan for the hotel administration and management (proposing a 5% annual revenue for the preservation and safety procedures of the hotel) • Preparation of DRM plan
Structural measures	• Maintenance/restoration of the asset which could increase the capacity of the hotel in case of a hazard/to facilitate visitor's service and safety • Upgrading the electrical installation of the hotel with modern materials and based on the new EBC • Changing the place of the Hotel's Kitchen to new area • Placement of Automatic fire alarm equipment's and Fire extinguisher and water sprinkler • Lightening conductor devices need to be placed.
Non-structural	• Awareness creation program • Regular training for the Hotel stuff on how to use fire extinguisher • DRM - Set up a system for a regular inspection and replacement of fire extinguisher at least once a year • Set up emergency response team which includes employees from the hotel and representative/volunteer from communities of the neighborhood and also experts from responsible government organization

6. Conclusion/ Emergency Response and Recovery

The field of cultural heritage management and in particular DRM needs a collaboration of different stakeholders at different level; in any event of hazard the need to have a response team which includes professionals from different filed and sector organization based on their interest and power is vital for short, medium and long term plans of emergency response and recovery/rehabilitation.

Based on the experience of Kobe/Japan linking the activities of mitigation to recovery is important. For example; while conducting immediate assessment, documentation and evaluation of the damaged section of the structure, hand in hand a study for its recovery/rehabilitation or in a case of damage rebuilding needs to be assessed along its financial coast break down and stakeholder's role. To conclude in any case for activities to be implemented for emergency response and especially for its recovery and rehabilitation needs to be balance and harmonize the heritage values associated with key attributes and the safty of vistors and the struucture.

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2.4 The Dominican Convent of Tehuantepec, Mexico. A Disaster Risk Management Draft Plan

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1. Introduction

This document is a product of the work carried out during the 13th UNESCO Chair International Training This document is a product of the work carried out during the 13th UNESCO Chair International Training course (ITC) on Disaster Risk Management of Cultural Heritage at the Institute of Disaster Mitigation for Urban Cultural Heritage (D-MUCH), Ritsumeikan University, Kioto, Japan. This brief document is the first attempt at developing a Disaster Risk Management (DRM) plan of the former Dominican Convent, located in the city of Santo Domingo Tehuantapec, in the southeast Mexico. It is the only remaining 16th century cloister building in the Istmo de Tehuantepec [2] region. It was built on the flat land near Tehuantepec river, and is one of the oldest building in the city from the colonial period.

A general plan for the management and reduction of disaster risks of this specific cultural asset is formulated. The methodology used was the one designed, implemented and taught since 2006 during the ITC by D-MUCH, which links the Disaster Risk Management approach with conservation of cultural heritage. It considers the allocation of heritage values, the vulnerability assessment process, identification of multiple hazards and threats and the analysis of exposure, all from the cultural heritage perspective as an integral part of a comprehensive risk evaluation process.

The selection of this specific cultural site responds to the adverse circumstances in which it was before I attended the ITC, particularly due to damages caused by series of earthquakes since 2017. During the response fase, emergency actions where taken by the National Institute of Anthropology and History (INAH) [3] to protect the collections and prevent them from further damage. Emergency measures were taken also to stabilize the building through shoring. Unfortunately, there was considerable loss of architectural finishes and decorations, particularly on wall paintings. The building is still closed to the public until the writing of this paper.

2. The 2017 Earthquakes

On September 2017, two of the most important earthquakes in Mexican recent history occurred. The first one, on September 7th, with magnitude of 8.2 [4] was one of the biggest events recorded since seismic instrumentation has being used, severely impacting five states in the country and having

1 Instituto Nacional de Antropología e Historia.

2 The region is called Istmo de Tehuantepec, which translates as the isthmus of Tehuantepec. (Author's translation)

3 The National Institute of Anthropology and History (INAH for its acronym in Spanish), it's the Institution responsible for the protection, conservation, research and promotion of cultural heritage from ancient times to 19th century, at a national level.

4 The earthquake took place at 23:49 hours, 133 km Southwest of Pijijiapan, Chiapas, with geographical references at 14.761° latitude N, and -94.103° longitude W and 45.9 km deep, according to the National Seismological Service (SSN) from the Universidad Nacional Autónoma de Mexico (UNAM).

an unusual number of aftershocks. The second one happened on September 19th of the same year, with magnitude of 7.1 with its epicenter in central Mexico, which affected another 8 states, including Mexico City. Together they caused damage to over 2,300 historic buildings from XVI to XIX centuries, 320 of them with severe damage, within 11 states, representing one third of the national territory. (Pérez-Campos, Espíndola, 2018: 49, 55; Prieto, 2018: 110)

The first event, having the epicenter around 180 km from Santo Domingo Tehuantepec, the precise location of the Convent, had an enormous impact on the building, damaging the historic structure, the architectonic finishes and decorations, and somehow affected almost all the cultural objects and collections kept inside. During the emergency fase, some quick measures where taken to rescue and stabilize the cultural assets and attributes of the site, and protect them from further damage. Veils where applied to damaged wall paintings using non-woven materials, all the collections where stored, evacuated and secured to the undamaged area of the building with restricted access. This was the situation for the Dominican Convent before 2018 ITC and the reason it was selected as case study for the course.

Fig.1 The Dominican Convent of Tehuantepec after the September 7th M8.2 earthquake. Photograph: David Torres

3. Attributes, Vulnerability and Values

To successfully understand the site, attributes and its associated values where initially identified followed by a vulnerability assessment. This allowed me to evaluate the tangible or intangible aspects of the site against multiple potential hazards from an integrated perspective, and opened up the possibility of priorization. The identified attributes are showed in the following table, where the associated values for each one of them are described, and a level of significance was assigned according to the range of values and the number of stakeholders involved. It is possible to notice that the historic building itself including the wall paintings and the architectural decoration, having identified at least four kind of values associated with them, including material, scientific and spacial ones, and being the container of all the other attributes, was stablished as the most important attribute of the site.

	Attributes	Associted value	Level of significance (3=high; 1=low)	
Immovable heritage	16th century building	Historic value	1	Social Value
		Scientific value	2	
		Function value	2	
	Wall paintings	Historic value	3	
		Artistic value	3	
		Material / scientific value	2	
Movable heritage	Archeological collection	Institutional value	1	
		Historical value	2	
		Material / scientific value	2	
	Religious art collection	Institutional value	1	
		Historical value	2	
		Material / scientific value	2	

Fig.2 Identified attributed and the associated values

5 There were more than 22, 000 aftershock reported by the National Seismic Service (SSN) until 1st of June.

6 The September 19th earthquake took place at 13:14 hours, 17 km Southeast of Axochiapan, Morelos, 127 km from Mexico City, and 38.5 km deep, according to the National Seismological Service (SSN) from the Universidad Nacional Autónoma de Mexico (UNAM).

One relevant aspect was to understand the community value of the building as a social space, since from this point of view, this cultural asset is not only appreciated for it's historic fabric or it's architectural relevance among the people of Tehuantepec, but mostly because it functioned as a cultural centre where popular cultural activities where taught to children and youngsters, and local art exhibitions where held. Even now when it remains closed to the public, it represents one of the focal points for identity creation, cultural continuity and an essential agent for social cohesion in the city. This was identified as a root value underlying every other aspect or attribute of the site, and furthermore not included in the attribute list as it related to not only to one of them, but as an axis that permeates at all levels instead.

4. Hazards, Risks and potential scenarios

The next step was to identify and understand the hazards that could possibly threaten the cultural asset in a given period of time. This allows the DRM planner to implement structural or non structural methods to reduce the potential risks and so reduce the expected loss of value to the heritage asset.

Regarding the former Dominican Convent of Tehuantepec, understanding of risks in the current state, focusing on the frequency, or chance of occurrence, of potential hazards was paramount, in order to identify and prioritize immediate interventions and implement them accordingly. It was so that time parameters were stablished for the immediate and medium term ones. Furthermore, not only potential long term risks where taken into account but also short term risks due to the current situation of the site were studied. In this way, heavy rainfall was found as the most plausible and thus more important of them to care of as it is expected to occur soon, and again every year, followed by a slow recovery process which could not be fast enough to prevent more damage. In this scenario, the plastic used to protect damaged areas of the building from water filtration has been wearing off due to prolonged sun exposure. Thus, water could leak inside the building causing damage to temporary storage of collections, flooding the inner spaces which are not designed to manage water and subsequently damage wall paintings by dripping and draining through the walls. Furthermore, this could affect the wooden shoring causing differential or irregular movements, putting the whole building at risk of instability, and more structural damage in case of another seismic event.

In addition man-induced threats were included particularly inadequate practices for the reconstruction of the damaged structure as a very likely risk in the medium term due to the recovery process in the region. Poor monitoring and control of the reconstruction techniques from the central government agency, for instance, could cause not only the loss of authenticity and integrity of the site, but also could create new risks in further earthquakes, which are very likely to occur [7]. In addition, but also derived from what has been described up to this point, the collections could be directly affected by the high humidity levels or even direct contact with water, causing the deterioration of organic materials such as fabric, silk, paper or wood.

7 According to the National Seismic Service, the city of Tehuantepec is located in one of the most seismic regions in the country due to its closeness to the subduction zone between the Cocos, the North American and the Caribbean tectonic plaques.

From this overall perspective what was identified at highest risk was the social value that works as cohesive agent for all the other attributes of the site. In an obvious way, the lack of access for the local communities due to security reasons has interrupted the local function of the space, overlooking the importance of carrying out cultural activities. Nonetheless, keeping the building closed and out of reach for locals, even when it is being repaired, could actually have a negative impact on the community. But less evident is the lack of collaboration initiatives by the official agencies that could enable the community to be part of the process, especially during the recovery phase. In the end, risk analysis and scenario evaluation showed that every potential risk points at the same direction: the loss of social link to the site and thus, the loss of active values associated with material attributes.

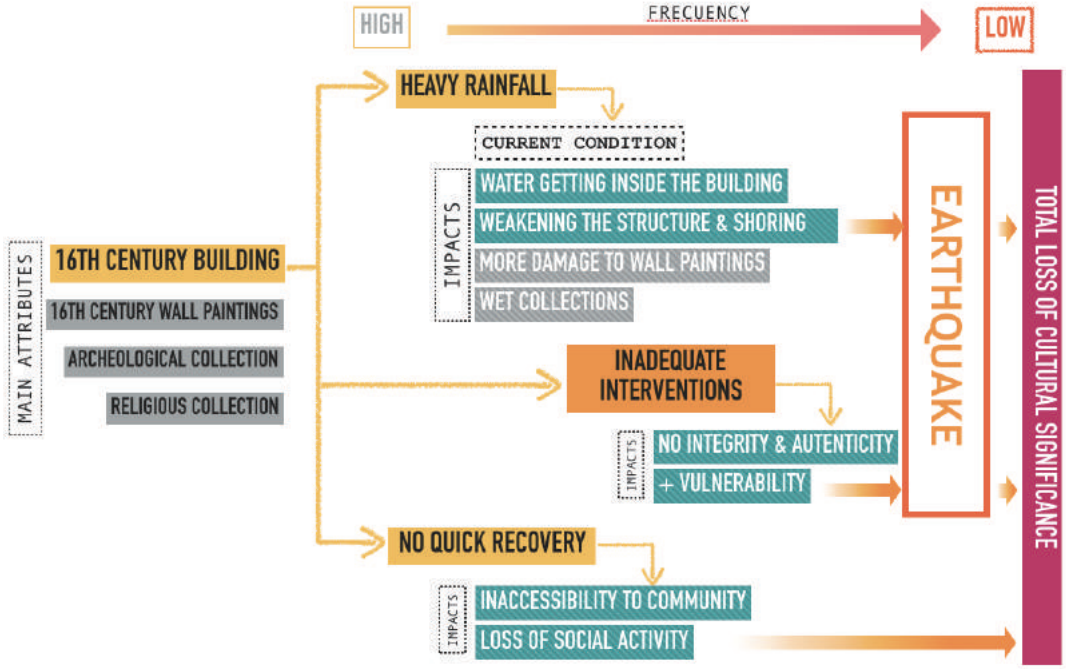

Fig.3 Risk identification and high estimate scenario

5. Stakeholders for DRM draft planning

The next step was to identify the possible actors or organizations that could be involved or interested in the conservation of the cultural asset. For this purpose, a stakeholder map was drawn by considering the people around the Convent of Tehuantepec, in order to understand their relation with the site and among each other as well. Two different stakeholder maps were drawn for different moments. One for the planning stage and another one for the implementation of the risk reduction measures. Thus, a first one was developed as an interpretation of the initial relations between the stakeholders, working as a starting point from where the DRM draft plan was developed. This was important because it was established from the start that a people centered approach would be followed in order to work towards the sustainability of the plan.

Among several stakeholders involved, five were recognized as main actors for the planning stage, namely INAH state office, the director / manager of the museum, the "Alfredo Harp Helú de Oaxaca" Foundation

(FAHHO) as the funding entity , the local community considering it was approved by different groups, and especially the local government represented by the built heritage officer, who was identified as a key actor. Nonetheless, some issues where identified among this groups, the most critical one being very poor communicating channels and trust between the community and the local government, particularly due to the lack of reliability on social support after the earthquakes. As a general matter, the definition and improving of roles and relations among the key stakeholders and actors was marked as crucial. The idea was to improve the relationship between stakeholders with a clear and strong sense of co-responsibility within all the parts involved, and therewith strengthen the resilience of the site.

Fig.4 Stakeholder map for planning stage

6. The DRM draft plan

As mentioned before, the DRM draft plan was based on the frequency of occurrence of the identified hazards, taking into account the actual condition of the site. It is important to remind that it was inaccessible to local groups and their cultural activities due to severe damage since the earthquakes. With this in mind, two key aspects regarding the Tehuantepec Convent were developed: first, to keep in mind a people-centered approach, where strengthening their capacities, focusing on their needs and having a compatible concept of heritage was the central part of the draft plan. And second one was that the community and INAH were collectively responsable for the rescue and further conservation of the cultural assets and therefore co-responsibility among all the other stakeholders needs to be encouraged. From this perspective, ranges of time were proposed regarding the frequency of the identified risks, and so, as was already explained before, a high estimate scenario was developed. From there, coping or mitigation measures were established in order to reduce the expected impact of the risks.

To effectively achieve the reduction of the identified risks, multiple mitigation methods were proposed. Nonetheless, special attention was given to the protection of social values. Rehabilitation and reopening of some parts of the building with low or no damage at all, and temporarily re-activating the cultural activities related to them was proposed as an adaptation method. This could help in the conservation of the site attributes and values but could also make the community involvement to come alive again through their active participation in the reactivation of the cultural activities, nourishing the co-responsibility and engagement with the site. In addition, this could in turn reactivate the site financially, having maybe small but consistent impact on the funding for the reconstruction process. This proposal would involve setting up temporary evacuation areas, civil protection groups and

8 This actor came into play after my attendance to the ITC, so it wasn't originally taken into account during the case study work in the course. Nonetheless it was included here as an active actor due to its high relevance in the decision making process and the implementation of the DRM pilot plan.

a team of local volunteers to work with. Even so, the community involvement is essential as it could mark the creation of a local disaster risk prevention squad, including the museum staff and the director, to work beyond the current situation and towards a more sustainable vision.

Other measures proposed in the DRM draft plan focused on the timely detection of the slow impact of deterioration. One of them was to train the museum staff and local volunteers in the monitoring and documentiation of collections while being under storage, taking into account the temporary place in which they are, the materials used in their construction and the environmental condition of the city. Another measure was to work with local authorities and the community to acquire and lay new tarpaulins to protect the damage areas of the building to prevent water to infiltrate inside. This is not an expensive measure but again it could have a strong impact on the community and the preservation of the structure. All together, these actions could considerably reduce the risk of deterioration of organic materials by fungus growth for instance, and at the same time by building the capacity of the museum team at a very low cost.

Accordingly, a financial program was drawn in order to implement the DRM draft plan. Understanding that the national cultural heritage agency is under huge financial pressure due to the recovery process for more than 2,300 historic buildings and more than 5,000 cultural assets, an alternate funding plan was considered. The key principle is to keep a tripartite financial scheme for each mitigation measure, in order to reduce the individual investment and thus to reduce the risk of insufficient funding. This could also contribute to the co-responsibility concept inception by involving every stakeholder financially, taking into account their economic potential.

Lastly, two main ideas regarding funding are underlined. The implementation of a crowdfunding scheme, which could allow locals to contribute financially in the reconstruction process of their own cultural site, according to their own capacity. But also opening the opportunity to national or even international community to be part of the recovery of the cultural heritage of the city of Tehuantepec. The other idea is to involve the non cultural private sector in this process by partially funding the draft project, idea that has already been done in other countries with good outputs.

Fig.5 Financial scheme

7. Pilot project: community capacity building, preparedness and local immediate response.

a pilot project is proposed to be put into operation during 2019 by the National Agency for Conservation of Cultural Heritage (CNCPC). This first approach will focus on the implementation of capacity building methods such as the Disaster Imagination Game and emergency drills. The goal is to raise risk awareness and to improve preparedness against disaster risks within the museum staff, local volunteers and local authorities, and to promote the creation of a local immediate response team. This will expectedly open the door to a bigger participation and involvement for the DRM plan and later on, to possibly develop the same strategy for all the other cultural sites in the city.

8. Challenges

Under the current situation, when so many cultural heritage sites have been damaged by 2017 earthquakes, it is clear that not implementation of the draft plan is not going to be a smooth path. From this perspective a few challenges were already identified, keeping in mind that adjustments and modifications should be made on the way.

- Firstly, the willingness of different stakeholders and actors to participate in this project is always a challenge. The development of communication tools and strategies will be primordial for the success of the draft plan, taking into account each stakeholder's background and interests.
- A inter institutional framework needs to be developed or reinforced, in order to collaborate with other agencies and organizations, both in the planning and implementation stages.
- Immediate actions are needed in order to prevent further physical damage, particularly in the management of water getting inside the building due to current damage; but also measures to counteract against the negative impact and loss of the social value. Nonetheless, long term actions should be carried out, especially regarding the capacity building and people centered actions in order to make the plan sustainable by involving locals and promoting co-responsibility.
- It is fundamental to work with the community and the local government towards the development of proper relations that allow us to move together towards disaster risk reduction for the Dominican Convent of Tehuantepec. It is clear that we will need to renew the communication channels since the relations between the different actors have weakened after the 2017 disaster.

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2.5 Disaster Risk Management Plan of Pashupatinath Temple Complex in Kathmandu, Nepal

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1. Introduction

Fig.1 Pashupatihath Temple complex, Gausala Kathmandu

The Pashupati Area is the holiest pilgrimage site for Hindus, a unique heritage site for archaeologists and a charming and lively site for protectors and promoters of religion and culture. It is famous due to the existence of the temple of Lord Pashupatinath and many other temples, stupas, monasteries etc. Any tourist visiting Kathmandu should not overlook the opportunity to step into this most fascinating area. The huge and the gorgeous temple of Lord Pashupatinath is situated on the bank of Bagmati River at a distance of approximately 5 Kilometers northeast of the heart of the Kathmandu City. World heritage committee of UNESCO has inscribed it into its world heritage list as a part of Kathmandu Valley World Heritage Site in the year 1979.

From the recent earthquake, major monuments in Kathmandu's seven Heritage Monument Zones were severely damaged and many collapsed completely. Similarly, more than 20 districts, thousands of private residents built on traditional lines, historic public buildings, ancient and recently built temples and monasteries, were affected by the disaster, 25 percent of which were destroyed completely. According to the report of Post Disaster Need Assessment published in NPC (2015a), the total estimated damage to tangible heritage is NPR 16.9 billion (US$169 Million) affecting 2,900 structures with a cultural, historical and religious heritage value(https://www.nepjol.info/index.php/GAZE/article/viewFile/15120/12246). The earthquake-vulnerability of each historical site is different, based on its unique location, shape, and construction. But the architecture of the Pashupatinath Temple, at the very least, highlights the importance of good building material and smart engineering, which Kathmandu hasn't always employed in past reconstruction efforts. After the 1934 earthquake, for example, temple repairs were hastily done, using cheap, flimsy materials (like wood and mortar). An obvious problem when it comes to reinforcing Nepal's monuments is that the country lacks resources. Once the immediate human suffering and damage has been contained, Nepal might need the help of international conservation organizations to rebuild its cultural and historical landmarks—including its temples—which are the heart and soul of the country's identity. Unlike the Durbar Square or Dharahara Tower of Kathmandu valley the Pashupatinath Temple

isn't very tall. It is also made of solid material; its brick (as opposed to mortar) walls are held together by the strong metal sheets in its roof. And the temple, looked after by the Pashupati Area Development Trust, has been renovated a couple of times in the recent past "because of its importance, focus, and revenue generation capacity.

Fig.2 Pashupati Temple Complex, GAUSALA KATHMANDU

2. Statement of Outstanding Universal Value

Located in the foothills of the Himalayas, the Kathmandu Valley World Heritage property is inscribed as seven Monument Zones. These monument zones are the Durbar squares or urban centres with their palaces, temples and public spaces of the three cities of Kathmandu (Hanuman Dhoka), Patan and Bhaktapur, and the religious ensembles of Swayambhu, Bauddhanath, Pashupati and Changu Narayan. Pashupati has an extensive Hindu temple precinct

Criterion (iii): The Pshupatinath ensembles represent an exceptional testimony to the traditional civilization of the Kathmandu Valley.The coexistence and amalgamation of Hinduism and Buddhism with animist rituals and Tantrism is considered unique.

Criterion (iv): The property is comprised of exceptional architectural typologies, ensembles and urban fabric illustrating the highly-developed culture of the Valley, which reached an apogee between 1500 and 1800 AD.

Criterion (vi): The symbolic and artistic values are manifested in the ornamentation of the buildings, the urban structure and often the surrounding natural environment, which are closely associated with legends, rituals and festivals.

3. Hazard, Risk and Vulnerability of Pashupatinath Temple Complex

There are various climate types in Nepal. The World Meteorological Organization (WMO) describes that the Kathmandu Valley is in a mild subtropical climate with an average high temperature is around 27C from April to September and the average low temperature is below 5C from December to February (WMO 2014). There are four seasons in Kathmandu Valley, winter, spring, summer and fall (rainy season). During the rainy season, the KV experiences an average rainfall of 20cm to 35cm (WMO 2014). Although spring is mild, summer can be humid and winter can be severe and cold.

Since the 1800s, there were at least 20 large earthquakes occurred in Nepal. The largest earthquake in the history of Nepal occurred in 1934 with a magnitude of 8.3. Although the epicenter was in eastern Nepal, 4,300 people were killed in the KV (the total death of the earthquake was 8,500). It also, damaged more than 2 million buildings including temples. Out of which, 81,000 buildings were completely destroyed. Even in Kathmandu, a total of 55,000 buildings were affected and 12,500 of them were completely destroyed.

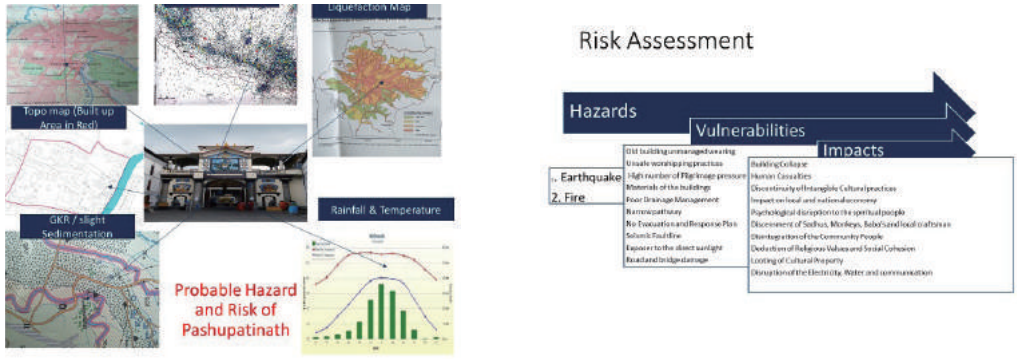

Fig.3 Risk assessment through the Pressure and Release model for Pashupatinath Complex (Wisner et al. 2004)

Root causes: easily damaged wooden structures. Unsafe practices of worshipping, poorly constructed surrounding buildings, high susceptibility to damage. Low awareness on Hazards and their impacts. Mind concept of "it is because of god so out of everyone's capacity". Budget management and transparency for the maintenance and management of the Temple complex

Dynamic Pressure: faster urbanization, lack of parks and open spaces in the city, government's different priorities, Political instability, conflict, moveable business pressure, High number of pilgrimage in the temple means more exposed to the environment and biological products,

Unsafe conditions: Old buildings, Poor maintenance and facilities, high number of pilgrimage and tourist, Older and handicapped people.

4. Existing Policies on Disaster Risk Management and Cultural Heritage in Nepal

Considering the Risk & Vulnerability of the Pashupatinath Temple Area we have to work a lot on the Disaster Preparedness part like preparing Contingency Plan, Simulation Exercise, Identifying Evacuation Routes, linking this area on the government policies and plans on DRM. Recently Nepal government has passed the Disaster Management Act based on the Sendai Framework for action and tried to include the Culture as well. The following figures in red color represent the policies related with Disaster Risk Management and the green color represent the cultural heritage and monuments of Nepal

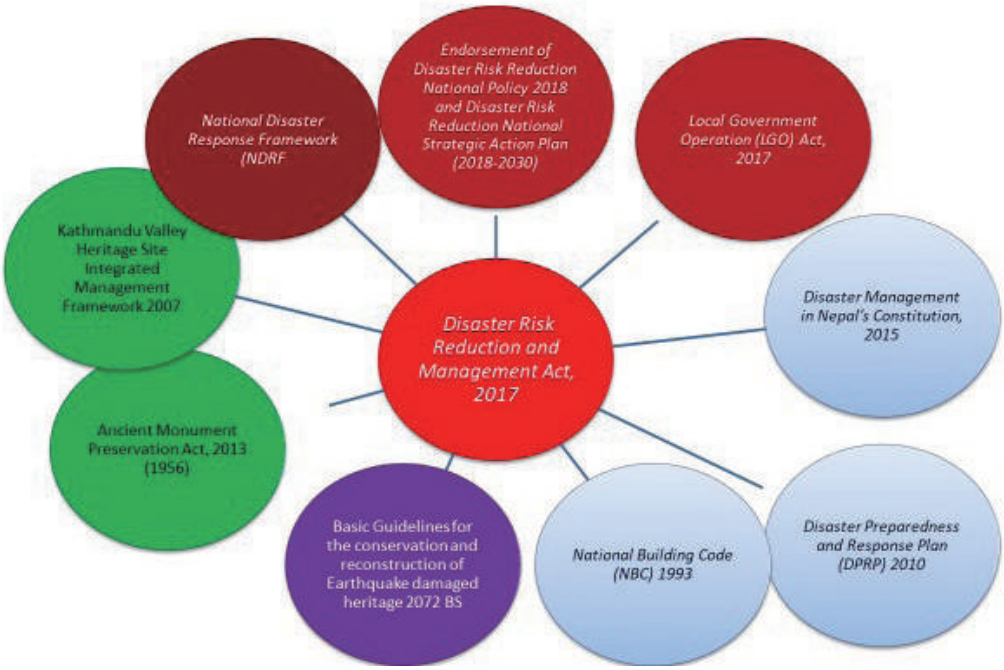

Fig.4 Existing Policies on DRM and Culutural Heritage

5. Disaster Scenario:

Earthquake on27th July of 7.8 Magnitude damaged the adjoining buildings of Pashupatinath temple. Four adjoining buildings collapsed completely and some visible cracks have been found on the main temple wall. July which is the time of high flow of pilgrimage, rainfall and precipitation. So, there is the risk of spreading fire very soon. Older people are trapped inside the sattal, pilgrims wounded, vehicle stranded, and water supply system blocked.

6. Impact on tangible and intangible heritage attributes:

Pashupati is socially and culturally important Hindu temple in Nepal. It is highly susceptible because of different pressure like pilgrimage, exposer to sun, poor management and low interest of the high-powered government ministries. Along with the collasped building the intangible heritage attributes like cremation practices, worshiping trend and integration of Hinduism and Buddhism has been dismantled in this area.

Fig.5 Pilgrimage for worshipping and ritual practices along the bay of Bagmati River/ Hence the picture shows the impact on different heritage attributes

7. Mitigation Measures (Preparedness):

I. Retrofitting and Renovation of the Temple and surrounding buildings

II. Evacuation Plan and Regular Simulation Exercise for awareness raising

III. DRM plan is incorporated into the Pashupati Area Development Trust's Master Plan

IV. Capacity Building Training like Masson, Carpentry, SAP regular training, First Aid for Cultural Heritage.

V. Information desk will be established and safety brochure will be distributed to all visitors and pilgrims

VI. Security briefing on the information desk to the tourist after providing the tickets,

VII. Fire Hydrant system will be installed in the four corner of the temple with the capacity of 100,000 lit tank)

VIII. Medical facilities with one officers and four staff nurses in regular duty.

IX. Medium size warehouse to store firefighting, rescue materials, excavator and first aid volunteers managed

X. Establishment of digital unit/archives within the seismic and fire proof two room building for storing important data.

For the effective implementation of the Disaster Risk Management Plan along with the different awareness raising and capacity building activities we have to engage wider stakeholders including private sector and donor agencies Following communication mechanism might be the model to implement the plan and reduce the risk

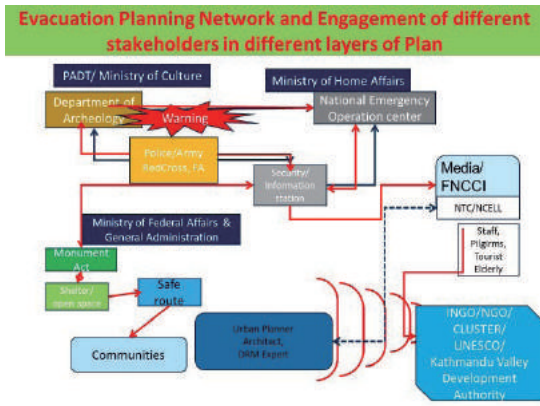

Fig.6

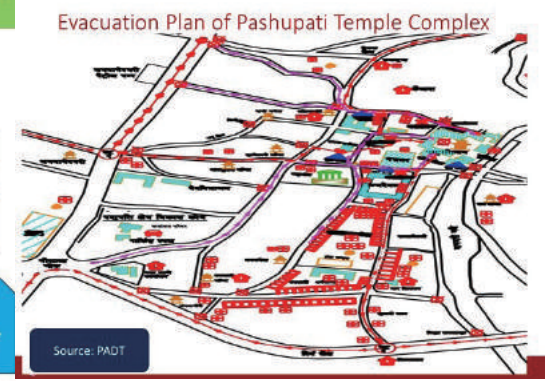

Fig.7

8. One year Preparedness Project

With support from different actors and stakeholders involved for their main responsibilities and duties following output is achieved. A solid cooperation amongst actors is needed to avoid overlapping activities and to save money that could be allocated for preparedness and prevention exercise. One of the main actors for the implementation of this disaster risk management plan is the Pashupati Area Development Trust (PADT).

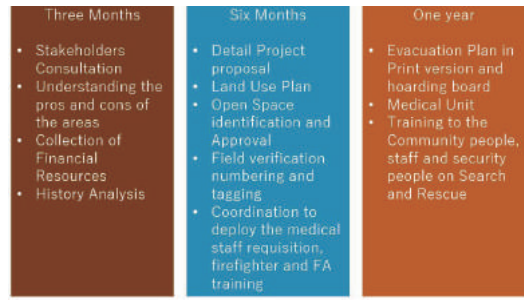

Fig.8 Pashupati Area Evacuation Plan Development Project

Reference

1) Basic Guidelines for the conservation and reconstruction of earthquake damaged heritage 2072 2) Ancient Monument Preservation Act, 2013 (1956)

3) ICOMOS 2006 WHC Report of Kathmandu Valley

4) Jing, Dr. Feng, Forbes, Mrs Catherine, Zhou, Mr Lyu Report on the joint world heritage center/ICCROM Reactive monitoring mission to the Kathmandu Valley (NEPAL, C 121BIS) 20–25 March 2017

5) Legislation for Protection-Kathmandu Valley World Heritage Site, Integrated Management Framework 2007

6) Vision 2035 and Beyond 20 Years Strategic Development Master Plan (2015 - 2035) for Kathmandu Valley

7) Pashupati Area Development Trust, Gausala, Kathmandu, Nepal

8) Kathmandu Valley Resilient Plan (2017), JICA

2.6 Upper Svaneti Region, Village Chazhashi. Georgia

Irakli KOBULIA
Consultant

1. Background

Georgia, (Georgian Sakartvelo), country is located at the eastern end of the Black Sea on the southern flanks of the main crest of the Greater Caucasus Mountains. The country is famous with history and culture, and its cultural heritage is equally ancient and rich. Georgia's cultural heritage includes tangible and intangible heritage, among others residential, religious and military architectonic structures spread all over the country. Svaneti is one of the oldest mountainous region of Georgia, which situated at the southern slope of the Greater Caucasus Mountain and due to severe climate conditions and rough terrain are isolated from other parts of the country. Therefore, many important architectural monuments are preserved in this region, such as prominent churches and residential/defensive architecture, in the form of towers, and fortified dwellings, many of which also roots to the early middle ages.

Ushguli community is distinguished within the region with its precious and well-preserved cultural heritage. The community is located at an altitude of about 2,100 m.a.s.l. in the south-eastern part of Upper Svaneti and includes four settlements: Murkmeli, Chazhashi, Chvibiani and Zhibiani (see Fig. 1). The area is an exceptional example of mountain scenery with medieval-type villages and tower-houses. The village of Chazhashi still has more than 200 of these very unusual houses, which were used both as dwellings and as defense posts against the invaders who plagued the region. To preserve both the cultural and scenic value of cultural heritage objects the village Chazhashi was included in the UNESCO World Heritage List in 1996.

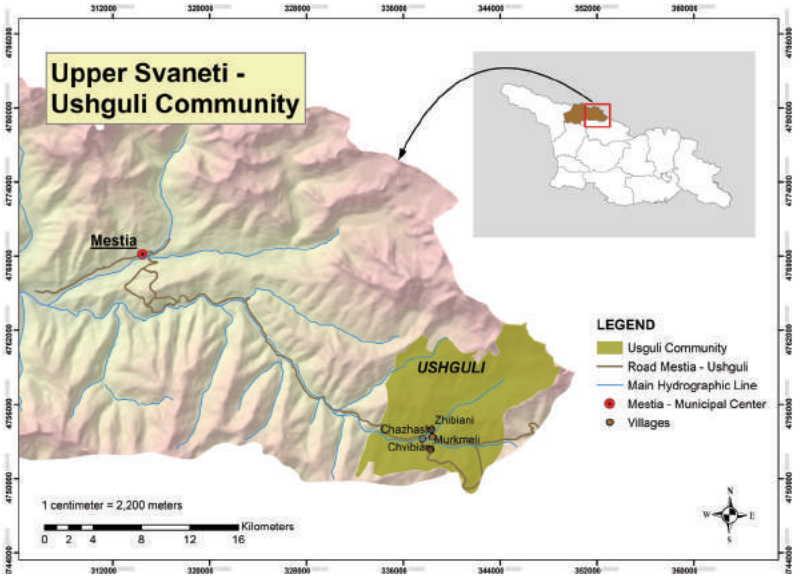

Fig.1 View of the Luang Prabang World Heritage Site

Outstanding Universal Value OUV

The Upper Svaneti site is at World Heritage List of UNESCO as per criterion (iv) and (v). The OUV criteria for Upper Svaneti is as following:

Criterion (iv): The region of Upper Svaneti is an outstanding example of an exceptional mountain landscape composed of highly preserved villages with unique defensive tower houses, examples of ecclesiastical architecture and arts of medieval origin.

Criterion (v): The region of Upper Svaneti is an outstanding landscape that has preserved to a remarkable degree its original medieval appearance notable for its fragile traditional human settlements and land-use patterns.

Fig.2 Village Chazhashi – World Heritage Site. General view.

2. Attributes and Values

The village of Chazhashi in Ushguli community, situated at the confluence of two rivers and has preserved more than 200 medieval tower houses, churches and castles. The land use and settlement structure reveal the continued dwelling and building traditions of local Svan people living in harmony with the surrounding natural environment. The structure and setting of village dwellings go back to prehistory. Its features reflect the traditional economic mode and social organization of Svan communities. The area also notable

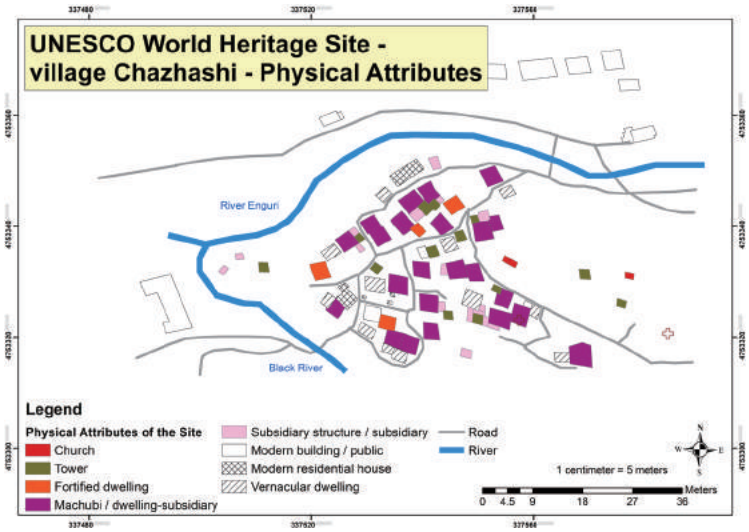

Fig.3 Chazhashi World Heritage Site – Physical Attributes

for the monumental and minor arts. The mural paintings are outstanding examples of Renaissance painting in Georgia. The architectural elements of the buildings have maintained the medieval material and most of them have retained their original use and function as well as the relationship with the surrounding environment. The geographical location and setting of this exceptional medieval landscape highly contribute to preservation of the forms of local intangible heritage, such as traditions, customs, beliefs, rituals of everyday life, language and folklore of the Svan community. Below, the table describes attributes of the site and corresponding values.

Table 1 Attributes and Values

Attributes	**Type of Attribute**	**Values**
Church 	• Tangible • Immovable • Visible • Mixed	• Aesthetic • Historic • Architectural • Cultural • Social
Towers 	• Tangible • Immovable • Visible	• Aesthetic • Historic • Architectural • Technological • Cultural • Social • Scientific
Fortified dwelling 	• Tangible • Immovable • Visible	• Aesthetic • Historic • Architectural • Technological • Cultural • Social • Scientific
Traditional settlement – community (Strong social connections) 	• Visible • Mixed	• Aesthetic • Historic • Architectural • Technological • Cultural • Social • Scientific • Economic • Environmental

Home interior - Household appliances 	• Tangible • Movable • Visible • Decorative elements (reliefs, wall painting, wood carvings)	• Aesthetic • Historic • Technological • Cultural • Social • Scientific
Traditions / Festivals / Folklore 	• Intangible • Movable	• Aesthetic • Historic • Technological • Cultural • Social • Scientific • Economic
Landscape – Natural and Cultural 	• Mixed • Visible	• Aesthetic • Historic • Architectural • Technological • Cultural • Social • Scientific • Environmental

3. Risk Assessment

Geomorphologically, area of Ushguli community is dominated by fluvio-glacial landforms where glaciers have developed U-shaped valleys with steep slopes. In the higher parts of these valleys (above 3000 m.a.s.l.) and close to the still glaciated areas periglacial processes such as solifluction occur. On the valley slopes at lower altitude surficial landslides and debris flows are very common. On very steep, near to vertical slopes rock fall frequently occurs. The higher

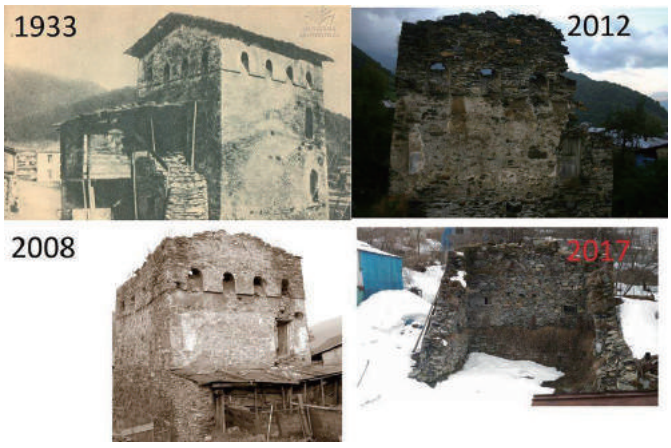

Fig.4 Ushguli Community - Collapsed buildings

parts of the slopes, above the tree line, are also frequently affected by snow avalanches. The outlets of secondary streams in the main valleys are also often characterized by debris cones that are formed by periodic debris flows, mud flows and snow avalanches (Krol, Westen, & Tarragüel, 2012). Besides, slow acting hazards are also common within the area. Evidences of different levels of humidity and biological degradation are found in all types of physical attributes of the site. Above described hazards with vulnerable factors lead to the destruction of cultural heritage. Besides, the harsh environmental conditions, lack of access during long winter periods, and inappropriate repair techniques applied to maintain the traditional structures often challenge the authenticity of material and the state of conservation of the components of the property.

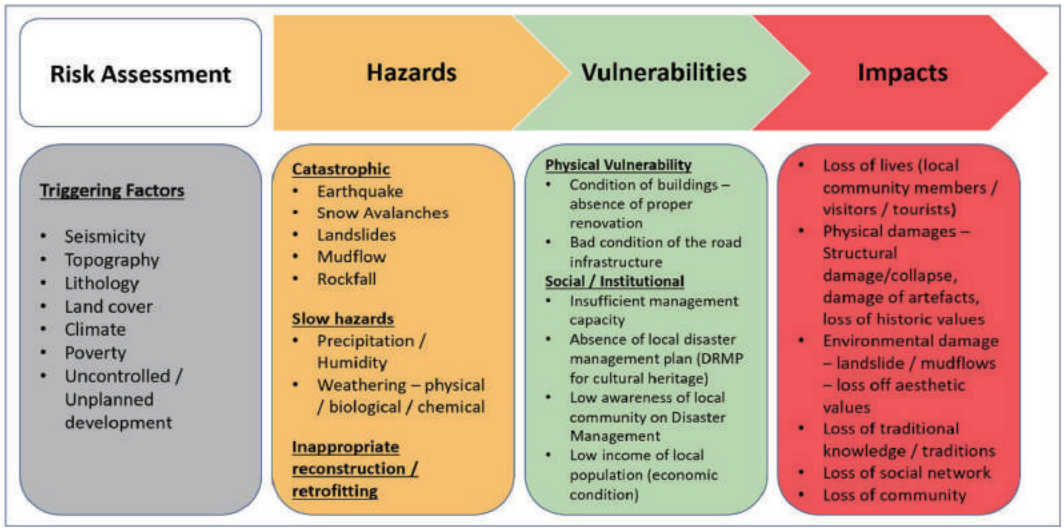

Fig.5 Risk Assessment

Based on the hazard's probability and the identified possible impact to the Ushguli site risk analyses matrix can be established, which will act as an action prioritization tool for the risk reduction planning phase.

PROBABILITY						
	HIGH			Weathering	Snow Avalanches	
	M to H					
	MEDIUM			Mudflow	Earthquake	
	L to M		Landslides			
	LOW					
		LOW	L to M	MEDIUM	M to H	HIGH
		IMPACT				

Fig.6 Risk Analyses

4. Risk Management

Participatory Disaster Management Planning process should be established at the site level. All relevant stakeholders should be included in the process and local geographical, social-cultural and economical characteristics should be considered. At the end of the process, Integrated Disaster Management Plan should be developed which should be part of high level (municipal, regional, national) DRM plan and should reflect responsibilities, financial sources, timeline, and adaptive management approaches of planned activities.

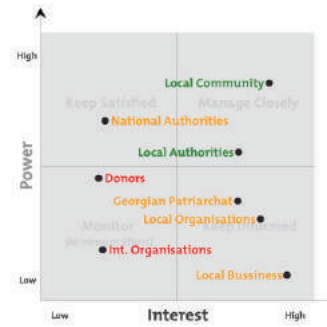

Fig.7 Stakeholder Analyses

Objectives	Result	Level of intervention	Involved Stakeholders	Priority	DRM Stages
Develop complete census of natural hazards inventories	Understanding hazards / exposure. Reducing Hazards	Site	•National Environmental Agency •Regional and Local Authorities	High (short term)	Preparedness - Mitigation
Slope stabilization measures	Reducing Hazards - Landslide. Snow Avalanche Mudflow	Municipal / Site	•National Environmental Agency •Regional and Local Authorities	High (short term)	Preparedness - Mitigation
Improving accessibility to the site	Reducing Vulnerability - Limited access to the site	Region / Municipality	•Regional and Local Authorities	Medium (medium to long term)	Preparedness / Response / Recovery
Ensuring sustainability of the buildings (restoration) – establish monitoring system	Reducing Structural vulnerability	Site / Structure	•Regional and Local Authorities •Local community	High (short term)	Preparedness / Response
Improve local disaster risk reduction capacity (coping capacity)	•Reducing Vulnerability - Low awareness • Low capacity	Site	•Local Authorities •Local Community •Local NGOs Donors	High (short term)	Preparedness / Response / Recovery
Arrange first response system to disaster (evacuation, sheltering etc.)	•Reducing Vulnerability - Low Capacity. •Absence of response infrastructure	Site / Municipal	•Local Authorities •Local Community •Local NGOs Donors	High (short term)	Response
Establish an Early Warning System	Reducing Vulnerability - Low capacity	Site	•Local community •Local authorities / •National Environmental Agency •Donors	High (short to medium term)	Preparedness / Response
Develop detailed documentation (complete census) on local tangible and intangible heritage	Reducing Vulnerability – absence of documentation on heritage	Site	•Local community • Local NGOs •Governmental agencies • Donors	High (short to medium term)	Preparedness / Response / Recovery

Reference

1) Antoni Alcaraz Tarragüel, Bart Krol, Cees van Westen. Analysing the possible impact of landslides and avalanches on cultural heritage in Upper Svaneti, Georgia. Journal of Cultural Heritage, Vol. 13, pp.453-461, 2012.

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5) https://whc.unesco.org/en/list/709

2.7 Chhatrapati Shivaji Maharaj Vastu Sanghralay (CSMVS), Mumbai, India

Vikas Namdeo KURNE
Disaster Management Coordinator, Indian Red Cross Society

1. Introduction

The Chhatrapati Shivaji Maharaj Vastu Sanghralay (CSMVS) formerly known as the Prince of Wales Museum showcases Indian Art and Sculpture. The museum was built as tribute to visit of Prince of Wales, later known as King George V. The building has remained a public landmark located in southern part of Mumbai city, India. The building contributes to the development of a unique architectural style and use of technology where the contemporary materials were combined with historical forms. The museum acts a s symbol of shared values, combining eastern and western arts, sculpture, Architectural styles and techniques and the overall motive of a space that is meant to exhibit cultural assets throughout time. The structure is Indo – Saracenic style. Architecturally, presents synthesis of indigenous Indian architectural motifs, features Islamic (Saracenic) patterns, along with classic European planning style. The wooden flooring and the staircases of the two storey museum building is vulnerable to fire, which in turn can lead to destruction of valuable historical collections / objects which have been preserved for years.

2. Location and Context

The idea of building museum was conceived in year 1905 co-inciding the visit of Prince of Wales to India during the British Raj. The building was temporarily used as a children welfare centre and military hospital during the World War I. The monumental structure's versatile space has served a crucial purpose during the time of need due to its size and location (close to Arabian sea)

Fig.1 Museum building

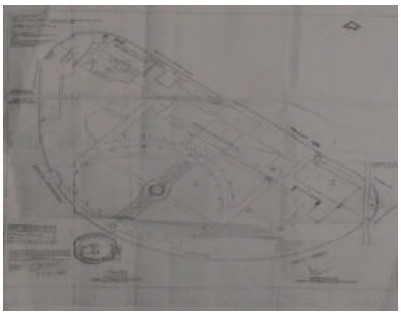


Fig.2 Layout of Museum area

3. Attributes and values / stakeholders / OUV

The CSVMS is Grade I Heritage Building and its cconstruction was completed in 1914. It is '2010 UNESCO Asia – Pacific Heritage Award' for Cultural Heritage Conservation. CSMVS houses about 50,000 artefacts. Collection consists of sculptures, terracotta, bronzes, excavated artefacts, miniature paintings, European paintings, porcelain and ivories from China and Japan, etc. besides Natural history section.

Table 1 Attribute values for Museum Garden

No.	Aspects	Artistic	Historic	Scientific	Social	Total
	Total	12	16	7	10	45
1	Form and Design	3	3	1	2	9
2	Materials and substance	1	3	1	2	7
3	Tradition, technique and workmanship	3	3	0	1	7
4	Location and setting	3	3	3	2	11
5	Use and function	1	2	1	3	7
6	Spirit and feeling	1	2	1	0	4

Fig.3 Museum Garden

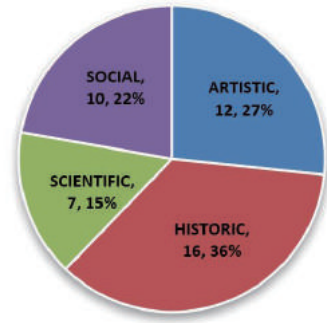


Fig.4 Pie chart for Museum Garden

Table 2 Attribute values for Miniature Paintings

No.	Aspects	Artistic	Historic	Scientific	Social	Total
	Total	11	15	1	14	41
1	Form and Design	2	3	0	2	7
2	Materials and substance	2	3	0	2	7
3	Tradition, technique and workmanship	3	3	0	2	8
4	Location and setting	2	2	1	2	7
5	Use and function	1	2	0	3	6
6	Spirit and feeling	1	2	0	3	6

Fig.5 Miniature Paintings

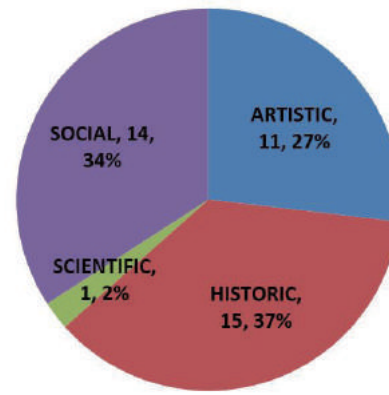


Fig.6 Pie chart for Miniature Paintings

Table 3 Interest of the Stakeholders

High Power , Low Interest	High Power , High Interest
→ UNESCO office, Delhi → Local /State govt. → Insurance company	→ Ministry of Culture
Low Power , Low Interest	**Low Power , High Interest**
→ Visitors → Local NGOs → Police → Fire dept.	→ Museum management → Museum staff → Local Residents → Cultural Heritage Trust → Local Guides → Volunteers → Tata Trust / donors → Researchers, Historians

4. Plausible Risk Scenario

Fire detected at 10.30 p.m. 5 security personnel were on duty. Fire was noticed on the first floor in the miniature paintings gallery close to museum office room. Fire brigade called in, response time 6-7 minutes. Fire increases due to chemical stored in gallery. After almost an hour fire doused. The water lead to soaking of partially burned paintings.

5. Mitigation Measures

The mitigation counter measures are in five phases;

Strategic phase which includes meetings with various stakeholders to discuss the policies and guidelines of disaster (Fire). Structural and fire audit and sharing of floor plan and evacuation plans. Procurement of No Objection certificate related to fire from the fire department.

Physical phase concerned about the obstacles on way to affected site, like parking of vehicles or any other objects.

Structural technical phase

Maintenance of the internal fire fighting system, installation of lighting arrestor and man circuit breakers so as to restrict the spread of electrical fire in case.

Non structural technical phase

Fire resistant doors to be installed, to compartmentalise and isolate the fire to particular area. . Refuge areas to be identified fro the people to get assemble during emergency. Checking of the fire extinguishers for the types and expiry date of fire extinguishers. Documentation of the objects / digital photography.

Training and capacity building phase

Regular fire drills to test the fire evacuation plans, training in handling fire extinguishers to staff and the local community. First aid training and awareness sessions for staff and community on disasters (Fire) to be conducted.

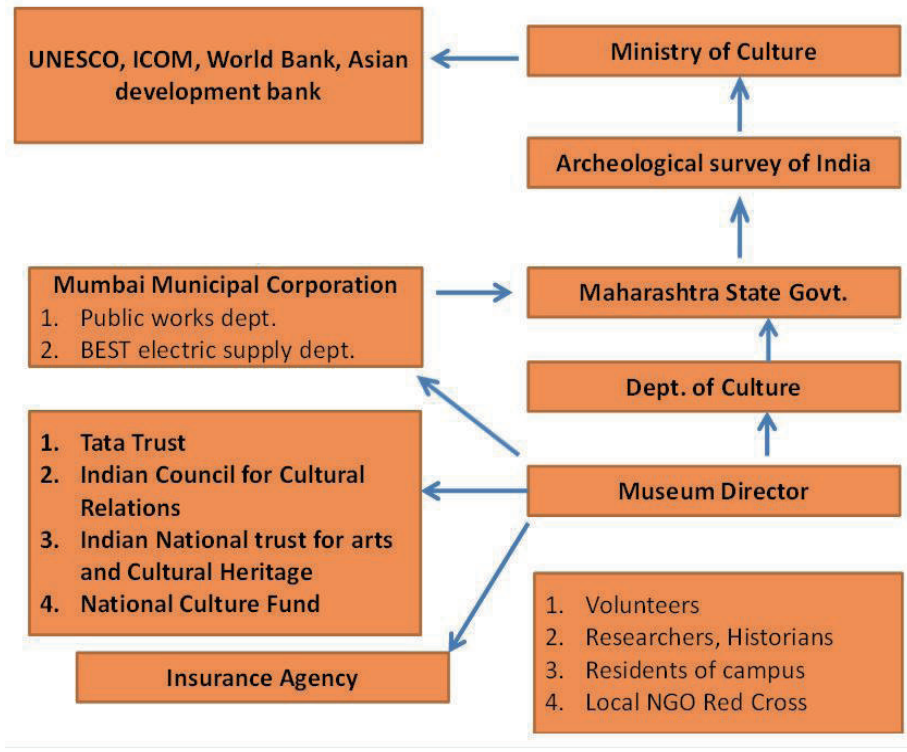
Table 4 Mitigation Measures for Fire hazard at the Museum

Strategic Policies	Physical	Structural Technical	Non Structural Technical	Training and Capacity building
1. Meetings	Illegal parking management	Installation of hydrant in museum campus	Fire protective doors.	Fire evacuation drill
Municipal corporation DRM Unit and	Maintenance of building	Lightning arrestor on dome	Demarking open spaces	Use of fire extinguisher
Fire officials		Main circuit breaker	Documentation	First aid and AED
2. Fire Safety Audit		CCTVs	Inspection and check of fire extinguisher/ hydrants	Best Practices
3. No Objection Certification			Removing of Obstacles in gangway/staircase	Awareness and sensitization workshops
4. Sharing floor plan with fire dept.				Community participation

6. Institutional Framework

The Director of the Museum will be the nodal person to coordinate with the external agencies during the emergency and post emergency phases. He will be assisted by assistant director and other designated museum officials along with the security personnel. The given institutional framework shows the linkages and flow of information related to disaster. The other group which is not linked to the flow of information are volunteers, community, local NGOs who will be the first responders during emergency phase.

Fig. 5 Institutional framework



7. Recovery Planning

Under the Recovery planning process, Rapid damage assessment along with first aid for collections/ objects burned partially. Also activation of fund raising activity like crowd funding or corporate grants in the short term stage. In the mid term stage detailed assessment and stabilisation process /conservation techniques. Fire safety trainings for staff can be conducted during this period. In the long term stage structural reconstruction, restoration of aesthetic aspects of the building can be carried out. Different stakeholders will be involved in each of these stages.

Table 5 Recovery planning process

No.	Short term (0-3 months)	Midterm (4-12 months)	Long term (2- 3 years)
1	Rapid damage assessment	Detailed damage assessment	Structural renovation
2	First Aid: Cleaning, drying, freezing for less damaged painting	Stabilization for badly burned paintings Conservation	Restoration of building and gallery
3	Fund raising activity	Fund raising activity	Fund raising activity
4	Investigation of cause of fire	Regular fire training and drills	Installing fire hydrants and underground water tank
	Stakeholders	Stakeholders	Stakeholders
	State Govt. (Ministry of Culture) Local Municipal office Fire officials Police Museum officials Local media	Engineers & Architects Conservators Community Museum officials Local media	Engineers & Architect Conservators Community Museum officials International organizations Fire safety institutions

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3) Jigyasu,R and Arora, V: Disaster Risk Management of Cultural Heritage in Urban Areas, A Training Guide, Kyoto Research Centre for Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University, 2013

2.8 Disaster Risk Management Plan
The Case of Peshawar Museum Khyber Pakhtunkhwa, Pakistan

Idrees JEHAN
FATA Disaster Management Authority (FDMA)

1. Introduction

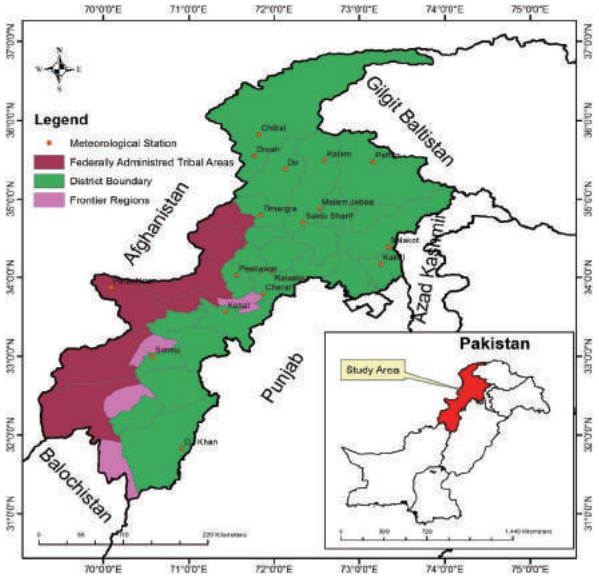


Fig.1 The study area, Source: Geological Survey of Pakistan.

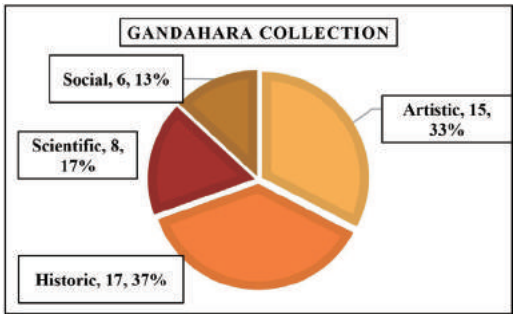
The Khyber Pakhtunkhwa (KP) province is located in the north-western part of Pakistan. It has a common border with Afghanistan in the North West, Punjab in the East, Baluchistan to its South, and Gilgit Baltistan to the North. The KP is the smallest province in term of area that covers 74,521 km2 (9.4%) of the total area of Pakistan (Figure; 1 Khan, 2015). Geographically the province of KP is stretches between 31o 15' to 36o 57' N latitude and 69o 5' to 74o 7' E longitude (Khan, 2012). According to 2017 census report the population of the province is 30.52 million (PBS, 2017). On the basis of geomorphology and hydrology the KP can be divided into southern and northern zones (Dichter, 1967).

2. The Case Study Project Area.

The Peshawar Museum is located in district Peshawar, the capital of Khyber Pakhtunkhwa province in Pakistan. The Peshawar Museum is famous for its unique art pieces of Buddhist creation in stone, stucco, terracotta and bronze dating from the early Gandhara Empire, the Islamic books, paintings and coins of metals, gold and copper see Fig 3. The Peshawar Museum was established in 1907 in memory of Queen Victoria as "Victoria Hall,". The two-story building was built in a syncretic architectural style consisting of Mughal Islamic, Hindu, British and Buddhist styles initially the museum had only one exhibition hall, but two more were added in 1969–70. The museum was extended in 2004-05 with the construction of two galleries, two halls for the collection in the storage, conservation laboratory, new block and cafeteria and offices for the provincial directorate of archaeology Fig 2.

Fig.2 External/internal Views of Peshawar Museum, Khyber

3. Attributes and Values



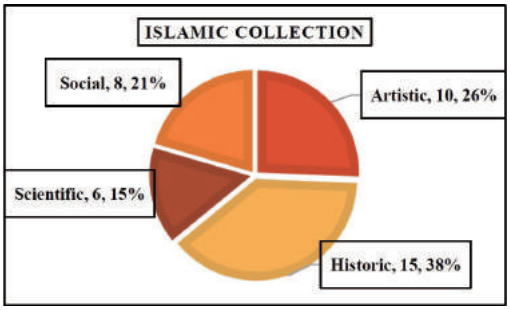


Fig.3 Attributes and Values of Collection in Peshawar Museum.

4. Risk Assessment Process

Pakistan is a disaster prone country due to its climatic extremes, geographical location and high level of vulnerability and exposure. The Pakistani society is threated by a series of biological hazards, geo-physical and hydro-Meteorological hazards including storms, cyclones, avalanches, floods, droughts, earthquakes, tsunamis, landslides and glacial lake outburst floods (GLOF). Besides natural hazards a range of man-made hazards like urban, forest and industrial fire, oil spills and transportation disasters also threaten Pakistani society, economy and environment. (NDMA,2013).Pakistan lies in the seismic strap and therefore, occurs recurrent earthquakes of moderate to high magnitude and causing damages in Khyber Pakhtunkhwa (KP), Balochistan, Punjab and Sindh provinces. Earthquakes almost happens in the mountains ranges of Karakorums, Himalayas, Hindu Kush ranges in the north and Koh-e-Sulaiman range. The earthquake risks are further intensified in the region due to poor quality of buildings and high exposure of population. The earthquake 2005 happened in Khyber Pakhtunkhwa and Kashmir causing gigantic loss of lives (over 73,000 persons) mostly in KP and extensive devastation to infrastructure. (NDMA, 2012).

Geographically the province of Khyber Pakhtunkhwa (KP) is mostly mountainous having a rich history of earthquakes. After conducting the risk assessment process earthquake was identified as a primary hazard and fire as a secondary hazard see Fig 4.

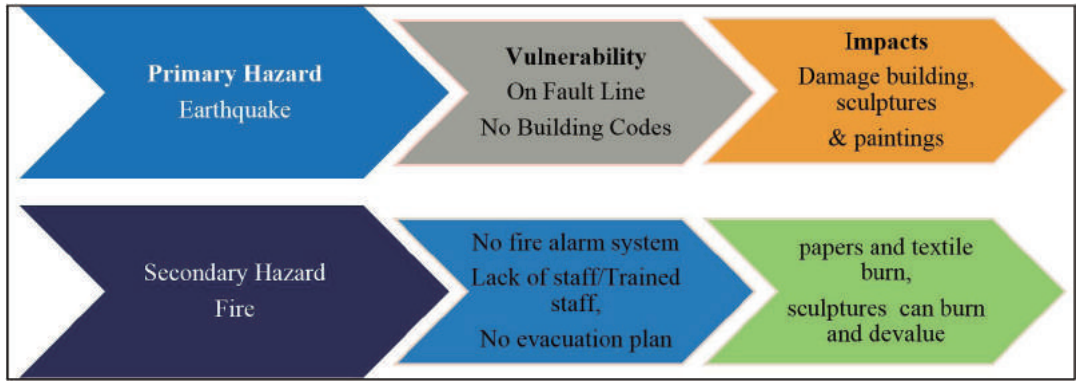


Fig.4 Risk Assessment Process of Peshawar Museum,

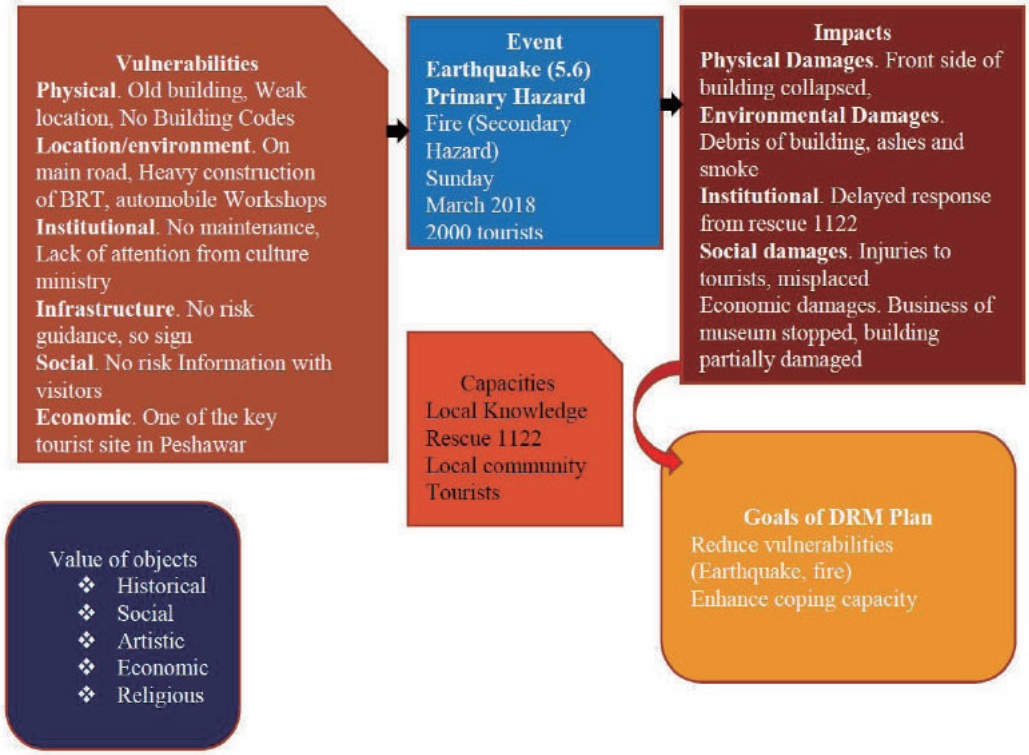


Fig.5 Risk Scenarios

It was Sunday morning 10 am when an earthquake of 5.6 rector scale happens in Peshawar. Meanwhile there were some 2000 tourists in the museum. The front side of the museum building collapsed and fire also happened in the storage area. There were debris of building, ashes and smoke. The rescue 1122 arrived after half an hour and some of the tourists were misplaced and some were injured. For few weeks the business of the museum stopped and the building was partially damaged see fig 5.

5. Prevention and Mitigation

On the basis of risk assessment, variety of structure and non-structure risk reducing actions are listed to lessen the vulnerabilities and impacts on buildings and collection with the active involvement of stakeholders and actors. The regular preventive measures include monitoring ad documentation of building and objects. See Table 1.

a. Structure Mitigation Measures:

• The Building of museum is old and need regular maintenance through annual audit.

• No building codes are adopted in the construction and design of building therefore, suggested retrofitting in close contact of local communities and traditional methods.

• Investigation on performance of materials, structure and traditional methods in case of seismic activity.

b. Non-structure Mitigation Measures:

• Improved security and properly locked the collections.

• Install fire alarm system

• Capacity building of museum staff on fire fighting and first aid.

Table 1 Prevention and Mitigation strategy of Peshawar Museum, Khyber Pakhtunkhwa,

	Vulnerability	Impacts	Mitigation	Stakeholder/Actor
Gandahara (Sculpture made of terracotta, schist stone, stucco)	On fault Line	Partially/ Permanent damage	Building Maintenance (annual audit)	secretary, Director of Archaeology & Museum, Curator, UEP
	No building codes	Partially/ Permanent Damage	intervention/ Retrofitting	
Coin (Copper, Gold & metal)	Theft, Burn	loss of values	improved security, Properly locked	Curator, staff
Islamic(books, papers, paintings)	No fire alarm	Paper and textile burn	Install Fire alarm system	WAPDA
	Lack of trained staff	Poor response & preparedness	Capacity building	PRCS, PDMA
Others(textile, dresses)	Weak location	Loss of originality	Glass cases	Curator, staff

6. Emergency Response and Evacuation:

There is no emergency response plan of Peshawar museum. It is essential to coordinate with different stakeholders ad actors and define their specific roles and responsibilities. In case of any catastrophic event i-e earthquake and fire immediate humanitarian response i-e rapid assessment, documentation of new situation, stabilizing the parts of museum seriously damaged by earthquake and ensure safety of visitors are the measure needed on making the site safe and secure. See Fig 6.

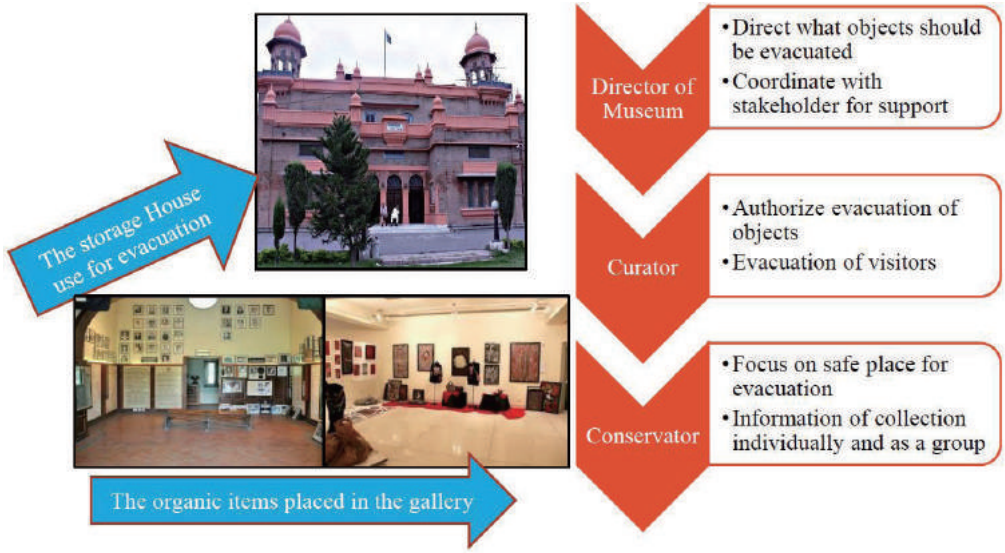


Fig.6 Emergency Response and Evacuation Plan of Peshawar Museum

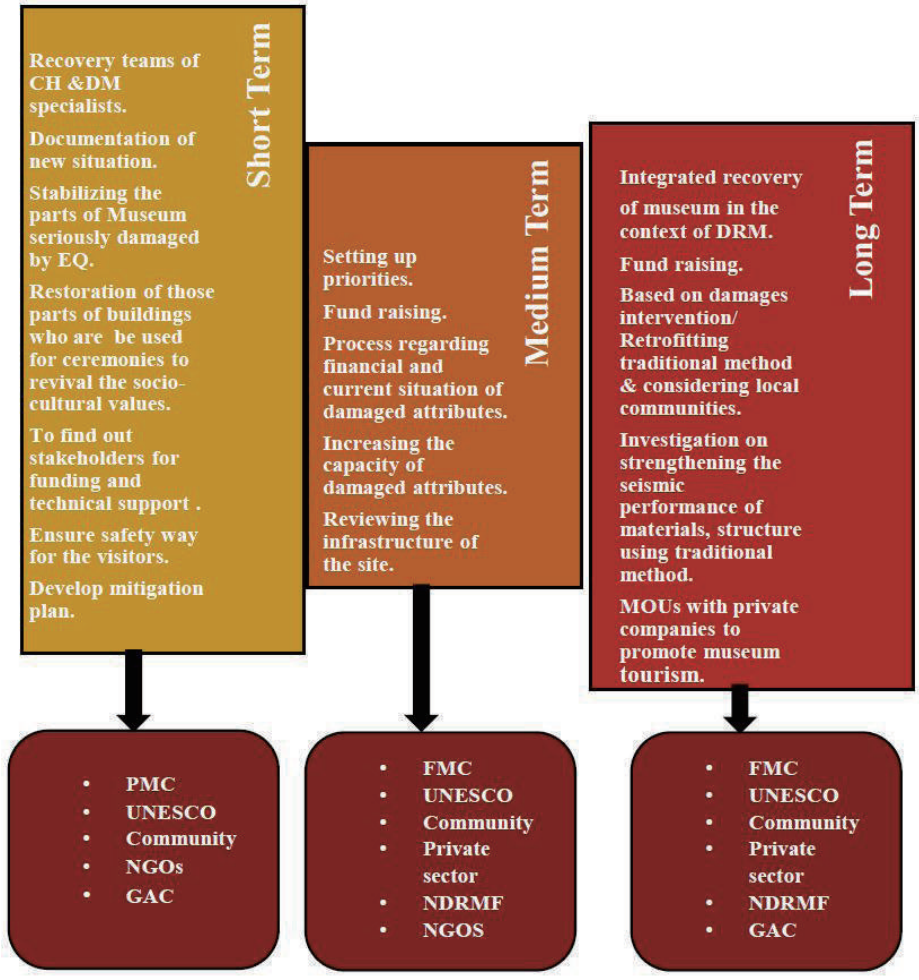


Fig.7 Recovery Process

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2.9 Disaster Risk Management Strategy for Cultural Heritages of Iran-Case Study: Qaisarieh Bazar of Lar-Iran

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1. Introduction

Heritage buildings like other kind of structures are at risk of natural and man-made hazards. In many countries, there is not any plan to protect them against high risks of disasters due to negligence, insufficient budget or lack of technical knowledge. In order to reduce the risks of disasters to cultural heritage, definite frame work for the planning process needs to be followed. The mentioned plan should address all aspects of any cultural heritage impacted by disasters. The methodology learnt during ITC is recommended for this purpose due to following reasons;

I. It is technically simple and easy to use;

II. It is comprehensive as it covers all aspects of a cultural heritage including tangible and intangible attributes;

III. It is universally verified and could be applied to all types of cultural heritages.

In this paper, the methodology would be applied to a case study chosen from Iran.

A brief look to the situation of cultural heritages in relation to Disasters in Iran

According to the report of United Nations Organization, Iran is amongst 10 countries which is most exposed to natural hazards. Arg-e-Bam, which was a unique cultural heritage; totally collapsed due to the great Bam Earthquake of 2003 that struck the Kerman province. Arg-e-Bam is famous as the largest structure in the world made out of masonry and dated back to 5 century B.C.

Fig.1 Arg-e-Bam before earthquake

Fig.2 Arg-e-Bam after happening of earthquake

Fig.3 Arg-e-Bam nowadays after reconstruction

Other than Arg-e-Bam, there are numerous archeological sites all over Iran which are exposed to various hazards and are unprotected against them. The common characteristic of them is that they are all built of old building technologies using traditional building materials. Beside corrosion, due to exposure to harsh environmental conditions, increasing frequency and intensity of natural and man-made hazards is considered as a severe threat to cultural heritages. However, policy makers and stakeholder organizations seldom take into consideration serious actions for the protection of the cultural heritages. The most prominent reason for this negligence seems to be lack of budget. Hence, the consideration of cultural heritage is placed amongst the lowest priority measures compared to the general welfare of people.

2. Objectives and Methodology

The main objective of this article is to introduce an outline for disaster risk reduction of cultural heritage sites based on the methodology learnt during the ITC. In order to display the applicability of the method, a case study has been chosen. The applied methodology is described below:-

• The work flow of the study follows the steps which are displayed in Fig. 4;

• Cultural heritage and risks are considered at various scales, namely regional level, site level, building level and attribute level;

• The use of pressure matrix would result in contribution of different stakeholders;

• The qualitative risk assessment method would be used to prioritize the risks relevant to different attributes of cultural heritage;

• Scenario building describes the way a certain risk influences the specific attributes of the cultural heritage;

• Eventually, structural and non-structural solutions would be designed to reduce risks to certain attributes of the cultural heritage.

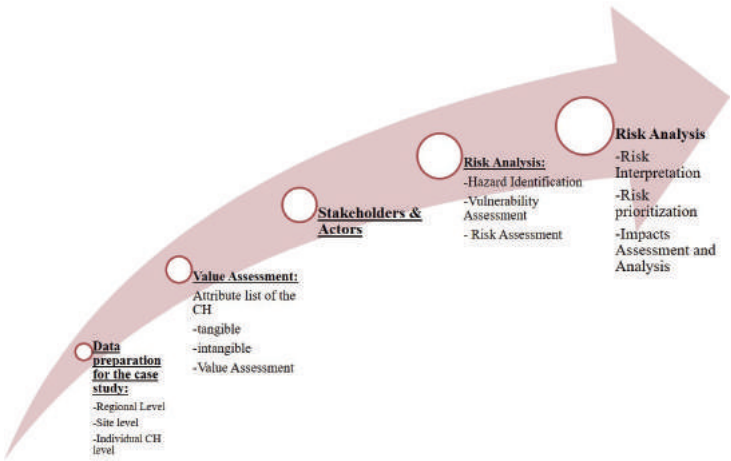

Fig.4 Work Flow diagram of the study

3. Case Study project

Qaisary)Caesarea(Bazar (market place) is located in Lar. Lar is the southern most city of the Fars province of Iran. Lar, the centre of Larestan is located 330 km southeast of Shiraz and 190 km North West of Bandar Abbas and is considered as the largest city in the Fars province. The altitude of Lar is 806 meters above sea level.

Lar is a sample of an urban planning belonging to the pre-Safavid dynasty. Continuity of the Bazaar of Qaisariye after the historical earthquake and its planning and expansion with the construction of a Square with polo gate and surrounding porticos show a unique complex of urbanization from the post-earthquake period. Qaisariye Bazar was built during the reign of Shah Abbas Safavid. From the planning viewpoint, it can be compared to the Bazaar Vakil market in Shiraz and Bazaar Qaisary market in Isfahan. This market is a fine collection of diverse ancient architecture and the oldest market in Iran with

historical architectural styles from the pre- Safavid era to Qaisary periods.

According to Arthur Pope, a recognized Iranologist, Iran is ranked first in building domes made out of bricks. Iranian talented architects solved the complex and problematic issue of "dome on four walls and four corners" which Roman engineers and architects were unable to resolve. This engineering resulted in artistic buildings in the Safavid era. Emergence of this perfection is the result of progressing along centuries from the time of the Parthian and Sassanian to poetic adorned buildings of the Safavid era.

The internal facing of the main dome is made of rock. Four long corridors "North", "South", "East" and "West", make up the main skeleton of the Bazar. The corridors intersect at a four way junction called "Char Sough" in Persian. There are 13 pairs of shops located at each side of the southern, eastern and western corridors, also 14 pairs of shops are based on both sides of the northern corridor. The main building, a very old market, is around 1300 years old.

According to the seismologic map of Iran, Lar is located in a high seismic zone. Numerous earthquakes have frequently destroyed Lar since 700 years. Statistics show that almost every 45 to 90 years, Lar has been shaken greatly and destroyed by earthquakes. The most recent quake struck on the 24th of April 1960 with the magnitude of 6.7 on the Richter scale. 450 people were killed out of the total population of 14000. The Bazar remained intact in that event but historical records show that it has been reconstructed several times after past earthquakes. The last repair was done in 1892 at the time of Qajarid Dynasty and the earlier reconstruction work was conducted in 1605 at the time of Safavid Dynasty.

Other than earthquake, Qaisariye Bazar has also faced the risk of flood. City of Lar is located in a region with arid climatic conditions. It may look like it never floods there. But the facts and figures indicate that every few years, a rather severe urban flood inundates Lar due to heavy rains. This flood causes severe damages to many different parts such as houses located in old parts of the city, streets, nearby agricultural farms and micro industrial units. The amount of the damage is considerable. The bazar which is located in an old place in this city is not protected against such floods and gets partially damaged. So it is very common that the Cultural Heritage Organization takes action to release water from flooded zones and also repair the damaged parts. Besides, the two main risks of earthquake and flood, there is lower risk of dust storm along with the routine risks of damages due to aging, erosion and risks pertaining to human activities.

Seismicity of Lar

So far various earthquakes have destroyed Lar. Once in 1871, the other time in 1911 and the last devastating earthquake struck 1960. According to the recorded earthquakes, within 1913 and 1970, the frequency of the earthquakes is shown in Table 1.

Table 1 frequency of happening of earthquakes in Lar

Earthquake intensity in Richter	4-4.9	5-5.9	6-6.9
The number of events	20	24	2

Heritage Value assessment for Bazar Qaisarieh

After a very close look at the attributes of the bazar, it is possible to divide them into three different parts, namely;

- Structural elements of the bazar
- Non-structural elements of the bazar
- Intangible attributes

The reason for classifying the Bazar into different elements is to address different categories of attributes with different risks. So that it is possible to analyze the impact of any estimated risk on different attributes. Thus, it would be possible to estimate the risk of any hazard to different attributes. Consequently, appropriate solutions would be proposed for specific attributes with any specific risk.

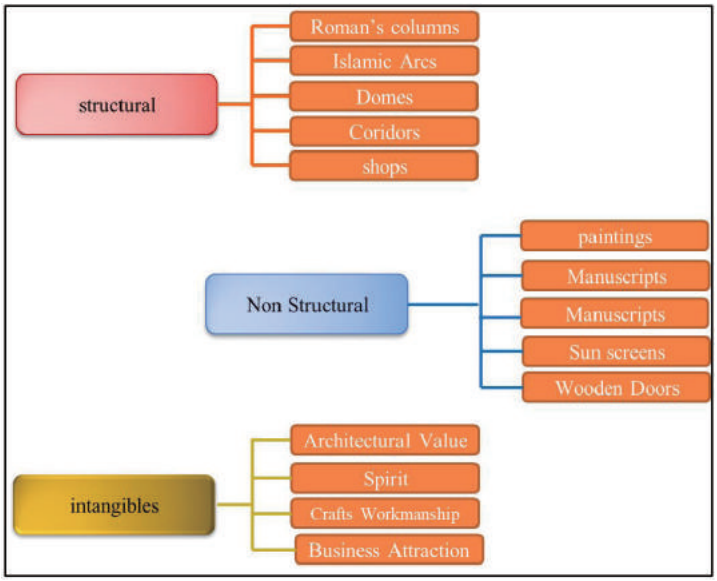

Fig 5 classification of different attributes of Bazar Qaisarieh

4. Risk Analysis of the Cultural Heritage

Risk assessment of the attributes at this stage has been done based on sound experimental judgment which is arisen from the site visit and study of existing reports, fact and figures relevant to the case study. For this qualitative assessment, Analysis of hazards, vulnerability and impact have resulted in four risk levels which ranges from highest degree to the lowest degree. According to Fig. 6, the highest risk for the Bazar from an earthquake. Risks of fire and urban flooding are placed in the high level. Theft is estimated to be the medium level. Finally low level risks are namely dust storm, typhoon and sink holes due to subsidence.

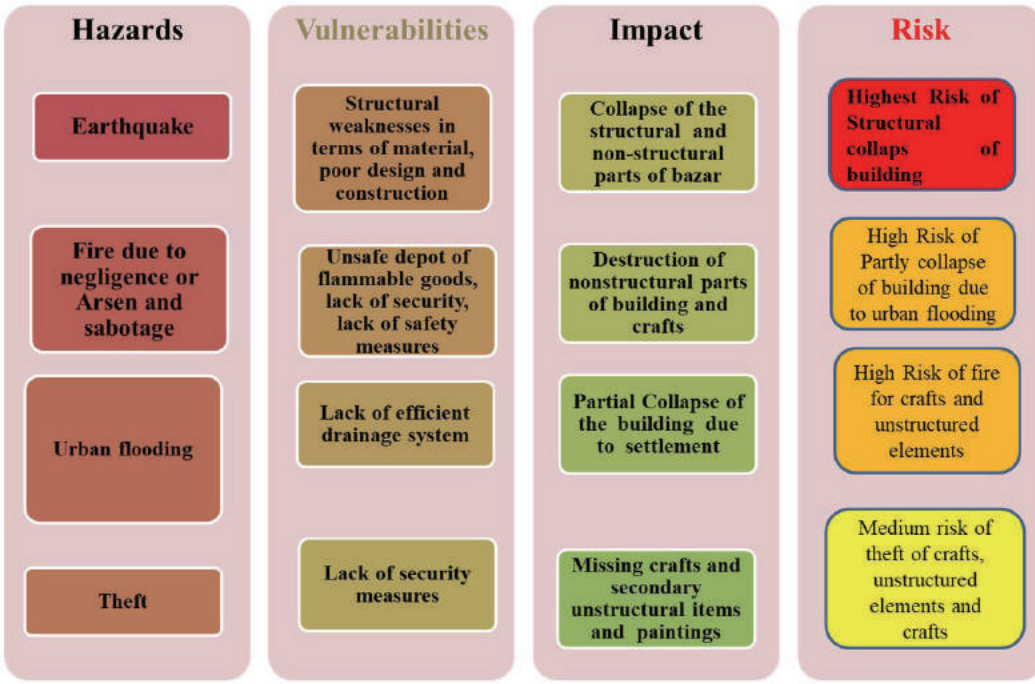

Fig. 6 risk priorities of Bazar Qaisarieh

Creation of Risk Scenarios

Scenario building for identified risks is a very essential way to visualize the risk to respective attributes of the Bazar. In addition, one can imagine the mechanism of how a risk will make an impact on the affiliated elements. Besides, the information gained from every scenario will help in finding specific solutions accordingly. It should be mentioned that a series of scenarios could be designed for any hazard that ranges from low impact to highest impact. The worst case scenario depicts the most tragic situation that would be imagined as the consequence of an event. A number of scenarios of high risks are displayed in Fig. 7.

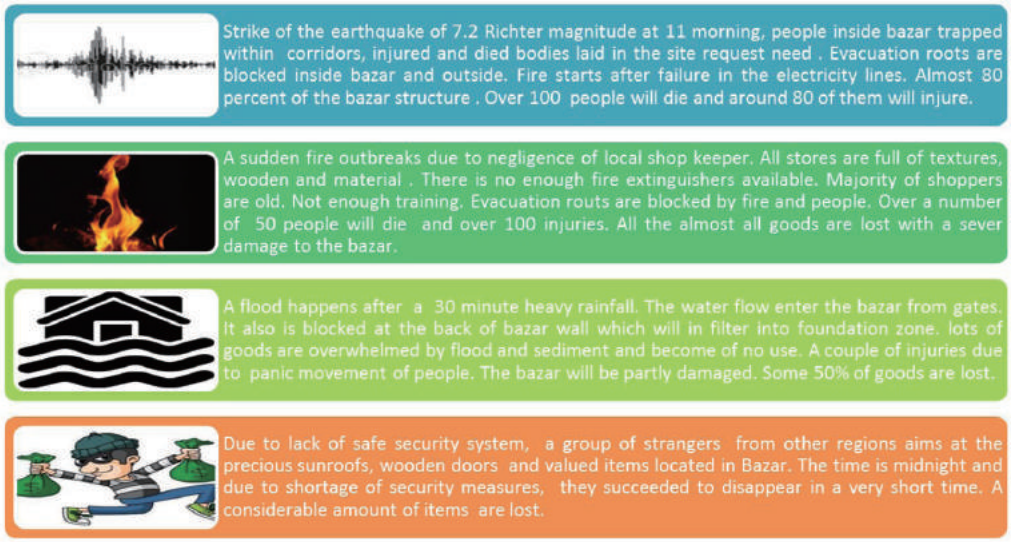

Fig. 7 sample scenarios for higher risks assessed for Bazar Qaysarieh

5. Disaster Risk Reduction

In order to manage disaster risks to cultural heritages; it is essential to address any attribute that is at risk and focus on the nature of damage that would be induced from the specific hazard. As mentioned earlier, damaged attributes are not only structural ones but also spiritual ones. There are many remedies for reducing the risks and are different in terms of know-how, cost and time. In order to help decision makers it is necessary to priorities them based on the availability of budget, technical resources, time and man power.

There are two different classifications of risk reduction solutions including structural and non-structural ones. Structural measures are of physical nature and while non-structural measures are of managerial nature. Table 2 displays a number of structural and non-structural measures that could be implemented in order to reduce the estimated risks of hazards on different attributes.

Table 2 Matrix of Risk Reduction Measures

Hazard	Attribute	Applicable Measure	structural	Non-structural
Earthquake	Bazars structure	Strengthening the domes and	✓	
		Monitoring structural elements of the building	✓	
		Earthquake Emergency Action Plan		✓
Fire	Existing materials and goods and wooden building parts	Installation of fire distinguisher devices		
		Rearrangement of existing electricity system		✓
		Installation of smoke detectors	✓	
		Training the stuff for fire emergency situation		✓
Urban Flooding	Bazars structure and goods in shops and storages	Design and installation of drainage system in site area,	✓	
		Water proofing the roof and back of the Bazar	✓	
		Use of temporary flood walls	✓	

6. Summery

Disaster risk management of cultural heritages is a complicated for many decision makers in terms of technical issues, budget and strategy. In many cases, authorities just can cope with routine defects like dissociation, decay, aging, and oxidation and so on. But the bigger problem is related to the unexpected risks of disasters with high magnitude and uncertainty that abruptly causes much more damages to cultural heritages as invaluable assets.

In the current paper, a methodology for disaster risk reduction of cultural heritage sites has been applied.

The issue is looked in a very comprehensive way by addressing various elements and aspects of a cultural heritage exposed to any kind of risk. In order to implement the mentioned measures for any cultural heritage site it is necessary to first conduct a study regarding risk assessment and analysis and then to find effective solutions to mitigate the risks. In real scale, the study should be performed at regional level, site level, cultural level itself and finally for various types of attributes. This way all possible and probable risks would be addressed.

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2.10 Implementation of Disaster Risk Management for the World Heritage Site of Bruges, Belgium

Grace DE SMET
Urban Planner and Researcher for Cluster Landscape

1. Introduction of Bruges

Belgium has a rich history of medieval architecture showing the vibrance of the West-European area full of craftmanship, art, trade and proto-industries that have leaded to the Industrial revolution in the 18th and following centuries. It shaped the identity of the region of Flanders significantly and the city of Bruges is the best preserved example of this medieval city type in my home country.

Fig.1 Septem Admirationes Civitatis Brugensis (1550-1560) by Pieter Claessens

In 2000 the city center of Bruges was protected as a World Heritage Site (WHS) by United Nations Educational Scientific and Cultural Organisation (UNESCO). The protected zone is the situated between the ringroads, where the former city walls where located, which are marked as the buffer zone. This zone includes around thousand protected objects, monuments and sites. The city has 22 museums including important 16th/17th century Flemish Primitives paintings. The Outstanding Universal Value (OUV) of this WHS claims Bruges briefly as followed:

The Historic Centre of Brugge is an outstanding example of an architectural ensemble, illustrating significant stages in the commercial and cultural fields in medieval Europe.
Brugge in medieval times was known as a commercial metropolis in the heart of Europe.
The city reflects a considerable exchange of influences on the development of art and architecture, particularly in brick Gothic, which is characteristic of northern Europe and the Baltic. This architecture strongly determines the character of the historic centre of the city.

One of the most significant protected sites in Bruges is the Béguinage which is also a WHS and situated in the south area of the the city center. It is one of the 13 Béguinages in Belgium that had been given the protection of WHS in 1998. In the OUV they are briefly described as followed:

These Beguines were either unmarried or widowed women who entered into a life dedicated to God, but without retiring from the world. In the 13th century they founded the béguinages, enclosed communities designed to meet their spiritual and material needs.

The Flemish béguinages formed architectural ensembles, enclosed by walls or surrounded by ditches, with gates opening to the outside world during the day. Inside, they were composed of houses, churches, ancillary buildings, and green spaces organized in a spatial conception of urban or rural origin, and built in styles specific to the Flemish cultural region.

The Holy Blood Procession in Bruges which takes place every year at Ascension Day is inscribed at the List of the Intangible Cultural Heritage of Humanity by UNESCO. This pageant takes place since the 13th century and commemorates the arrival of the Relic of the Holy Blood of Jesus Christ back from the Second Crusade. At the same time it shows the life of Jesus and the history of Bruges which was a very wealthy Medieval city and one of the most important for trade, craftmanship and art in West-Europe.

The Procession is a vibrant example of how a collective ceremony can unite a city through ritual enactment of its history and beliefs.

2. Disaster Risk Management Plan

Attributes and Values

The OUV's tell more on the most important heritage and monuments of the city. Based on this, further assessments can be made. The Béguinage of Bruges was selected as one of the attributes for this case study. The values of this Béguinage are in the typical character of the form and design which is a huge pull factor for visitors and its users. It creates a center of peace in the city and is one of the greenest places near the waterside. The preservation of its characteristics and lasting inhabitation by women keeps the tradition and purposes of this site in stand.

Fig.2 The Béguinage of Bruges seen from above © Google Maps

Threats and vulnerability

Bruges is located near the coast, about 10 – 15 km, and has a port that is connected by a canal with the Northern Sea. This region has a very low elevation above sea level, for Bruges only 13 meters, which poses threats by global warming in case of floods and storms. Storms and floods are the biggest risks for the whole region of Flanders. Heavy rains and storms have doubled in the last 50 years and more heat waves were measured in the last 10 years. Meteorologists explain these effects due to climate change. The coastal line of Belgium is still very fragile and not adequately protected against storm tides as experienced by events in the last two years.

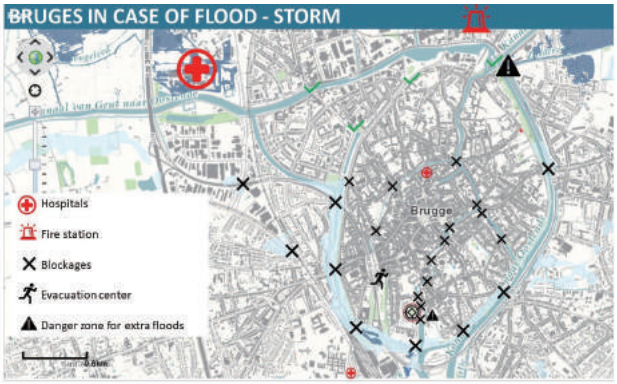

Fig.3 Flood risk zone map © waterinfo.be

Although Bruges has not recently been threatened by floods, a disaster risk plan on the Cultural Heritage against floods and storms in Bruges has not yet been made. Studies have shown that a 1,5°C temperature increase through global warming would result in a complete flooding of Bruges. The water level in the city is under the influence of the tides, which makes it vulnerable during storms in combination with high tide. Flanders has a complete map to show the sites that are under flood risks but no action plan for protecting cultural heritage against those risks, neither strict regulations against building in those zones, are provided. The maintenance of the buildings near the waterside are thus an important factor of damages in times of heavy rains and floods.


Fig.4 View on the canals of Bruges near the Béguinage © Grace DS

As these flooding by heavy rains and storms can become more and more likely to happen, it could also bring severe damages to the heritage located near the little canals including some of the museums. This primary hazard can cause secondary hazards such as blockages or fires. A map of the flood risk zones (Fig. 3) shows the most prominent areas are located near the ring road in the south of the city and the most important hospital in the North-West. As an outcome of this analysis an evacuation plan could be made in collaboration with the stakeholders. This could lead to a better overview of the who could take the responsibility in the risk prevention of the heritage.

Stakeholders

In Belgium the governance on culture and risk prevention are not completely organized on the same governance levels. This friction between the stakeholders on different governance levels and departments did not make it easy to collaborate on this topic so far. On a local level, the collaboration between the different actors would look like presented in Fig.4. Still this would only be a partial share of all the actors working and developing the DRM plan. The exchange between local, provincial, regional and federal level would be a necessity for a full operative DRM plan.

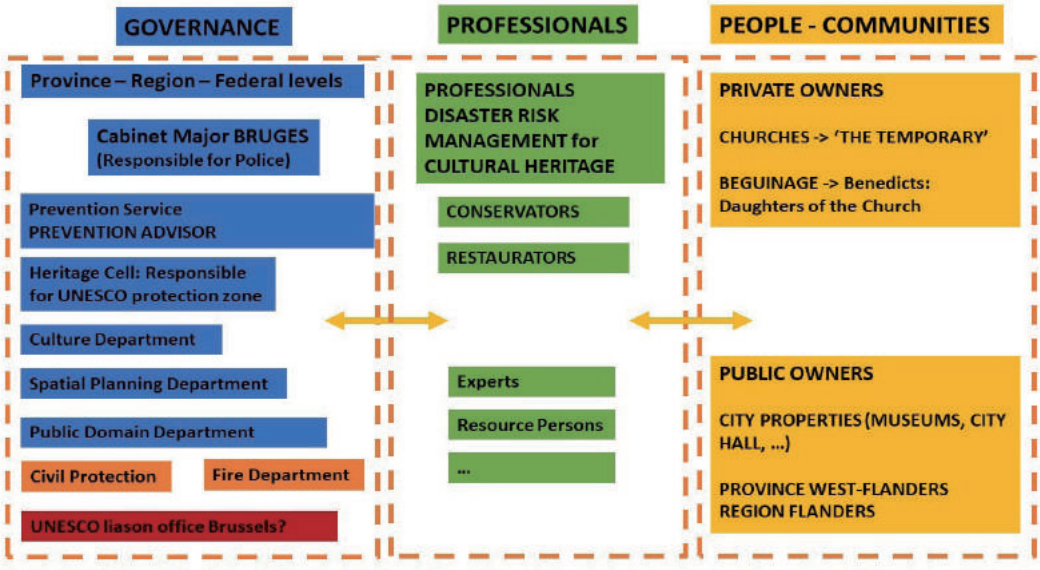

Fig.5 Scheme of the local stakeholders

Risk prevention and mitigation strategies

As there were not many severe events and damages caused by different hazards in the city of Bruges or the Béguinage, the focus of this DRM plan lays on the prevention and mitigation of flood risks.

These prevention and mitigation strategies can be made for the different phases of a disaster, preparedness, response or recovery. The approaches for these different phases are based on six levels: policy; planning; technical (non-structural and structural); maintenance and monitoring and training and awareness.

On policy level, the first step is to bring the different stakeholders together and find a group of actors to build on a strategy plan of evacuation. These can be the decision makers to introduce it on the different governance levels or can be the exerting power such as civil servants, firemen, police,… the final decision needs be carried out by the decision makers.

Together with a team can develop a management plan for the different sites in Bruges specific on the needs and location of them. Also the creation of evacuation plans per building with specific locations of the most valuable objects would be a good outcome of this DRM plan for the city.

Technical level both structural and non-structural, maintenance of the heritage is key to prevent it from further damages. A limewashing technique can be introduced for the protection of walls against rainwater and to reduce erosion of the brick stones.

Maintenance and monitoring can be also introduced on the regularly check-ups of trees, public furniture, etc. With GIS-maps, the flood zones are already mapped and followed-up. Linking these with the documentation and digital database of the heritage could be an advantage for the monitoring of the heritage. A flood risk system linked to an evacuation procedure, would also be an option for the buildings next to the canals.

3. Conclusion

The above presented prevention and mitigation strategies are just one of the more measures that could be taken. These measures will be proposed in a set up meeting with the prevention advisor of Bruges, the fire department and the civil servants of monument care and museums. To implementing these strategies, it would be an advantage that a general coordinator would be recruited. This coordinator would follow-up on the tasks to establish an evacuation plan and team. Good locations needs to be identified together with a value identification card for all the objects. A priority list of museums and other locations with important objects, needs to be set up as one of the first steps in implementing these strategies.

Further evacuation drills needs to be coordinated and regularly repeated so the team and the different tasks are correctly divided. Good communication between these different actors are essential to lead to the success of this strategy.

Specifically for the béguinage it is important to know who is living in which home and what the needs of these women are. As the inhabitants of this site are mainly elderly single women, they have not always the specific support system to rely on. Thus for this situation, it would be good to get an overview of the needs within this community.

As there is not a single plan for the protection of cultural heritage in case of an event, it would already be an accomplishment if the Disaster Risk Management strategies could be heard by the city council and implemented in some areas of Bruges.

2.11 Disaster Risk Management Initiative for the Historic Centre of Sighisoara, Romania

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1. Introduction

Established in the 13th century, the city of Sighisoara is located in the historic region of Transylvania, in the central part of Romania. From a cultural and historical point of view, the center of Sighisoara illustrates a rare case where a fortified medieval urban site was almost completely preserved and continuously inhabited. Apart from its important military role, given by its strategic position on top of a hill overlooking the river valleys, the city had flourished in the Middle Ages as a commercial place on behalf of the German merchants and craftsmen who settled there.

In 1999, the Historic Center of Sighisoara was designated by UNESCO as a World Heritage Site [1)] based on criteria (iii) and (v), asserting that "Sighisoara is an outstanding testimony to the culture of the Transylvanian Saxons, a culture that is coming to a close after 850 years and will continue to exist only through its architectural and urban monuments. It is an outstanding example of a small fortified city in the border region between the Latin-oriented culture of central Europe and the Byzantine-Orthodox culture of south-eastern Europe. The apparently unstoppable process of emigration by the Saxons, the social stratum which had formed and upheld the cultural traditions of the region, threatens the survival of their architectural heritage as well."

The city has witnessed numerous disasters in the past that have the potential of reoccurring, so it is essential to take action in preserving its cultural legacy for the generations to come. One of the primary forms through which such measures might be taken is by developing an integrated plan for the disaster risk management (DRM) of the site, as outlined in the present paper.

2. Site Analysis: Values and Attributes

Most of the medieval urban fabric of the historic center has remained unchanged, preserving the original network of narrow cobbled streets and stairways, as well as the building plot configuration. Furthermore, over 90% of the constructions are still in existence [2)]. The urban structure has evolved mainly during the 14th to 16th centuries inside the hilltop citadel and at the base of the hill in a unitary way, by adapting its shape to the geomorphology of the site. The compositional and scenic values of the site are sustained by the old public squares and volumetric accents of the citadel that perfectly blend with the tree-laden slopes (Fig 1).

Fig.1 The Historic Center of Sighisoara (photo credit: Iosef Kovacs).

Sighisoara is characterized by a high density of historic monuments, which constitute expressive groups of varied typology. Henceforth, the city is surrounded by a strong defensive system that was primarily built, maintained and defended by guilds of craftsmen. Today, the fortifications consist of nine towers, three bastions and a 930 m perimeter wall that demonstrate how the constructions evolved as a result of the advancements in military techniques. The defensive arrangements carry with them the marks of past bombardments and sieges. Of aesthetic and historic value are equally the churches, public buildings (administrative, educational, cultural) and especially the houses of artisans and patricians, all of which have preserved to a great extent the original materials, forms, and construction techniques.

The historic center hosts a vast amount of movable heritage inside its buildings. For instance, the History Museum of Sighisoara arranged inside the Clock Tower has an impressive assortment of classified objects including national treasure items, which are organized in various collections referring to ethnography, weaponry, guilds, craftsmanship, medieval furniture, and pottery, among others.

Lastly, the historic center embodies the perfect setting for passing on the local Saxon traditions, knowledge and crafts.

3. Risk Analysis

The city is located in a moderately active seismic region. Its buildings and constructions have been subjected to important ground movements over the past centuries, the earthquake from 1834 causing the vault of the Evangelical Church on the Hill to collapse. Another factor, which poses a notable risk for its comprised monuments, is fire. In 1676, almost three quarters of the citadel were burned down leading the builders to use for the most part stone and brick masonry, and ceramic roof tiles instead of timber materials.

River floods and surface floods due to heavy rainfall and rapid snowmelt have historically affected areas in the Lower Town, however, because of the more recent embankment and drainage works, the phenomenon is less severe. To a smaller extent, localized shallow landslides have damaged parts of the fortified city wall for which conclusive measures have yet to be taken (Fig. 2).

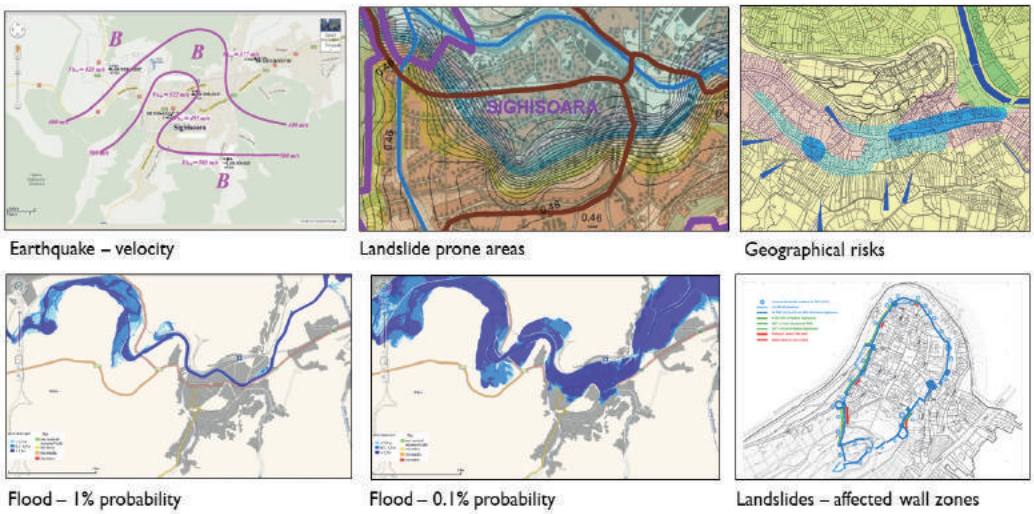

Fig.2 Hazard and risk maps (source: Sighisoara City Hall, Mures County Council, ANAR).

Sighisoara's cultural heritage is also affected by slow hazards such as ground humidity, differential settlement of foundations, and material degradation from exposure to different environmental or biological factors.

In order to carry out a risk analysis for the site, it is necessary to take into account, besides the plausible hazards, the various vulnerabilities of the heritage attributes, their root causes and the dynamic pressure they are subjected to. Additionally, one must take into account the exposure of the elements and the capacity of the site. As a final point, given a specific risk scenario, it is possible to anticipate the impacts of a disastrous situation on the examined cultural heritage property. An envisioned risk analysis for the Historic Center of Sighisoara is exemplified by key points in Fig. 3.

Recent steps have been made to develop a disaster risk management plan for the discussed site but only for fire risk prevention and improvement of the fire extinction systems [3]. Therefore, a broader view is needed in formulating an integrated strategy that covers all the relevant sides of the topic.

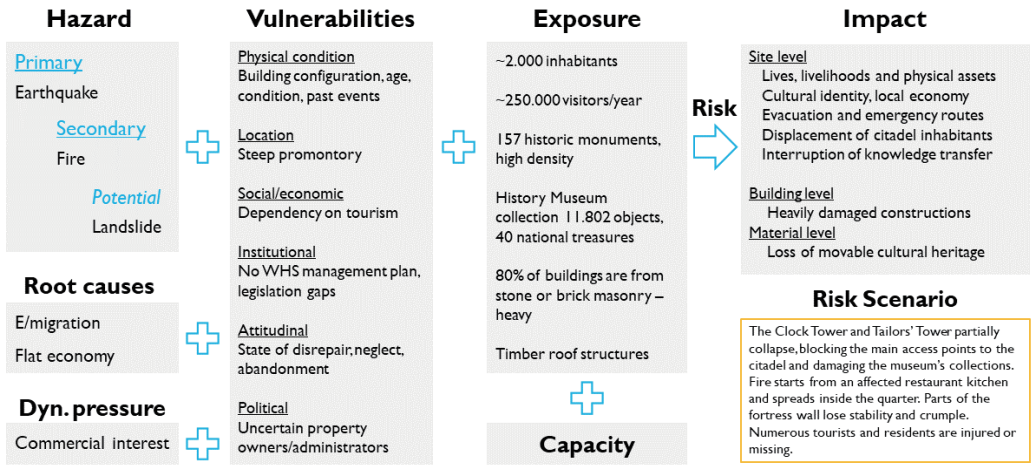

Fig.3 Risk analysis chart.

4. Disaster risk management plan

The main challenge in developing a comprehensive public policy for risk management of cultural heritage resides in changing the post-disaster response approach into a culture of preparedness and prevention. The objectives of the DRM plan for the Historic Center of Sighisoara are to build resilience, enhance disaster mitigation capabilities and minimize disaster impacts to all forms of cultural heritage. Some of these goals require cooperation at local, national and international levels, strengthening of municipal administration capacities, and engaging the local communities. Ultimately, it is necessary to periodically revise and adapt the DRM system in order for it to function properly.

The following paragraphs go into detail about the possible prevention, response and recovery measures that need to be considered for the envisioned risk scenario.

4.1 Mitigation and prevention measures

A. Policy

- Provide subsidies for fire and earthquake preparedness measures. Include private properties.
- Simplify and accelerate procedures for restoring public buildings.

•Encourage through administrative measures the maintenance of historic buildings, by lowering taxes for cultural properties.
•Increase funding for restoration programs.
•Improve the national DRR framework in accordance with the Sendai Framework priorities for action.
•Develop a local strategy to discourage the acute migration of workforce.

B. Planning

•Create a WHS management plan with DRM components that is linked with the city's urban plan for development.
•Include category A monuments on the response priority list of the Fire Department.
•Organize and improve the available documentation on the site.
•Elaborate special guidelines for fire prevention systems in historic buildings.

C. Physical

•Strengthen and restore vulnerable defensive structures (towers, walls), public buildings and houses.
•Install fire prevention and control systems: automated fire detection, water cannons and hydrants.
•Provide a secondary water reserve and an additional road access.
•Set up anchored steel meshes and drainpipes on dangerous inclines.

D. Maintenance and monitoring

•Track building changes and carried works.
•Chart vulnerabilities and exposure of cultural properties to various hazards.
•Create a register of monuments at risk and in danger so as to prioritize funding and projects [4].
•Inspect regularly fire prevention systems and assure periodic treatment of timber roof structures.
•Control the vegetation growth on the hill slopes.
•Investigate the ground stability using advanced space technologies [5].
•Enforce better measures for disobeying regulations.

E. Training and awareness

•Carry out earthquake and fire drills with hotel staff, museum custodians, clerics and volunteering tourists.
•Use the Medieval Festival as a means to draw attention to cultural heritage. Engage the community and regional artisans and carpenters in practicing and exhibiting traditional skills.
•Build education and public interest in the preservation and capitalization of heritage.
•Involve residents in Disaster Imagination Games.
•Hire more specialists in the field of conservation and restoration of historic monuments to work for the local administration.

4.2 Emergency preparedness and response

A. Rescue and salvage

•Perform rescue efforts and place temporary supports.
•Install an emergency alert system and provide tourist assistance.
•Develop logistics and cooperation plans between local and regional authorities (Fig. 4).

B. First aid for cultural heritage

•Create a network of specialists from emergency departments, museums, research institutes and universities.

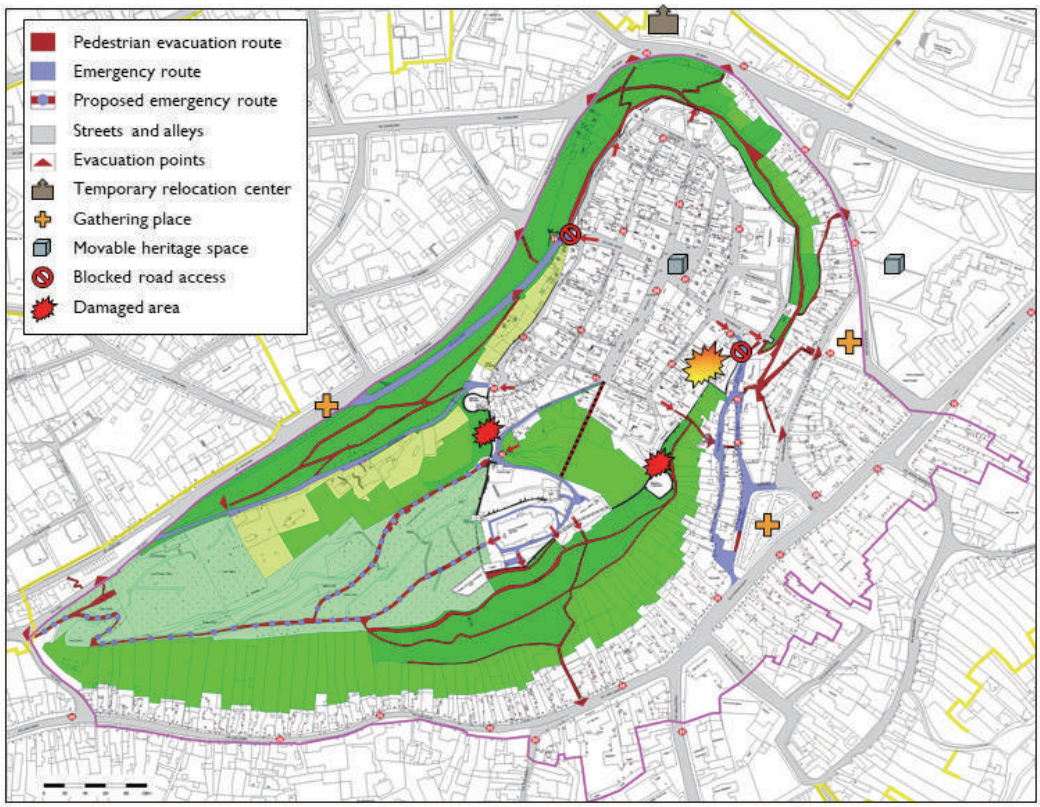

Fig.4 Evacuation plan (adapted from the Heritprot project 3).

- Propose an initiative for a young volunteer group called "Guardians of the Citadel" that can help during salvaging operations.
- Tap into the expertise and support of NGOs and associations for culture and aid.

C. Immediate assessment and protection

- Provide security at site for guarding affected objects.
- Secure perimeter for public safety.
- Rapid evaluation of damaged cultural goods.
- Install shoring for buildings.

4.3 Recovery and rehabilitation

A. Short term (0-6 months)

- Site clearance. Engage volunteers and community leaders.
- Restore utilities and infrastructure.
- Catalogue, map and evaluate the state of cultural properties.
- Structurally assess damaged buildings.
- Carry out emergency repair works.
- Apply conservation treatment for movable heritage.
- Assure conditions for displaced residents.
- Deploy emergency equipment and facilities in public spaces.
- Start up a public awareness and fund raising campaign entitled "It's time to act!"

B. Medium term (6-12 months)

- •Prioritize works and mobilize financial resources.
- •Organize specialized courses in managing disaster risks, taking into account the latest tools and techniques available [6].
- •Promote new integrated technologies for prevention, preparedness and response [7].
- •Plan academic forums and workshops on restoring historical medieval buildings.
- •Elaborate national guidelines for the restoration of timber, stone, masonry structures.

C. Long term (1-5 years)

- •Offer psychosocial support. Participatory recovery with the support of the local community.
- •Adjust the level of involvement that the state can have in cultural heritage recovery to the dynamic economic context [8].
- •Improve codes and regulations dealing with cultural heritage.
- •Perform emergency drills.
- •Repair or rebuild and document restoration works. Consider adaptive reuse.
- •Continuous monitoring of cultural heritage and risks.
- •Adjust the DRM plan to the new circumstances and data.
- •Improve the legal framework.
- •Collect data on direct economic loss, damages and costs of reconstruction or rehabilitation [9].

5. Stakeholders and Funding

For the design of the DRM system, it is crucial to include all the actors and stakeholders that are responsible or affected by the mitigation, response and recovery measures. At a local and regional level, the following entities should be involved for the discussed case: representatives of local communities and owners, City Hall – Department for Heritage Administration, County Council – County Directorate for Culture, Cults and Heritage, UNESCO World Heritage Site manager and committee, Inspectorate for Emergency Situations, Fire Department, Local Police, Regional Inspectorate of Romanian Police.

At a national level, the subsequent institutions are concerned: the Ministry of Regional Development and Public Administration, Ministry of Culture and National Identity, National Institute of Heritage, National Committee for Tourism, Romanian Order of Architects, and the private sector.

Furthermore, because the historic center is listed as a World Heritage Site, the guidance and technical support of the following bodies is advisable: UNESCO, ICOMOS, ICOM, Universities, Research Institutes, NGOs, foundations and trusts

A complex DRM plan requires substantial funding in order to become viable. Financial resources may be accessed from ROP and INTERREG Europe 2014-2020 funds, EU URBANACT programme, JICA projects and initiatives, World Bank assistance, RO-CULTURA 2014-2021 funds from the Ministry of Culture and National Identity and SEE Grants, and the National Restoration Program. To a smaller degree, funds may be obtained from the City Hall, County Council, cultural trusts, foundations, associations or insurance companies.

6. Conclusions

The Historic Center of Sighisoara encompasses values, architectural styles and cultural traditions that are specific to a minority that has unquestionably and decisively influenced the way of life, the culture and, in the end, the history of Transylvania. Its cultural heritage has suffered a lot in the past so it is of great importance to develop an integrated system for the disaster risk management of the site, which balances heritage preservation, sustainable economic development and risk reduction strategies. The plan should take advantage of past experiences, knowledge transfer and new technologies in building resilience.

7. Pilot Projects

The National Institute of Heritage from Romania is working on a National building code for the evaluation and rehabilitation of historic buildings. The proposed document will provide better-suited technical principles and methodologies for interventions on historic monuments, encourage the use of traditional materials and construction techniques, and promote less aggressive strengthening measures. Similar codes or guides are in work for other types of risks, for both movable and immovable cultural heritage.

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2.12 Cultural Heritage and Disaster Risk Reduction. The case of Reggio Calabria City Center.

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1. Introduction

The Calabria region, located in the south of Italy, is the region with the highest seismic hazard. It's crossed by a system of faults in full activity, which passes through the Strait of Messina and ends in eastern Sicily. These faults represent sectors with a high seismic risk and have originated almost all the catastrophic earthquakes that hit Calabria in historical times.

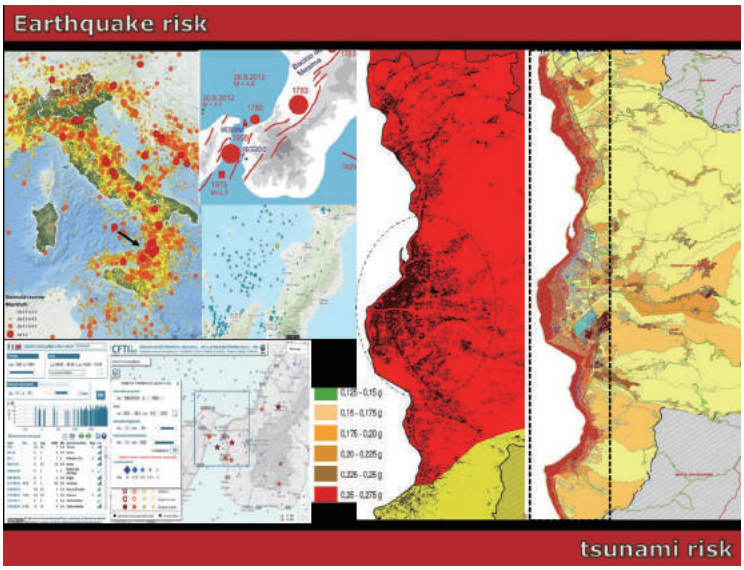

Fig.1 Seismic activity in Italy and in Calabria region. Seismic and tsunami risk in Reggio Calabria.

Reggio Calabria is the most populated city in the region, becoming a metropolitan city since 2016 with national law and leading a large area with over 500,000 inhabitants. As regards the province of Reggio Calabria, it is well known that many hinterland municipalities have demographics under a thousand inhabitants due to a relentless drive of the population to the main cities and to the Northern Italy, which offers definitively more. The city, located in a strategic position on the Strait of Messina, has historically represented the gateway to the south of the European continent. Reggio Calabria is located at 31 mt above sea level on the extreme slopes of the Aspromonte, on the slope of the eastern shore of the Strait of Messina. Since the 70s, the city has shown a very intense building growth, to be a true coastal conurbation of more than 20 km.

Reggio is also the oldest city in the Calabria region, dates back to the second millennium BC, while the first urban settlements date back to the foundation of the Greek colony Rhegion of the VIII century B.C. by the Calcidesi.

The case study here presented, is on historical centre of Reggio Calabria situated on the extreme south of Calabria region as the most populated city of the region (180.000 inhabitants) completely destroyed as a

consequence of the biggest earthquake and tsunami occurred in Italy in 1908 (7.5 of magnitude). This catastrophe has erased every building testimony of the past causing the death of with 90.000 victims.

2. The City Centre of Reggio Calabria

After the earthquake of 1783, 8.5 degrees of Mercalli scale, the reconstruction took place according to new criteria and the urban plan became a tool for seismic risk reduction. These new criteria established the first anti-seismic city's rules: the "chess board" urban plant characterized with wide rectilinear and perpendicular roads, open areas as squares and markets localized along the longitudinal roads, buildings with a regular and right angle plant. The new urban rules were completed with the following Buildings codes to rule the reconstruction:

- the elevation of the building was setted in relationship with the width of the roads;
- the number of the buildings floors were proportioned to the number of citizens;
- the regular façades with the prohibition to build large balconies but small and light ones distant from the building angles;
- to promote the ligneous structure system building;
- Outer walls in bricks and mortar for increasing the resistance of the buildings (constructive system introduced after the earthquake of the year 1755 for the Lisbon's reconstruction.).

The urban projects realized after the 1783's earthquake were characterized by both the elegance and the monumentality typical of the urbanism of the XVII century and the new anti-seismic requirements.

After the next earthquake and tsunami of 8 December 1908, the first anti-seismic rules were promulgated (Regio Decreto 18 april 1909) as first example of territorial micro zoning, in which they listed the towns damaged by the earthquake and they established the technical and sanitary rules for the reconstruction. These rules controlled the heights of the buildings (maximum 2 floors, allowed height max 10 mt) in relation to the width of the road (least 10 mt). To defend the cities from the tsunami have been prohibited buildings close to the railroad within distance between the 30 meters.

The Seismic National Law emanated after the 1908's earthquake established that all the destroyed urban centres had to make a new plan. The Reggio Calabria plan of reconstruction provides for the reconstruction of the city in the previous location today recognized as the historical centre. The historical centre of Reggio Calabria has been completely rebuilt after the earthquake and today preserves many cultural assets from the oldest such as the archaeological sites:

- the Aragonese castle, cylindrical towers and the curtain section of the Aragonese period (15th century);
- the Art Nouveau buildings, first half of the 20th century, Palazzo della Provincia (G. Spinelli , C. Author, 1920), Palazzo San Giorgio (E. Basile , 1921), Villa Genoese Zerbi (1925);
- the church of the Ottimates has remains of the previous Byzantine-Norman construction;
- the National Archaeological "Magna Grecia" Museum, one of the most important collections from Magna Graecia with also the Bronzes of Riace two large, original bronze statues Greek recovered in the stretch of sea in front of the beach of Riace in 1972 probably coming from the cargo of a ship wrecked ship. The statues are original penthouses of the 5th century BC, of Fidia or his circle.

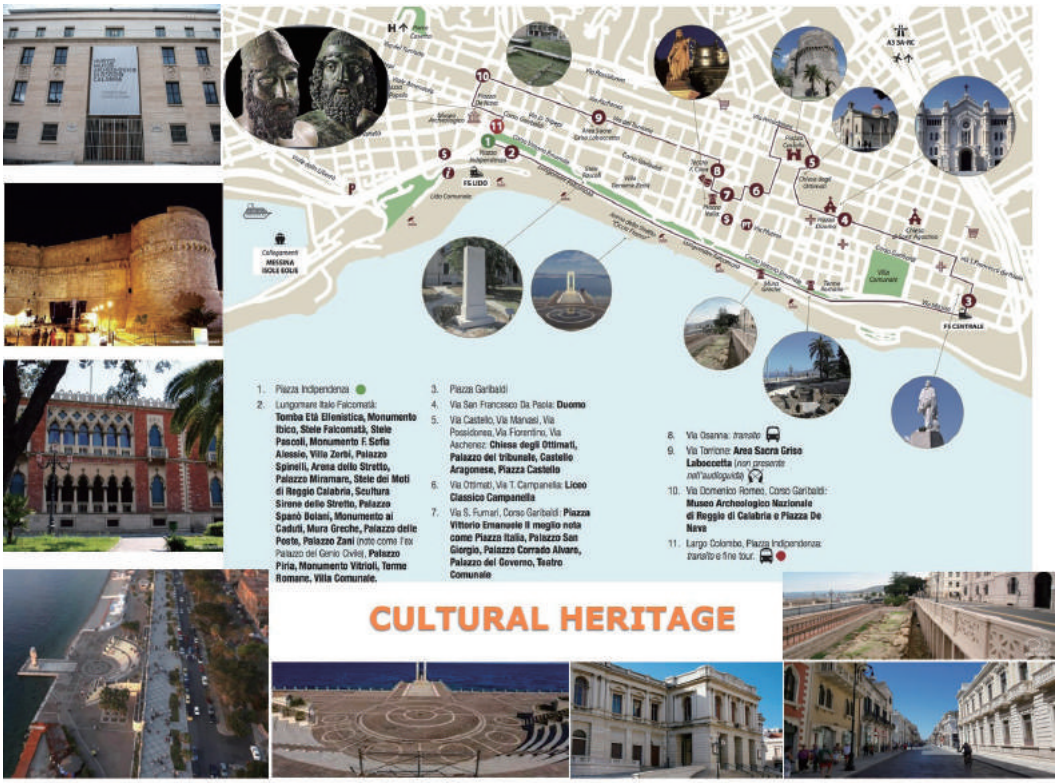

Fig.2 The cultural heritage site

In addition to the tangible attributes of the historical center, intangible attributes are also present. The local population furthermore, uses the Strait of Messina Landscape, surrounded by Art Nouveau buildings and by ancient trees as a large social place, for these reason it is defined the most beautiful kilometer of Italy. The Festival of Madonna della Consolazione as traditional artistic heritage developed and maintained over generations by individuals reflecting the traditional artistic expression.

3. Risk Scenario

The scenario considers the occurrence of an earthquake of 7.5 of magnitude originated through the fault in the Ionian see of Strait of Messina, the same of 1908, and a tsunami followed immediately after affecting the whole coastal area. The earthquake and the tsunami damaged 90% of the buildings. The historic center is destroyed, all roads are inaccessible. The cultural heritage and the most part of it is destroyed, such as the Magna Grecia museum of Reggio Calabria and the Aragonese castle and almost all of the Art Nouveau buildings located on the main road.

The tsunami that followed brought waves estimated to be 40 feet (13 meters) high crashing down on the coasts of northern Sicily and southern Calabria killing almost 2.000 people. The whole coastal area of Reggio Calabria has been completely destroyed and the seaside and the archeological site. Because of earthquake, the breaking pipeline causes fire in many areas.

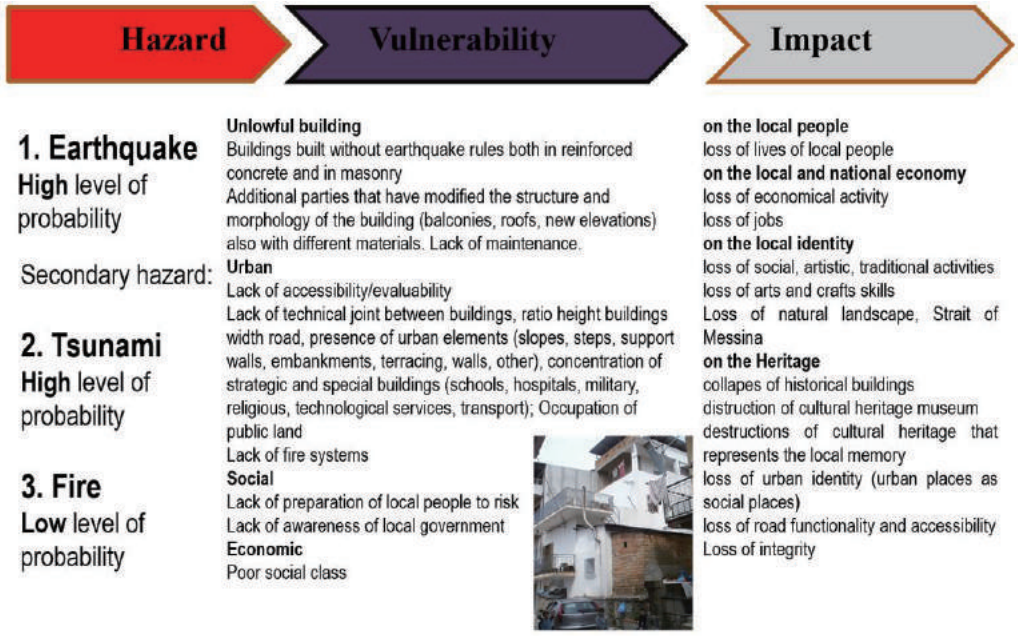

Fig.3 Risk assessment

The risk assessment puts in relation the hazards with the vulnerability and the impacts on the attributes located in the historic center that is the most vulnerable social, economic and structural urban area.
The impacts of each hazard are highlighted on the attributes present in the historical center with a different level of intensity. The main hazards are earthquake and tsunami, so the highest impact is on a restricted area where there are some cultural heritage. This allows circumscribing and concentrating the risk scenario.

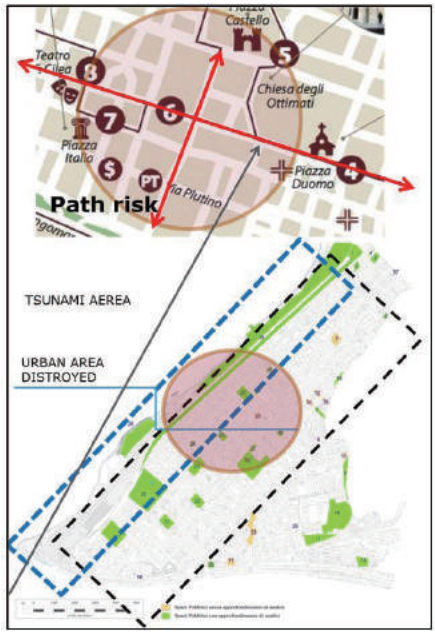

Fig.4 Risk scenario

The selected area is the most damaged and where there is a greater exposure of the attributes. Path risk passes through the area where buildings are most vulnerable due to the construction age, structure and material. Furthermore, this is an area with many public exposed buildings. The problems in this area are also related to urban vulnerability due to the complete lack of preparedness for risk and to the lack of awareness of the local government. There are no exercises in the city.
The emergency plan at the territorial level highlights the affected area, the security areas, immediately after the event, the alarm system, the security areas, the temporary shelter areas, and the evacuation route along safe routes.

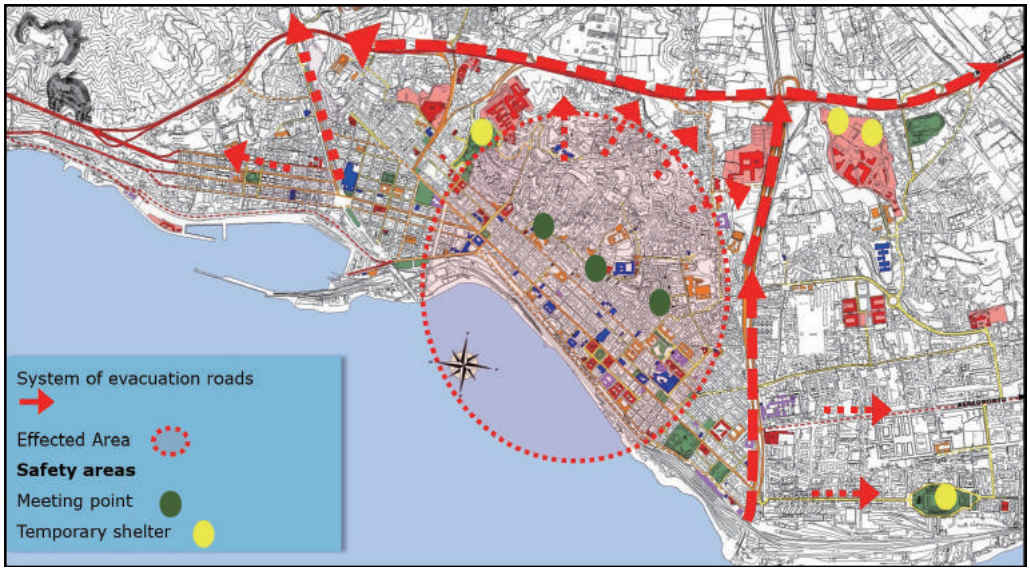

Fig.5 Emergency preparedness at spatial level

At the urban scale, the emergency plan highlights the urban area damaged by the event and the measures taken immediately after the event, such as the alarm system, the security areas, and the evacuation system through safe routes. The institutional emergency coordination is identified starting from the local one up to the central government and to the civil protection agencies involved. The National Fire Department, the Armed Forces, the Police, the National Forestry Corps, the scientific community, the Italian Red Cross, the structures of the National Health Service, voluntary organizations, the National Mountain and Alpine Rescue Corps form the operating structures.

The National Service operates at central, regional and local level, in compliance with the principle of subsidiarity. The local context of our country, subject to a variety of risks, makes necessary a civil protection system that, in every area, ensures the presence of human resources, facilities and operational capabilities able to intervene quickly in case of emergency, but also to operate for prevention and, as far as possible, predict potential disasters.

The first response to the emergency, whatever the nature and extent of the event, needs to be guaranteed at the local level, from the municipal structure, which is the closest institution to the citizen. The first head of civil protection in each municipality is, therefore, the Mayor. But when the event cannot be met by the means available to the municipality, the higher levels are activated through an integrated and coordinated action: the Province, the Prefecture, the Region, to the involvement of the State in the event of a national emergency.

The strength of such a complex system of competences is the guidance and coordination entrusted to the President of the Council of Ministers, which makes use of the Civil Protection Department.

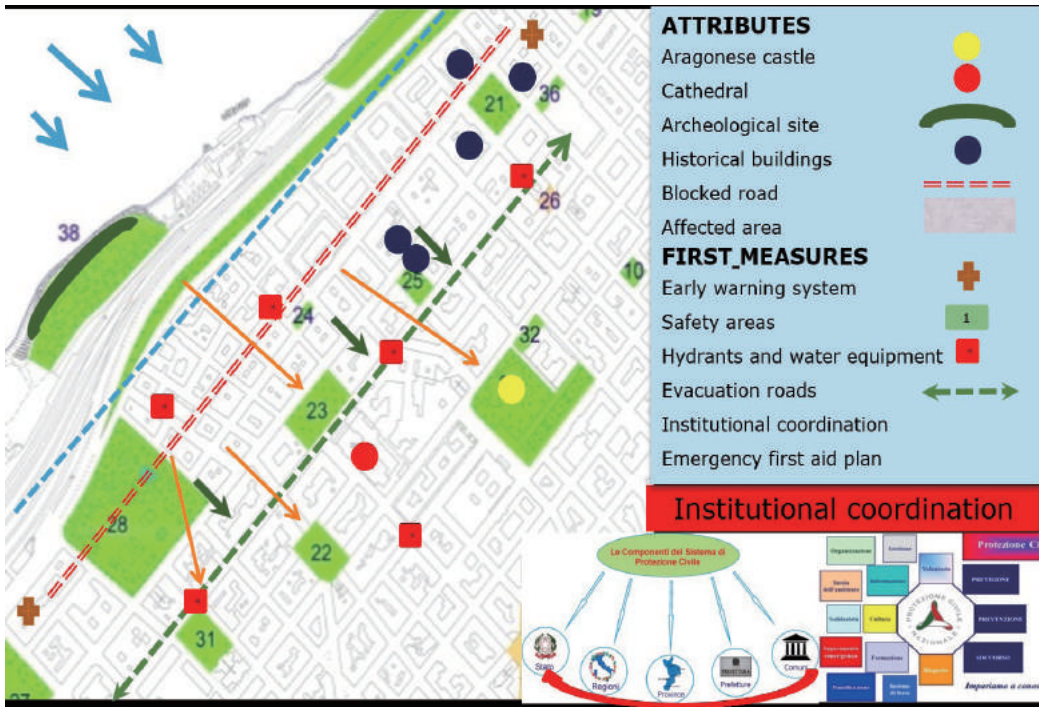

Fig.6 Emergency preparedness and first measures

The urban area of Reggio Calabria, despite having suffered many earthquakes and disasters, still presents a very high and complex vulnerability:

- Social. Although the Calabria region has historically been devastated by natural disasters and considered to be at high risk by national civil protection organizations, it still has high levels of social vulnerability due mainly to the lack of awareness by local civil protection organizations that citizenship. Civil protection exercises are rare.

- Physical-structural. The Calabria region and above all the city of Reggio Calabria despite being completely rebuilt after the earthquake of 1908 with strict earthquake rules, has over the years allowed continuous interventions on buildings without earthquake-proof rules and respect for the laws. The urban area of Reggio Calabria developed spontaneously between the '70s and' 90s in the hilly and coastal areas, without respecting the indications of spatial planning tools. The uncontrolled growth of the urbanized surface has not been accompanied by corresponding growth in road and service infrastructures, determining inefficiency in the waste collection systems, poor and incoherent development of urban mobility infrastructures, insufficiency of public green areas, and poor quality of the building, both public and private. The levels of urban vulnerability are very high. Entire neighborhoods have been built exceeding the permitted heights and saturating all the open spaces, and the distances between buildings and the correct distance from the road have not been respected.

- Economic. The Calabria region is among the last in Italy for per capita income, a low level of industrialization and a very high youth unemployment rate. This critical economic situation in Calabria region is made even more serious by the financial crisis affected the entire country for several years.

Estimated COSTS L Low M Medium H High	HAZARDS		
	EARTHQUAKE	TSUNAMI	FIRE
SHORT ····● LONG ·····● PERIOD			
REDUCING	Attitudinal vulnerabilities		
Strategic level	L Implementing new knowledge on Legislative framework L DRM Planning guidelines for heritage M Control of rules ·····●		
Physical Planning level	L Land use plan L Infrastructures system plan (transport, electricity line, pipeline gas, water) L Civil protection plan ····● L Recovery Historical center plan L Implementing DRM for heritage with an integrate vision		L Fire safety plan
Technical level	M Adequate Assessment H Retrofitting and Strengthening H Improvement new technologies ·····● M Adequate maintanance		M Hydrants and water equipment
Social level	L Involvement of local people in a DRM plan: -residents, craftsman, agency tourists, local identity associations, local knowledge		
Economic level	M Maintanance and Strengthening local activities M Support craftmans activities ·····●		
BUILDING CAPACITY	M Exiting capacities at different levels. Improvement the awareness and development a long-term process stakeholders participants		
DETECTING	M System of early warning ····●		M Fire fighting system ····●

Fig.7 Mitigation measures and costs

Risk mitigation measures to be effective can not only focus on one aspect but also must be multidisciplinary and integrated between them. Measures to reduce risks are identified in short and long term and divided according to the type (physical, technical, social, economic), and in building capacity at different levels as improving the awareness and development process stakeholders participants. The most expensive measures are referred mainly to the strengthening of buildings. Other measures concern the improvement of detecting system. At a technical level, some measures are directed towards the construction and urban scale. The interventions on the buildings mainly concern the seismic adaptation and the structural reinforcement on the cultural heritage damaged by the event inside the historical center. The goal is to return to the original chessboard plane with wide streets, both straight and perpendicular, empty spaces like squares and buildings with regular layouts all at right angles. These are simple ignored and distorted rules in a modern contemporary city where we find a complete distortion of the original morphology of buildings with the addition of balconies, new floors even with different materials and so on that have greatly increased the vulnerability on buildings and urban system.

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2.13 UNESCO Archaeological Site of Palatine in Rome: Implementation of Disaster Risk Management Plan Rome, Italy

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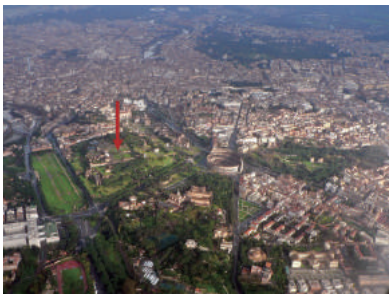
1. Introduction

The "Archeological Park of the Colosseum" in Rome, located south-west of the ideal axis stretching from the Colosseum (Amphitheatre Flavius) to the Victor Emmanuel Monument, is the most important archaeological area in the heart of the city, inscribed in UNESCO in 1980 responding to the I, II, III, IV and VI criteria (Fig. 1a). This area is full of both monuments and archeological remains from different ages, all equally representative of the worldwide known and rich Italian Architectural and Historical Heritage and here is located the Palatine, which is a hill composed of a topsoil lying on a bench of volcanic tuff whose actual content, in terms of hidden remains, stratified and attributable to different ages, has not been completely clarified yet, neither excavated.

(a)



(b)

(c)

Fig.1 Boundaries of the Site (a); aerial photo of the Palatine (b); one of the Domus atop the hill (c).

The Palatine Hill is the centermost of the Seven Hills of Rome, it is one of the most ancient parts of the city and today it is an archaeological site open to the public. It stands 40 meters above the Roman Forum, looking down upon it on one side, and upon the Circus Maximus on the other (Fig. 1b).

Rome has its origins on the Palatine. Excavations show that people have lived in the area since the 10th Century BC. Many affluent Romans of the Republican period had their residences there and from the start of the Empire (27 BC) Augustus built his House there and the hill gradually became the exclusive domain of emperors; the ruins of the palaces of at least Augustus (27 BC – 14 AD), Tiberius (14 – 37 AD) and Domitian (81 – 96 AD) can still be seen (Fig. 1c).

2. Attribute and Value

In the definition of values for different aspects and different dimensions, the UNESCO Universal Outstanding Values have been considered (Fig. 2).

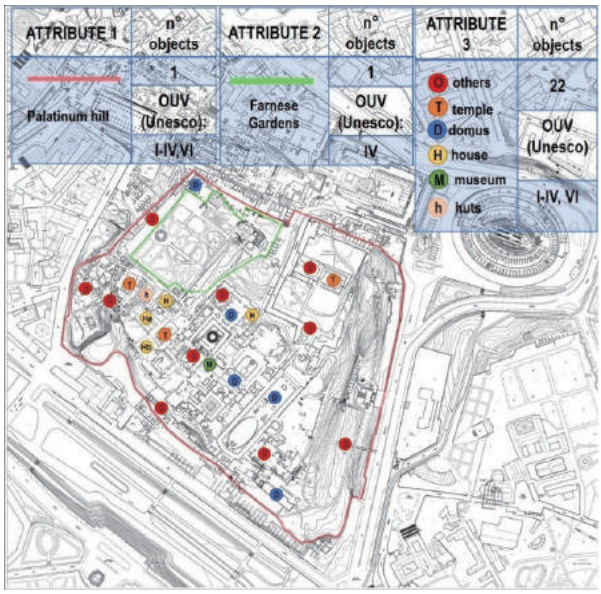


Fig. 2 Identification of the Attributes

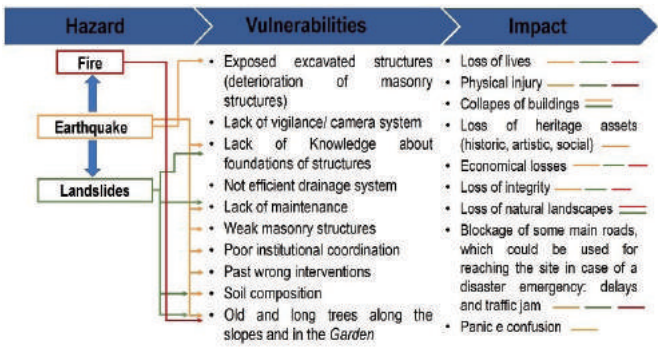
Table 1 "Aspect and Value" referred to 3th Attribute

Aspects and value	Artistic	Historic	Scientif.	Social
Form and design	3	3		
Material and substance	2	2		
Tradition, tecnique, workmenship			3	
Location and setting	3	3		3
Use and function	3	2		
Spirit and feeling	3			3

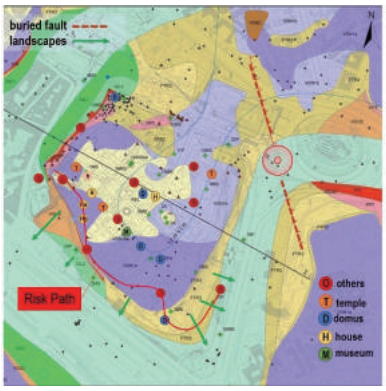
Legend value:
Low (1), Medium (2), High (3)

The three main attributes are: the Palatine in its entirely, as an area of archaeological importance but also social, because the origins of the city of Rome have been traced here (Table 1); the Farnese Gardens, that are an important green area of Renaissance period both in terms of art and history. For this attribute it was necessary to consider the natural dimension as a value in the qualification of this one. Finally, the third attribute is the group of the monuments and ruins on the hill, for a total of 22 "objects".

3. Risk Assessment and Scenario



(a)



(b)

Fig.3 Diagram of Hazard, Vulnerabilities and Impact (a); Scenario graphical representation (b).

Historical sources on past disasters show that several earthquakes, floods and landslides have affected the area close Palatine. As regard to seismic risk, Rome presents a moderate seismicity and a division of the municipal territory in subzone. The Palatinum is in the highest seismicity zone of Rome and in the most recent past two earthquakes occurred with epicenter in Rome, in 1703 (XI-X MCS) and in 1812 (VI-VII MCS).

Therefore, the probability of occurrence of a future earthquake is high. The stratification of the Palatine, characterized by different layers, also highlights the instability of the hill slopes and the possibility of also occurring landslides. In Fig. 3, the diagram shows the primary hazard (earthquake) connected to secondary hazard (landslides and fire) and relative vulnerabilities and impacts, listed in ascending order of severity.

Table 2 Impact of Scenario on values

ATTRIBUTE	Augustus House and Gallery of Collapsed Vaults					
Vulnerability	• Exposed excavated structures (deterioration of masonry structures) with frescoes • Past wrong interventions • Lack of Knowledge about structures foundations • Soil composition • Lack of maintenance • Weak masonry structures					
Impact values	Form and design (art./hist.)	Material and substance (hist./art.)	Tradition, tecnique, workmenship (scient.)	Location and setting (arti.,hist.,soc.)	Use and function (art., historic)	Spirit and feeling (artistic, social)
Low						
Medium					X	
High	X	X	X	X		X

The scenario considers the occurrence of an earthquake of six point five of magnitude that hits the Colosseum Park, along the buried fault near the north-eastern slope of the hill (41 ° 53'26.5"N 12 ° 29'25.4"E) (Fig. 3a). Its power reaches rapidly the Archaeological Site provoking the collapse of some parts not yet restored of the Augusto's House (Collapsed Gallery Vaults), during the time of the groups visit, and many other damages to the other roman ruins along and to the nearby Museum (to the structure and to the collections). The Site is still opened to visitors (many of them got wounded). As a direct consequence of the earthquake, many landslides occur along the slopes of the hill causing the blockage of some routes of connection to the Archaeological Site, for Civil Protection operative teams (for rescue people and salvage of collections). Moreover, due to presence of old and tall trees in the Farnesian Gardens, the fall of some of these causes a short circuit and consequently a fire. The Table 2 shows the impact of the scenario on heritage values associated with key attributes. In particular, the example refers to the "Augusto's House" and to "The Collapsed Vaults", for which the occurrence of the hypothesised scenario could cause significant losses in value.

4. Emergency Preparedness and Response

The Disaster Risk Management Plan, developed for the Palatine site, aims to satisfy three main objectives:

1) To MINIMAIZ the impact of disaster to preserve the Word Heritage value for the transmission to future generations and the safety of visitor, staff, guide, etc.:

2) To PREPER a public - privet partnership task force:

3) To PROMOTE a fast Recovery Process in case of disaster:

The proposed mitigation measures to reduction of the disaster risk are divided into three different types: structural, non-structural and institutional measures (Table 3).

The evacuation plan for visitors, staff and objects considers safe area inside and outside, storage area, and

a division of the Hill in three zone (marked in different colours) to which correspond three different escape routes (Fig. 4).

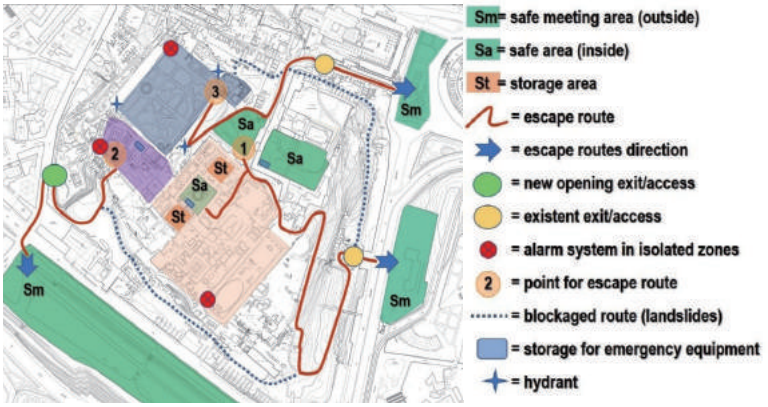


Fig. 4 Rescue and first aid

Table 3 Mitigation measures

	INTERVENTION PROPOSALS	LEVEL	HAZARD REDUCED	STAKEHOLDERS	COST
STRUCTURAL MEASURES	Consolidation/local intervention	Structures/Buildings	Earthquake : Collaps/Damage	uperintendence Expert Funders: EC-WMF	Medium
	Restoration/Isolation system (reversible)	Structures/Buildings	Earthquake : Collaps/Damage	uperintendence Expert Funders: EC-WMF	High
NON-STRUCTURAL MEASURES	Installation of Hydrants and mechanical hydrant near the Farnese Garden and in the green areas of the hill	Site	Fire	Superintendence Fire Department	High
	Alarm system in isolated zones	Site		Superintendence	Medium
	Maintenance	Structures/Buildings	Earthquake -Landslides : Collaps/Damage	Superintendence	Medium
	Monitoring System of the slopes	Site	Landslides : Collaps/Damage	Geological Expert	Medium
INSTITUTIONAL MEASURES	Human Resources: • Roster of Expert (Arch., Engineer., Archaeol. etc) • Volunteers (Training workshops) • Students (Training workshops)	Regional	-	ICRROM UNIVERSITY MiBACT	Low
	Building Guidelines for Protection	Regional	-	Superintendence	Low
	Hazard map and evacuation plan RM Procedures for custodians/ staff/guide	Site	-	Superintendence Fire Department	Low
	Improve coordination and communication system beetween Super. and tourists	Site	-	MiBACT Superintendence	Low

In the face of recovery, the plan of restoration is articulated in three different times in which measures are planned at the regional level, at site level and for single monument – elements (Table 4).II MCS).

Table 4 Planning of restoration

	REGIONAL	SITE	BUILDINGS/ELEMENTS
Short Term (0-6 months)	• Reidentifying loc., nat., and internat. stakeholders and their coordination • Recruitment of new volunteers	• Post-event damage assessment • Restoring access • Remove debris and fragments and take them to storage areas • Shoring up structurally damaged monuments • Restrict access to most relevant or vulnerable areas	• Survey of damages • Investigating and assembling the artefacts
Mid term (1-2 years)	• Establish a multidisciplinary restoration/recovery team • Heritage Emergency Fund • Training staff about new possible disaster - vulnerability	• Documentation of the new situation and preparing update data-base • Slope Consolidation • Archaeological excavations • Monitoring	• Consolidation/Local intervention
Long Term (5-10 years)	• Development of Policies and Guidelines Manual for Disaster Response of the CH building	• Monitoring	• Regular Maintenance and Monitoring

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2.14 Disaster risk management for the Historic Centre of San Gimignano, Italy

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University of Pisa

1. Introduction

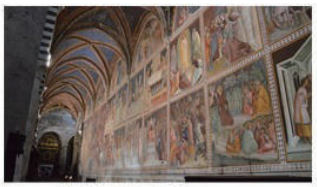
San Gimignano is located in Tuscany, an Italian region known all over the world for its golden grain, vineyards and ancient borgoes. The city sits on a height of land, dominating the surrounding landscape and clearly visible in the distance with its many stone towers. The historic centre retained the feudal atmosphere and appearance, for this reason it was inscribed in the UNESCO World Heritage List in 1990.

The historic town is at high risk from the seismic activity and landslides. Besides, it shows signs of unsustainable congestion due to the increase of touristic flows. The current Municipal Civil Protection Plan includes the operational procedures for the emergency management and the protection of population. Nonetheless, the plan doesn't consider the impact of disasters on the historic centre, with its specific vulnerabilities and exposure.

According to the Italian legal framework for protection, San Gimignano is under a conservation order and interventions are subject to prior authorisation of the Regional Administration or the Office for Cultural Heritage (D.lgs. 42/2004, Codice di beni culturali e del paesaggio). The Municipality has added several rules to regulate and control any transformations in the historical centre, notably concerning tourism, trade, posting of advertisements, traffic, noise, use of public ground. Nevertheless, recent events highlight the necessity of further insights on urban resilience and disaster mitigation in order to prevent the loss of cultural heritage.

2. Site analysis: values and attributes

The Historic Centre of San Gimignano is part of the UNESCO World Heritage List under criteria (ii), (iii) and (iv), as summarized in Fig. 1. The core zone of the site corresponds to the outer ring of historic walls, while no buffer zone has been defined.



Criterion (i):
to represent a masterpiece of human creative genius

Criterion (iii):
to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared

Criterion (iv):
to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates significant stage(s) in human history

Fig.1 Outstanding Universal Values (OUV)

The foundation of the city dates back to ancient times, while the settlement fully developed until the 13th century. During the Middle Ages it provided an important relay point for pilgrims travelling to or from Rome on the Via Francigena. The town and the urban structure grew with an intricate layout around two principal squares: the triangular Piazza della Cisterna and the Piazza Duomo, containing the

majority of public and private monuments, as well as the main church. Two architectural constructions are commonly considered as the symbol of San Gimignano: the towers and the defensive walls, both providing authenticity and integrity to the town. In medieval times the tower was the higher symbol of power: only the richest families of merchants and moneylenders could afford the works of construction. From the end of the twelfth century, towers were lowered and sided by other buildings of lower height. Despite the century-old transformations, the centre has retained its integrity and the remaining 14 towers still witness a past when families had power over public institutions. The perimeter of the historical town is defined by two concentric rings of defensive walls. The inner ring was constructed in the late 10th century and in the 13th century it was reinforced with the construction of the outer walls.

The main attributes of the historic centre are: towers, squares, churches, historical walls and gates, Rocca di Montestaffoli, via Francigena, monuments and listed buildings (Fig. 2). According to the Nara document on Authenticity, attributes can be evaluated by scoring the "dimensions" and "aspects" of cultural heritage (Van Balen, 2008), taking into account the intangible assets, such as social practices, rituals or public festivals. The results are presented in Fig. 3; the evaluation of the attributes of cultural heritage represents a valid tool to prioritize the objectives of the analysis, addressing the risk assessment and management. In fact, the scenario area has been selected on the basis of the attributes ranking, by focusing on the area with the most important church in San Gimignano, the Collegiata or Carhedral, with the nearby squares and the Rocca di Montestaffoli.

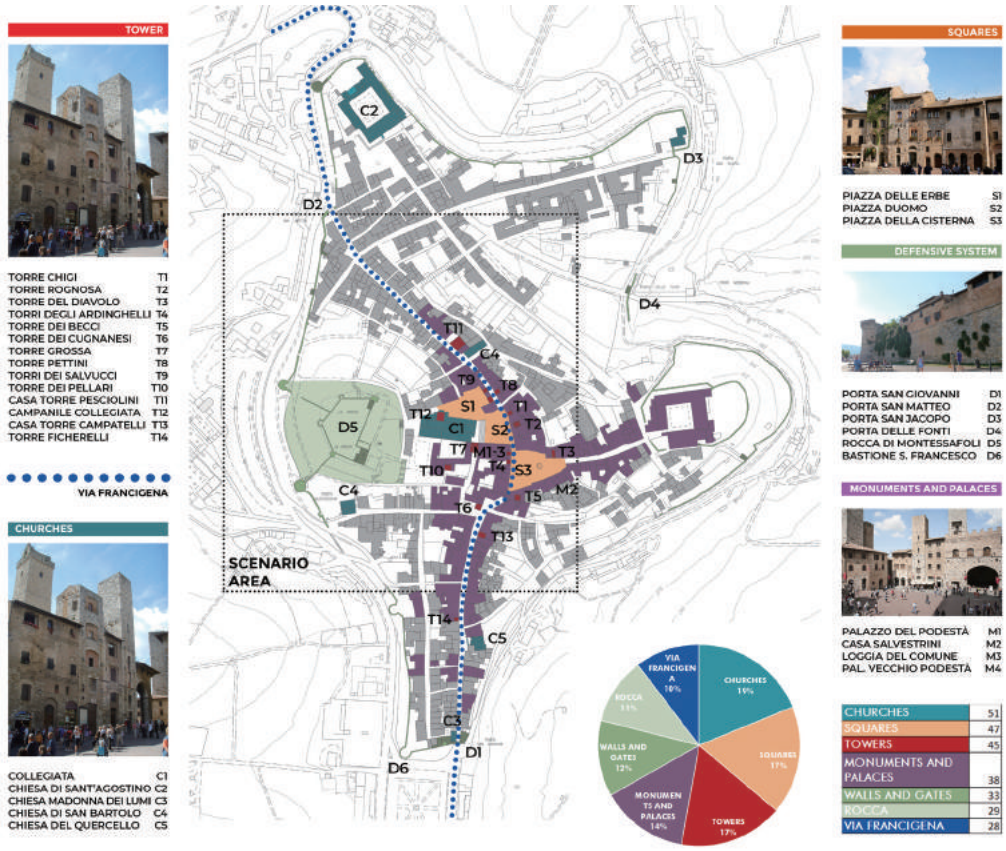


Fig.2 Identification and location of the cultural heritage attributes. On the bottom left, value assessment and ranking of the basis of the Nara grid

3. Disaster Risk assessment

3.1. Hazards and threats

The main objectives of the risk assessment are to:

- Preserve cultural heritage for future generations;
- Minimize the impact of catastrophic events;
- Include cultural heritage into existing DRM plans;
- Raise awareness between local groups through campaigns and capacity building initiatives;
- Update and implement documentation regarding the historical built environment.

Nowadays, the town is vulnerable to disasters and prone to several hazards. Besides, the effects of increasing tourism and the related pressure on modifications to the traditional use of buildings pose relevant conservation and safety issues.

Since the town is built on a limestone rocks and sandy substratum, the main geological problem concerns landslides. In 2018, a 20-metre section along the Eastern side of the historic walls abruptly collapsed due to landslides and steady rains, with water undermining the solidity of masonry (Fig. 3, letter A). The same causes brought to the partial collapse of the terrace under the Rocca (Fig. 3, letter B). At the moment, after more than 6 months, the temporary stabilisation structures built in April are still on-site and no intervention has been made to the damaged areas.

San Gimignano is located in a seismic-prone area classified as zone 3, characterized by a maximum PGA of 0.15g. Between the 1804 and the 1998, 20 earthquakes are registered in the area and a VII-degree earthquake (MCS scale) VII-degree earthquake occurred on September 1869. The local amplification map (fig. 3) identifies areas that are prone to local seismic amplification and instability. Therefore, landslides may be triggered by earthquakes, causing a chain of events that can be disastrous for the cultural heritage and the city. Besides, fire is another hazard that can follow earthquakes and spread because of burning candles, ruptured gas lines and arcing electrical wires. Many of the traditional vernacular buildings in San Gimignano present wooden elements such as roofs, vaults, floors, decorations.

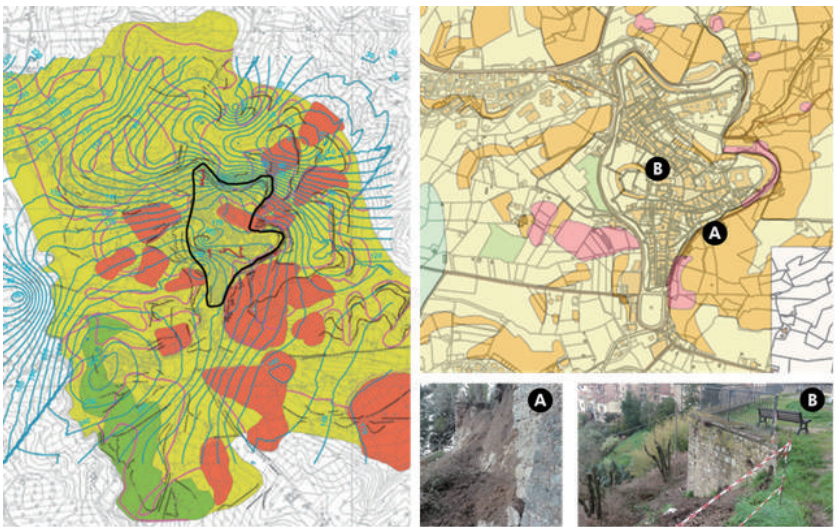


Fig.3 On the left, local site effects of earthquakes: in yellow are the stable areas prone to surface-wave amplification; in red are the unstable areas liable to landslide and local amplification. On the right, Geomorphological hazard: green are the low-hazard areas, while red ones present high-hazard.

3.2. Vulnerabilities and impacts

The vulnerabilities and impacts of the historic centre are summarised in Fig. 4, in which the blue boxes are directly related to the attributes located into the scenario area.

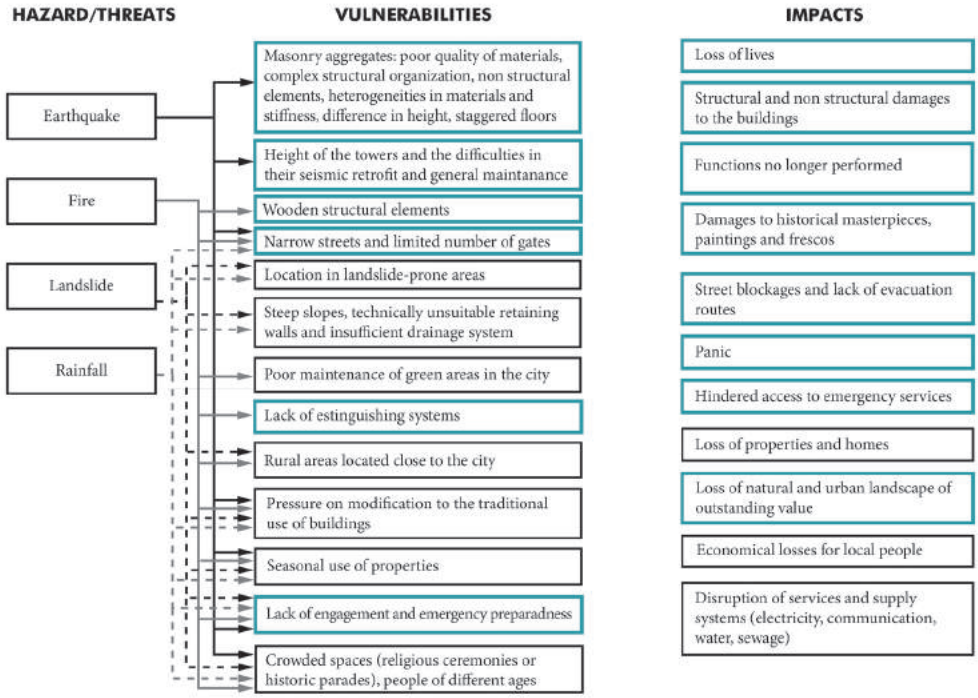


Fig.4 Vulnerabilities associated to hazards and impacts on the built environment. In blue, the boxes related to the main attribute (churches) as resulted in section 2.

4. Disaster risk management

4.1. Risk scenario

The disaster scenario assumes earthquake as primary hazard, while secondary hazards are landslide and fire. The scenario area is selected on the basis of the value assessment, as highlighted in section 2. An earthquake of 6-7 intensity (PGA=0.15g) strikes the historic centre during celebration of the "Ferie Messium", a medieval festival organized in June. During the historical parade, the narrow streets are crowded and host stalls. The main squares, Piazza del Duomo and Piazza delle Erbe, and the Cathedral's wide staircase are occupied by people, looking for a place to sit.

The earthquake activates several landslides on the hill. Due to differences in the local amplification of the earthquake, the most affected area is the eastern. Nonetheless, landslides occur next to the Rocca of Montestaffoli where the slopes are unstable since April 2018. Here, the situation constitutes a further vulnerability because some streets are still blocked by the temporary scaffoldings for the cracked walls.

The earthquake affects historical buildings: churches and towers are damaged, and the failure of masonry walls causes the fall of hazardous brick debris. The frescoes in the Cathedral and the collections are heavily damaged. People are in panic and have difficulties in evacuation. In the meantime, fires spreads in the shops located in the first and basement floors of the buildings and in the streets where several electrical generators are used for the parade. Even though firefighters are onsite, the staff is not sufficient to manage the disaster and backup needs 25 minutes to arrive from the nearest Fire Station.

4.2. Emergency preparedness and mitigation measures

The risk mitigation measures are classified in three groups: strategical and institutional, technical, management and planning. The measures for the preparedness and reduction of risk are listed in table 1, which links each measure with the institutional level, the affected hazard, the main stakeholders, and the economic cost.

Table 1 Emergency preparedness and mitigation measures

	Measure	Level	Hazard	Stakeholder	Cost
Strategical/ institutional	Include cultural heritage into the DRM plan	Site/ Municipality	Earthquake, Landslide, Fire	Local and regional government, Civil Protection, Soprintendenza	Medium
	Establish, organize and train rescue committees for cultural heritage and sensitive groups (elders, tourists, children, ⋯)	Site/ Municipality/ Building	Earthquake, Landslide, Fire	Civil Protection, Fire and police department, Local government, Communities	Low
	Public campaigns to raise awareness about cultural heritage, risks, existing incentives for private properties	Region/ Municipality	Earthquake, Landslide, Fire	ICCROM, National government, Civil Protection, Soprintendenza	Medium
	Capacity building with key stakeholders (parishes, museum staff, tourist guides)	Municipality	Earthquake, Landslide, Fire	ICCROM, Civil Protection, ICOMOS, UNESCO, Interest groups, Communities	Low
	Guarantee annual inspections of cultural heritage properties in order to collect information, documentation, data	National/ Region/ Municipality	Earthquake, Landslide, Fire	Local government, communities	Low
	Private-public partnership and fundraising campaigns for ordinary and extra-ordinary activities	Region/ Municipality	Earthquake, Landslide, Fire	Local and national government, Civil Protection, Interest groups, ICCROM, UNESCO	Low
	Engage communities for the drafting and adoption of special regulations for public celebrations	Municipality	Earthquake, Fire	Local government, Soprintendenza, Interest groups, Communities	Low
Technical	Retrofiting and reinforcement of towers, churches and palaces	Building aggregate/ Buildings	Earthquake	Parishes, Owners, Local government, Professionals, Museum boards, Research, Soprintendenza, Insurance	High
	Improve the safety of non structural elements (chimneys, decorations, lamps, ⋯)	Building	Earthquake, Fire	Owners, Local government, Soprintendenza, Insurance	Medium
	Improvement of fire protection measures in the historic centre	Municipality	Fire	Fire department, Local government, Soprintendenza, Research	High
	Improvement of the drainage system and reinforcement of the retaining walls	Municipality	Landslide	Professionals, Local government	Medium
Management/planning	Regular maintenance of buildings, routes and equipment	Municipality/ Building	Earthquake, Landslide, Fire	Local government, Owners, Communities, Interest groups, Insurance	Medium
	Provide emergency kits and identify storage areas for the equipment	Municipality/	Earthquake, Landslide, Fire	Local Government, Fire and police departments, Communities	Low
	Monitoring of buildings and retaining walls	Municipality	Earthquake, Landslide	Local government, Research, Professionals, Soprintendenza, Professionals	Medium
	Identification of evacuation shelters and storage areas for CH	Municipality	Earthquake,	Local government, Civil Protection, Communities	Low
	Implement the early warning system	Municipality	Landslide, Fire	Local government, Civil Protection, Communities	Medium
	Regular inspections to verify the compliance with fire safety standards of commercial activities (smoke detectors, fire extinguisher, evacuation route, materials)	Buildings	Fire	Local government, Civil Protection, Communities, Interest groups, Insurance	Medium

4.3. Response and evacuation plan

The risk mitigation measures are classified in three groups: strategical and institutional, technical, management and planning. The measures for the preparedness and reduction of risk are listed in table 1, which links each measure with the institutional level, the affected hazard, the main stakeholders, and the economic cost.

4.4. Recovery plan

The recovery plan entails four time-related steps as shown in Fig 5. Given the predictable aftershocks and the difficulties in predicting the occurrence of earthquakes, the first phase considers the immediate actions to rescue people and salvage cultural heritage. Cultural heritage professionals can reach storage areas after the intervention of Civil Protection, which is in charge of rescuing people and ensure safety inside the red zone. In case of minor damages, restoration works can ensure the use of buildings in short term, otherwise it is necessary to mobilize greater resources and develop a long-term reconstruction plan.

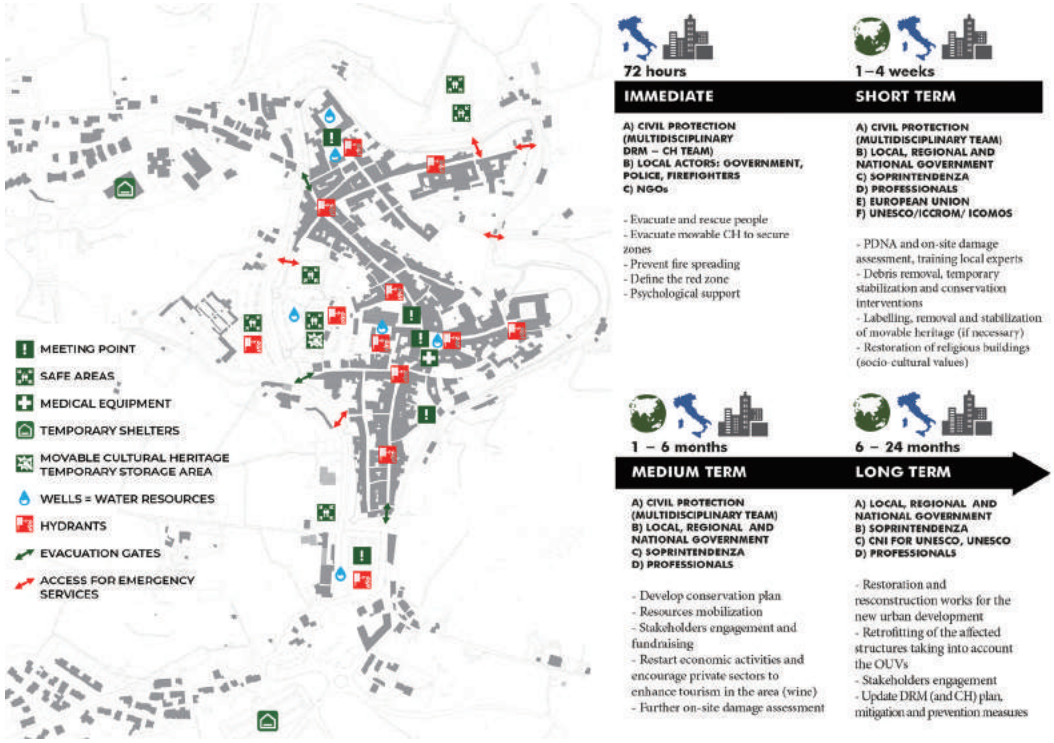


Fig. 5 On the right, emergency plan of the historic centre; on the left, recovery plan with the identification of the stakeholders involved in each phase.

5. Conclusion

The Italian Civil Protection system is quite effective in the emergency management, but has major weaknesses are in prevention and recovery, particularly of cultural heritage. One of the main achievements of the DRM plan is the engagement of communities in the system, not only educating about risks but also building on existing capacities, involving actors in the process. The Municipality should foster the participation of citizens to create a resilience-oriented workforce able to adapt successfully to ongoing challenges.

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3 Activities Undertaken after the International Training Course by Former Participants

3.1 The Lessons from Response and Recovery Process of Mexico Earthquakes

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1. Introduction

The following document is based on the lessons learnt one year after the 2017 Mexico earthquakes. It is an opportunity to realize the main issues to address the national risk management plan for cultural heritage.

This revision has been done from the viewpoint of the conservators of decorative finishes that work for the National Agency for Cultural Heritage in Mexico called Instituto Nacional de Antropología e Historia (INAH), the national agency main responsible for the cultural heritage safeguarding. The conservators of decorative finishes worked along with other personnel from INAH such as architects, archaeologists, anthropologists, and several others, so this revision only includes the perspective of a group of professionals.

The ideas gathered in this document come from the interview with several INAH and private conservators involved in different tasks during the year following the earthquakes. After these interviews were done, other forums have been organized to talk about the lessons from the earthquakes; however, this document summarizes the main ideas until September 2018.

On September 7th, 2017, an earthquake struck the southern part of Mexico; 12 days later another earthquake struck central part of the country. Apart from the important human and infrastructure damages, the immovable and movable heritage was also damaged. Several historic temples lost domes and vaults, while its sculptures, bells, altars, among others were badly damaged.

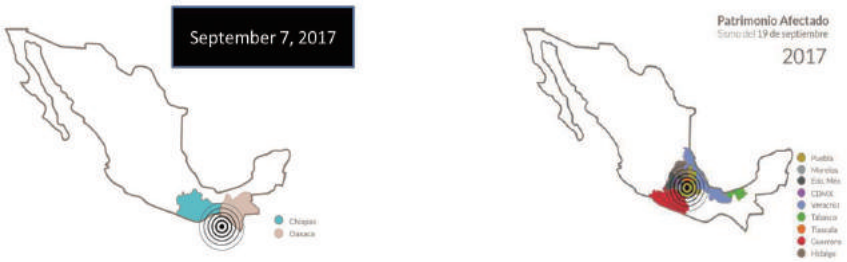

Fig. 1a and 1b Afected area of Mexico earthquakes, 2017. Source: CNCPC-INAH.

Several facts should be taken into consideration when talking about earthquakes and cultural heritage in Mexico. This country has a big population, around 1 hundred 23 million people that is concentrate in the central and southern part of the country. A big percentage of the people are catholic,82.7%, which means that there are many religious structures, most of them historic buildings, and quite an enormous amount of immovable and movable heritage contained inside them, as well as local traditional practices linked to the religion. The current census shows there are more than 110 thousand historic religious structures, an unknown number of movable heritage like sculptures, paintings, books, and so on, as well as an uncalculated number of local traditional practices, nine of which are currently on the list of intangible

Fig. 2 Temple of Santiago Apostol, Chila de la Sal, Mexico. 2017. Source: Archive CNCPC-INAH

Fig. 3 Inside of Temple of Santiago Tepontla, Cholula, Mexico. 2017. Source: Archive CNCPC-INAH

World Heritage.

No matter how many people are catholic, the traditional practices are more than a religious issue; they support the social structure, they ensure the moral and social behavior, and they show the economic status of the people inside and outside each community.

Fig. 4 Traditional practice: procession of Holy Image Virgin Mary at the Sanctuary of Los Remedios, Cholula, Mexico. Source: Archive CNCPC-INAH

On the other hand, Mexico is also prone to natural disasters, among which earthquakes is the most significant hazard as the highest seismic zone is located in the central and southern part of the country. The earthquakes from 2017 took place on this highly populated area of Mexico, strongly striking the historic religious buildings, the immovable and movable heritage they contain and interrupting the traditional practices; therefore the earthquakes deeply disrupted the social structure of the Mexican society.

However, this story goes back many years before, as there have been quite a number of earthquakes in Mexico. One of the most sadly remembered earthquakes took place 32 years ago in 1985. According to unofficial records, around 20 thousand people died. During the following two days the affected cities were in chaos. Therefore, the society finally organized and carried out emergency actions. As a consequence, the government designed a risk prevention strategy for the people, a Civil Protection Plan. This plan has been successful as human safety has improved and become part of our culture. Not the same has happened with prevention for cultural heritage.

During the earthquake of 1985 several historic buildings and collections were also damaged. The same happened in other events that took place before and after in 1973 and 1999, when there was a huge damage to cultural heritage in the same region, where these earthquakes struck in 2017. Those previous experiences raised a big concern for the protection of the cultural heritage. In 2002 INAH established an office called PREVINAH, in charge of preventing damage to cultural heritage by natural disasters and for doing the evaluation of the damage for recovery. This office invited and promoted the creation of working teams for sharing experiences and strengthening collaboration between different professionals: archaeologists, site managers, anthropologists, architects, conservators, etc. Collaboration was also promoted so that the agencies that elaborate risk maps could share their information with the cultural heritage sector. A whole set of documents like protocols, manuals, flyers and so on were elaborated.

An important experience was gained during those events by a big range of professionals including architects, archaeologists, anthropologists, engineers and conservators. Helping missions to neighbor countries also took place, as happened on 1976 for the response and recovery of the damaged heritage due to the earthquake at Guatemala. However, that experience was not disseminated among all of the personnel of INAH. No matter how many protocols, risk maps, etc. had been elaborated, before the earthquake of 2017, just few sites, projects, and personnel were familiar with these tools and no response groups had been created. The efforts for prevention were solely focused on civil protection.

Fig. 5 and 6 Damaged cultural heritage during the Mexico earthquake 1973.

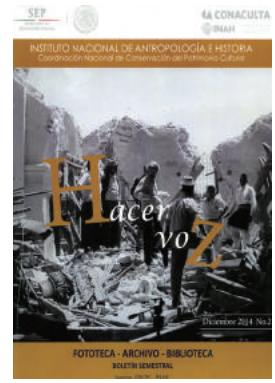

Fig. 7 Mexican helping mission during Guatemala earthquake 1976. Source: Archive CNCPC-INAH

SSo, 32 years later the two earthquakes that struck the center and the southern part of Mexico damaged 2367 immovable heritage, including 2041 historic buildings, 21 archaeological sites, and 7333 movable heritage (Foro Anual CNCPC, 2018). This has been the biggest damage to cultural heritage ever recorded in the Mexican history and therefore the response required all possible help.

The national agency for cultural heritage therefore had to organize a strategy; under the general director ´s guidance three new committees were immediately created: the emergency committee that is in charge of the emergency actions, the earthquakes office which takes care of the whole response and recovery strategy, and the technical and scientific committee that provides advice over specific treatment decisions at affected heritage situations. A workflow was designed: Emergency actions, Census, Funding, Communication & Dissemination, and Recovery & Conservation.

2. Emergency Actions

Immediately after the earthquakes, the emergency (first aid) actions started: although the structural stabilization of the buildings should have been the first task, salvage and evacuation of the movable heritage was carried out, mainly by the local communities. This heritage has such a high value for the people that they did not mind risking their lives in order to save their holy objects.

First, they relocated them just outside the temples and afterwards the objects were transferred for safeguarding to the community's honorable people ´s houses, after listing and recording. The people that received the objects in their homes (sculptures and so on) felt proud and provided their best, although humble, spaces for their safety. However, regardless of good will, not always the storage areas were the best ones, and some were even at risk of looting.

Meanwhile the national agency for cultural heritage could not accompany or help the local community

during these emergency actions as there were so many places to go and not enough personnel. Many volunteers, professionals and students offered to help but unfortunately they had to be rejected as they had no received previous training and the emergency plan was not clear. Therefore, during the following days INAH personnel focused on taking care of the emergency actions for the more recognized immovable and movable heritage, or where the damage had been so severe that special attention was required. Little by little, the national agency started to attend the rest of the damaged heritage and insisted on one workflow where first structural stabilization was done to the temples and then salvage for the movable heritage took place, including moving the objects to a safe storage, protecting immovable and movable heritage from rain and weathering, and removing damaged heritage from the debris.

The religious structures were closed waiting for a structural evaluation and therefore preventing any further collapse that could hurt anybody. Temporary structural supports were installed between architects, engineers and the local people. Sadly, the closing of religious structures temporarily interrupted the local traditional practices. Therefore, people became depressed about the situation. However, this made the communities resilient and many decided to continue with their traditional practices outside the church, which finally highlighted the importance of the intangible heritage for a community.

Fig. 8 and 9 First aid carried by local people at the Temple of Totolapan, Morelos. Source: https://www.youtube.com/watch?v=8-OOfhalHd8&app=desktop. September 2017

Fig. 10 Temporary storage at a private house of San Pedro Cholula. September 2017.Source: Archive CNCPC-INAH

Fig. 11a and 11b At Ocuilan town, during this year festivities more people attended than on previous years, supporting their damaged community. People said that no matter the disaster, their image of Holy Mary was happier than ever before. Ocuilan 2018. Source: Cristina Noguera, CNCPC-INAH.

The emergency was also misused or misunderstood for economic and political reasons. Just one day after the earthquake had taken place, demolishing of traditional buildings with earthen materials got started by the local governments (obviously without informing INAH). In some cases the demolishing took place in

areas where for long time there has been interest in mining or installing wind energy stations. So it seemed to be a good chance to relocate the people and use the place, although they were not willing to leave. In other cases the local government tried to improve the quality of the houses with new construction materials like cement without noticing that the traditional constructions are much better designed for the sites. Therefore, UNESCO, ICOMOS, and well-known artists from Mexico had to stand up and recommended those demolitions and reconstructions to stop.

3. Census

The next action undertaken was a census, which was later collated into a database. The concepts taken into consideration were:

• Catalogue, to know which was the exposed heritage,

• Mapping, to know where that heritage could be, and

• Evaluation, to know to what extent it had been damaged, as well as the cost and time required for its recovery.

To know what cultural heritage could have been exposed to damage during the earthquakes it was necessary to look for the already existing catalogs. Cataloging has been a priority for INAH since its creation; however, this is not an easy task, no matter the big effort done until now. Catalogs for immovable heritage contain more than 110,000, one hundred ten thousand, files for historic buildings, many of them religious temples, while for movable heritage the number is not known, but that can be over one million objects. Meanwhile, the traditional practices linked to the religious temples can also be estimated over one hundred thousand.

While the catalog for immovable heritage has a medium advance, the one for movable heritage is far behind due to its complexity and extension. Before the earthquakes, only 40% of the catalogue for built heritage had been included in a digitalized format and open to public consultation, while the rest of the information was obsolete and not updated into written charts.

The movable heritage was in a worse situation and the same with the intangible heritage.

The existing catalogs for movable heritage not only are quite few compared to the number of movable heritage but do not follow the same criteria, do not prioritize according to the significance and relevance of the objects, and are not updated. Tools for improving the creation of the catalogs have been developed, like a thesaurus to organize the terms used for cataloging, but just few people use them.

The next issue was to know where the heritage could be located and where we could expect to find the higher number of damaged heritage. During recent years a big effort has taken place to link the information about cultural heritage to the national GIS maps, both for location and risks. However, it was obvious that still today the information launched on the maps is scarce and only takes into consideration the more important cultural heritage sites. Regional risks maps for cultural heritage have not been done and therefore the location of areas expected to have been severely damaged relied on INAH ´s personnel knowledge and the information provided by the society. The available information was not only far from complete and detailed but also not accessible as fast as required.

Taking that into consideration, during the census it was difficult to have the specific information about what immovable and movable heritage we were looking for, and where it was supposed to be. Therefore, it was quite difficult to know where to start from, where to go first and to optimize human and

material resources accordingly.

The evaluation to know the extent of damaged cultural heritage, conservation and restoration costs and recovery time was carried out by about 400 professionals, among them architects, archaeologists, engineers, conservators, and anthropologists without any previous training. The task was not easy: the lack of training had to be overcome fast. People from the communities were not convinced about sharing the information and showing their damaged heritage to INAH ´s personnel. A previous link and communication had not been strongly built, so people felt they had been left alone during the emergency and first moments after the earthquakes. They feared for any looting and were not willing to see their damaged religious buildings on the social media as there was no moral code of conduct that could ensure respect for the somber moment when people were mourning death of their beloved ones. Moreover, people from the local communities lacked information about why it was necessary to carry out several revisions, by different professionals, and therefore could not heed to their request for immediate recovery. The accurate job done by the professionals of INAH during this emergency stage finally gained trust from the people who showed the movable heritage they had stored and were willing to follow the conservation recommendations.

The first and fast evaluation was carried out on formats that helped to make sure that standardized information was collected. It include a visit report (what had been done during the visiting of the religious building and give a copy to the local community), ID of the movable heritage, condition assessment and recommended treatment, as well as current storage conditions at private houses. A general classification for low, medium and severe damage was not enough for later condition assessment and decision making, due to the lack of previous training for filling up the formats in a standardized way.

Collation of the gathered information was done through an excel database meant to function not only for concentrating the information, but also as a tool for prioritizing and monitoring the status of all damaged buildings and movable objects. This database has served as a means for bonding between different actors involved, and has helped to gain a quick assessment to identify the most affected regions, as well as to identify the immovable and movable heritage which is more prone to damage in a future earthquake. Therefore this information is an important starting point for future plan mitigation actions. Sculptures and bells have been the more damaged movable heritage.

The database can be improved to serve better. The prioritizing process done through the database does not take into consideration the value and vulnerability of the object in a systematic way. Therefore currently the final process for prioritizing is done locally and subjectively, not under a general scope. It does not provide information about the budget and time required for the recovery of the damaged heritage as would have been desirable for better planning. Moreover, it does not keep track of the entire movable heritage taken to the private houses and does not include traditional construction that was damaged, and intangible heritage as traditional practices were also interrupted or linked natural heritage suffered damage.

As the database took too long (10 months) to be properly launched, other databases were used locally for collecting the information. Therefore they don ´t necessarily share the same data between them, result in scattered or lost information.

In spite of the difficulties, the census provided essential information that the National Agency had been wishing to gather for long time, both for immovable and movable heritage.

4. Funding

The economic resources for response and recovery are meant to come from a federal government fund for natural disasters (FONDEN), hired bank insurance, as well as from private donors, both national and international. This bank insurance was hired after the big earthquake of 1985 after noticing that cultural heritage could also be severely damaged by natural disasters. Previous disasters have been able to fulfill up to recovery with such funding but, for the 2017 earthquakes, every expected amount of resource will not be enough, due to the magnitude of the damaged heritage.

Recovery and conservation of slight or medium damaged buildings was funded by the national private donors, and international funding. Some local communities decided to gather together and raise the required funding for the restoration of their religious buildings, which helped in bonding the community members. Nevertheless, the really expensive recovery treatments will have to be funded by the government ´s fund, FONDEN, and the bank insurance.

However insurance requires that that in short time, you have to evaluate the damage, provide a written conservation proposal, recovery budget, and time required for the recovery treatment. However, the claim will only be accepted if it is possible to prove that the earthquake caused the damage. The insurances have a clear and organized procedure aimed to minimize corruption though it takes a long term process to receive the money for recovery, and one year later we are still waiting for it. But most of all, it requires the culture heritage personnel to become familiar with how to deal with insurances, how to negotiate, which information must be highlighted and which private conservation companies need to be considered for reasonable budgets for the future treatments. Therefore, proper training on the procedure of filling up insurance formats, to calculate costs, presenting convincing files showing the damage due to the earthquakes (and not due to lack of maintenance) was also missing.

Unfortunately, during this process we also noted that sometimes politicians used public money for supporting the recovery process, made a lot of propaganda and finally promoted themselves among the community, for their own personal benefit. Unlucky situations also have taken place where resources have served to exclude the recovery requirements of groups that belong to different religions than the majority.

5. Communication & Dissemination

Right after the earthquakes took place, it became evident that communication and dissemination were fundamental activities.

Communication was necessary to link the national agency for cultural heritage with other agencies in the country concerned with disaster response and recovery, as the information from both would be shared and provide guidance on the national priorities as well as indicate which were the areas of the country, where more damaged heritage were expected. That is not to mention that that main issue was that previous linking and communication with the national agencies in charge of civil protection under disasters has been missing.

Communication between the national agency for culture heritage and society was also necessary to gather the first information about the damaged heritage. An email account was launched so that people could send their report. This was an efficient tool for cities and larger towns, however, not for some

remote areas of the country, sometimes the most damaged ones, which lack internet connections and even people that can read, write or use internet.

But inside INAH communication was also missing. As the permanent program for the prevention of Disasters on Cultural Heritage, PREVINAH, has not been extensively disseminated among its personnel, professionals did not know what activities they were expected to do during the emergency response. Therefore, during the emergency actions, communication between different areas of specialization was missing as every professional group wished to say how things should be done; architects focused mainly on the buildings, conservators on the objects, anthropologists on the traditional practices, etc. Consequently, efforts and resources were not optimized and response was not as fast as should have been.

For dissemination, diverse materials were prepared: posters, flyers, which included information about who is the National Agency for Cultural Heritage, how to contact it, which are the emergency actions, guides that provided clear and useful information about what to do, how to get the funding, how to propose a conservation project. Unfortunately, this information was not always available to all the people involved, especially not available for people from far away regions.

Dissemination was done also through texts and images posted on social media that can help to keep the memory of what was happening for future times; including the people testimony. Unfortunately this information was mainly followed by the same group of people and not by the whole society. As well, images and short messages were posted on social media telling what the national agency was doing about response and recovery. The purpose of this posted information was to back up the criticism towards INAH for not doing enough and to make clear the work was done by the professionals, not by the politicians. It was the professionals working at the national agency who tried to tell the society about the big effort done, though not enough to attend everything.

Fig. 12 Poster by INAH encouraging people not to demolish the cultural heritage, but instead conserving and restoring. Source: CNCPC-INAH.

Fig. 13 Poster by INAH asking the society to help locate the damaged heritage. Source: CNCPC-INAH.

6. Recovery & Conservation

Currently we are in the recovery stage; 293 historic religious buildings have already been restored while several sculptures, paintings, bells, murals and altar pieces are being treated for its conservation. However, we have noticed that the budget spent up to now has mainly been designated for the immovable

heritage. This is not only due to the fact that historic buildings need to be structurally stable in order to be safe. It is also because the census for prioritizing was mainly done by the architects, who did not take into consideration the census of movable heritage. Is it right to set this priority? Some movable heritage, like sculptures, have played an important role in helping the people from the communities stand up together as well as carrying out traditional practices to survive through the disaster. Would it not be important to consider them as priority as well?

Fig. 14 Restoration of damaged paintings from the Temple of Ocuilan, Estado de Mexico. Source: CNCPC-INAH.

Current and potential actors have been invited to participate and build links for future collaboration. Politicians, professionals, and companies have attended meetings to make agreements that promote the recovery of the damaged cultural heritage. Local tourism has also been promoted by radio and TV spots in order to help the economic situation of the damaged sites to become better.

Several talks are taking place to explain the local communities what is been done, as well as training workshops for architects and masonry men to teach them about traditional construction techniques and best practices for conservation. Academic forums are being organized so that professionals and society can share their experiences and information. Hopefully the conclusions of these meetings between professionals will be taken into consideration by the decision makers.

Meanwhile, the national agency for cultural heritage is now much more sensitive to disaster management planning and several discussion forums have been taking place. Disaster management has become one of INAH ´s priorities.

Nevertheless, there is some concern on how will things work when the money from the insurances gets released and conservation treatment starts taking place. Private companies will be asked to carry out the treatments on both immovable and movable heritage while the national agency for cultural heritage will be in charge of authorizing the conservation projects and monitoring them in accordance with the international criteria. Will there be enough personnel to monitor all of conservation projects undertaken by the private companies? Will the same criteria be used for every treatment? Will the money be optimized so that it is enough for undertaking all interventions? There is also concern about ensuring that movable heritage will get back to its place and the traditional practices be preserved as well. The strategy for this mid and long term recovery needs to be disseminated.

7. Final Considerations

From all this discussion, I can conclude that the lessons from the 2017 earthquakes in Mexico are the following:

• The national agency for cultural heritage, INAH, has undertaken enormous efforts for the response and recovery of the earthquakes which has been supported by the commitment of many professionals that work for this institution and lots of local people and professional volunteers that were willing to help. Thus, the lessons needs to be evaluated along with the rest of the professionals that work for INAH, while

strong linking and communication between all of the personnel will help for designing good risk management plans.

• While "Mexican Civil Protection Office" has been successful in implementing strategies for the safeguarding of the people before, during and after disasters, through a networking process along with several other agencies and universities, PREVINAH, the national plan for preventing disasters for cultural heritage, has not succeeded in the same way. Therefore, it is important that INAH strengthens the bonds and communication with those national agencies committed to the risk management in order to learn and collaborate with them.

• We have realized that response and recovery process require additional help, knowledge and good will, which goes beyond the capacity of the national agencies or professionals. The collaboration of society through the local communities has been absolutely necessary. This communication should not be forgotten but maintained and encouraged through time and completed with proper training. Such training has been missing not only for the society but as well for all of the professionals. Therefore, communication and training have to be integrated into INAH working strategies and towards the society.

• The census has collected and updated an enormous amount of information that provides a better understanding of our cultural heritage and its current condition. Nonetheless complete catalogs of movable, immovable and intangible heritage are not yet complete and collated in a systematic way. An immediate priority should be to complete the cultural heritage catalogs of this country.

• Mapping of the cultural heritage should as well be completed and updated; and there is an important need to develop risk maps at regional and local levels. Let us make risk maps a common tool for every conservation project.

• The database that has collated the evaluation information should undergo a revision for improving its design according to the current experience, but most of all, it needs to be disseminated among INAH personnel along with rest of the tools and documents for disaster management.

• This has been a great opportunity to learn the lesson from a recent disaster; nonetheless it is important to add this experience to the previous ones, so let us make a historic revision of the disasters that have taken place.

• We have also learned that no insurance money will be enough for a disaster such as the earthquakes of 2017. Therefore, preventing and reducing the damage through constant maintenance should be the priority, while also setting up criteria for prioritizing heritage that should be more or less extensively treated as this will help in optimizing the available economic resources.

• But most of all, we have learned that taking care of cultural heritage should be a shared responsibility with all stakeholders, and not only a duty for INAH.

• As everything else, communication and dissemination should be planned and implemented before the disaster for better results.

• During the ongoing recovery process it is important to prepare and disseminate one single plan, with clear guidelines, known by everyone, so that we can all add our personal effort to this important task.

Finally, I would like to thank all of my colleagues who shared their experience and opinions with me.

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Appendix

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Photos of ITC 2018


Risk Assessment Exercise in Ponto-cho, Kyoto


Disaster Imagenation Game for Ponto-cho, Kyoto


A Damage Assessment Exercise in Ponto-cho, Kyoto


A Salvage Exercise


A Lecture by the Cultural Heritage DRM Expert


A Site Visit for learning the Firefighting Facilities at Ninna-ji


High Winds Simulation Room for learning from the Kyoto City DP Center


A Site Visit of Kiyomizu-dera WHS

Learning for the Susatiable Conservation System in Kiyomizu-dera WHS

On Site Lecture at Sayo Town Hall

Learning for the Recovery Process from Flood in Hirafuku

A Site Visit of Takeda Catsle Ruins

A Role Playing Workshop for Recovery Process Design

Final Presentation of Case Study Projects and Discussion

A Farewell and the Certificate Ceremony

A Group Photo of International Symposium

The site visiting for learning the lessons of the recovery from Hirafuku flood in 2009

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ICCROM

ICOM international council of museums

ICOMOS

ICORP