Proceedings of
UNESCO Chair Programme on
Cultural Heritage and Risk Management

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

2019, 14th year
From 9th September to 30th September 2019
At Kyoto and Hyogo, Japan

Organized by Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH), Kyoto, Japan
In Cooperation with UNESCO,
ICCROM and its regional office in Sharjah, ICOM, ICOMOS / ICORP
Financially supported by
(FY2019) Official Development Assistance for UNESCO Activities, the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan
Sponsored by NOHMI BOSAI LTD.

Hirafuku : the historical settlement which recovered from the post flood by Typhoon No.9, 2009

DM UCH
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University

Proceedings of
UNESCO Chair Programme on
Cultural Heritage and Risk Management

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

2019, 14th year
From 9th September to 30th September 2019
At Kyoto and Hyogo, Japan

Organized by Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH), Kyoto, Japan
In Cooperation with UNESCO, ICCROM and its regional office in Sharjah, ICOM, ICOMOS / ICORP
Financially supported by (FY2019) Official Development Assistance for UNESCO Activities, the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan
Sponsored by NOHMI BOSAI LTD.

Date of Publication: February 2020

Published by: Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University
58 Komatsubara Kitamachi, Kita-ku, Kyoto 603-8341 Japan

In cooperation with: UNESCO
ICCROM and its regional office in Sharjah
ICOM
ICOMOS / ICORP

Financially supported by (FY 2019) Official Development Assistance for UNESCO Activities, the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan

Sponsored by NOHMI BOSAI LTD.

Authors: Participants of ITC2019 and A Former participant of ITC

Coordinated by: Rohit JIGYASU, UNESCO Chair Holder, ICCROM Project Manager
Dowon KIM, UNESCO Chair Holder, Associate Professor, Ritsumeikan University

Edited by: Rohit JIGYASU, UNESCO Chair Holder, ICCROM Project Manager
Dowon KIM, UNESCO Chair Holder, Associate Professor, Ritsumeikan University
Wesley Webb CHEEK, Researcher (JSPS Post Doctral Fellowship)
Miho HAYASE, Administrative Staff of R-DMUCH
An Administrative Office of R-DMUCH

Layout by: Miho HAYASE, Administrative Staff of R-DMUCH

Printed by: HOKUTO Printing Co., Ltd.
38-2 Shimogamo Takagi-cho, Sakyo-ku, Kyoto Japan

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 and its regional office in Sharjah, ICOM, ICOMOS/ICORP and various national and international organizations. And we are very much fortunate for NICH (the Independent Administrative Institution National Institutes for Cultural Heritage in Japan) has supported us to provide the educational resources and lessons which are the integrated protection systems of movable heritage in Japan, by the lectures and visiting the Kyoto National Museum. 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.

ITC 2019 has been sponsored by the Japanese National Commission for UNESCO, and NOHMI BOSAI LTD. as a fire protection system company. I sincerely appreciate to the sponsorship that provides the important opportunity all the participants to learn from the training course.

Through the ITC in 2019 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 listen the news from 2019 participants to develop the international projects which are great initiatives by the former participants.

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

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

Preface

The year 2019 has yet again witnessed dramatic loss of cultural heritage due to disasters around the world. On 26th November, a 6.4 magnitude earthquake damaged historic walls and buildings of the medieval port city of Durres in Albania. Less than a month before this disaster, in the early hours of 31st October, a devastating fire ravaged Shuri Castle of the World Heritage Site of Gusuku sites and related Properties of the Kingdom of Ryukyu at the Island of Okinawa in Japan. Earlier this year, a ferocious blaze on 15th April devastated world famous Notre Dame Cathedral in the heart of Paris, France.

All these unfortunate incidents as well as many others that have previously damaged rich and diverse cultural heritage around the world serve to remind us that we need to act fast to implement sufficient measures to reduce risks to movable and immovable cultural heritage from disasters caused by natural hazards such as earthquakes, the tsunami, floods, typhoons, landslides and forest fires. Besides cultural heritage in various parts of the world have also suffered enormous damages due to human induced hazards like arson, vandalism, terrorism and conflicts, such as in the case of Aleppo and Palmyra in Syria, Mosul in Iraq, Timbuktu Shrines in Mali and Bamiyan Buddhas in Afghanistan. Often disasters and conflicts also affect the intangible cultural heritage consisting 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. Moreover, damages to cultural landscapes and local flora and fauna in general cause loss of valued ecosystem services thereby putting long term sustainability of local communities at risk.

Furthermore, Climate change is increasing the number of disasters and their devastating impacts. From 1988 to 2007, 76 percent of all disaster events were hydro-meteorological in nature. These accounted for 45 percent of the deaths and 79 percent of the economic losses caused by natural hazards.[i] The likelihood of increased weather extremes such as heavy downpours, heat waves, and strong hurricanes and cyclones therefore gives great concern that the number or scale of weather-related disasters will also increase. These hazards are also adversely impacting cultural heritage sites. For example, a cloudburst in Leh, India in August 2010 caused flashfloods due to unprecedented heavy rains which caused destruction of vernacular adobe heritage. Storms in western Europe earlier that year flooded many historic town centers, such as Paris, France; York, United Kingdom; and Lisbon and Porto, Portugal. Undoubtedly, climate change is increasing the number of disasters and their impacts on cultural heritage.

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 and hazards to which it is exposed. 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. Fortunately, cultural heritage has now been explicitly recognized in the Sendai framework for disaster risk reduction adopted in 2015 by United Nations Office of Disaster Risk Reduction (UNDRR), which gives strong leverage to mainstreaming of cultural heritage into national disaster risk management policies.

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, climate change adaptation and preparedness measures, emergency response procedures, and recovery process. However investing in disaster risk reduction through mitigation, adaptation 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

---

i UNISDR, . Links between disaster risk reduction, development and climate change. (Geneva:2008)

of 'Building Back Better', the recovery process should incorporate mitigation of risks for future disasters.

In order to undertake effective measures for disaster risk reduction, there 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 defense organizations such as fire office, police and humanitarian sector at large. Moreover DRM for cultural heritage should be integrated into various development sectors such as sanitation, water supply, housing, environment, infrastructure and services. This would also require capacity building initiatives at various levels.

However, in order to achieve effective results, close engagement with all sections of the local communities including those who are marginalized is crucial as they can effectively assist as volunteers during emergency situations. Local Nongovernmental Organisations (NGOs) can also play very important role in bridging the gap between government and local communities. This would necessitate effective awareness raising programmes to sensitise community members on impending risks to lives and heritage and the significant role communities can play as volunteers in reducing risks as well as responding to disasters. Media can play a crucial role in achieving this.

In response to the above mentioned challenges, the Institute of Disaster Mitigation for Urban Cultural Heritage at Ritsumeikan University, Kyoto, Japan in close technical cooperation with the International Centre from the Study of Preservation and Restoration of Cultural Property (ICCROM), an intergovernmental organization headquartered in Rome, Italy and with additional support from ICOMOS-ICORP, ICOM and Agency for Cultural Affairs of Japan has been spearheading capacity building in the area of disaster risk management of cultural heritage following the recommendations of the UN World Conference on Disaster Reduction in January 2005 as part of the UNESCO Chair Programme on Cultural Heritage and Risk Management; one of the unique programmes on this theme in the world. 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 164 professionals from more than 60 countries have been trained through this annual course that is held in Kyoto and other historic sites in Japan such as Minamisanriku Cho (East Japan), Nara, Himeji, Kobe, Sasayama and Takeda .

The 14th 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. Lectures, classroom exercises and discussions, as well as field visits to various heritage sites in Takeda castle, Hirafuku town and Kobe facilitated the learning process. Moreover the participants prepared outline of the disaster risk management plans for case study sites from their home countries based on the outlines prepared by them during the course The proceeding of the 14th ITC contains papers based on these case study projects.

The importance of this training course has been globally recognized as seen with increasing number of applicants from all over the world. 280 applications from more than 60 countries were received for ITC 2019. The institute hopes to continue this initiative in the future in close cooperation with ICCROM.

Rohit JIGYASU
Project Manager,
International Centre for the Study of the Preservation and Restoration of Cultural Property(ICCROM)

Table of Contents

Preface 3

1. Introduction 9

1.1 Background and Objectives of the 14th International Training Course 2019 10

1.2 Timetable of International Trainig Course (ITC) on Disaster Risk Management of Cultural Heritage 2019, 14th year, Ritsumeikan University 36

2. Outline of Disaster Risk Management Plans for Case Study Projects by ITC 2019 Participants 39

2.1 Proposal for Mitigation and Preparedness Measures, Argentina, by Virginia Fernanda GONZÁLEZ, from Argentina 40

2.2 Tor di Quinto Riverside, Rome, Italy, by Angela Maria MICELI, from Italy 44

2.3 Disaster risk management plan for heritage sites: A proposal for MuNDA, Museo Nazionale D'Abruzzo, L'Aquila, Italy, by Monia DEL PINTO, from Italy 50

2.4 Disaster Risk Management in the National Museum of Egyptian Civilization, Egypt, by Mahrous Eid Moustafa ELSANADIDY, from Egypt 57

2.5 Disaster risk management plan for Los Amantes de Sumpa (The Lovers of Sumpa) archeological site and museum, Ecuador by Enrique RODRIGUEZ LEON, from Ecuador 67

2.6 Disaster Risk Reduction for the Dal Josafat Cultural Landscape, South Africa, by Clinton JACKSON, from South Africa 73

2.7 The Historic Centre of Napoli, Italy, by Roy GIAMPORCARO, from Italy 79

2.8 Integrated DRM plan for People and Cultural Heritage needs for Mole Vanvitelliana in Ancona, Italy, by Alessia STROZZI, from Italy 86

2.9 Wamala Tombs, Uganda, by Samson Lukabya NABBIMBA (OMUTAKA NAKIGOYE), from Uganda 89

2.10 Formulating Disaster Risk Management Plan for Persian Qanats of Baravat, Iran, by Ameneh KARIMIAN, from Iran 94

2.11 DRM Plan for the Buddhist Vihara at Paharpur,Bangladesh, by Shah Zahidur RAHMAN, from Bangladesh 99
2.12 Development of Disaster Risk Management plan for Geological Museum, Armenia, by Lilit GEVORGYAN, from Armenia 104

3. Activities Undertaken after the International Training Course by Former Participants 111

3.1 Implementation of Disaster Risk Management on Cultural Heritage for George Town UNESCO World Heritage Site, Malaysia by Ming Chee ANG, from Malaysia 112

Appendix 123

List of Resource Persons 124
List of Participants 127
Photos of ITC 2019 128

1 Introduction

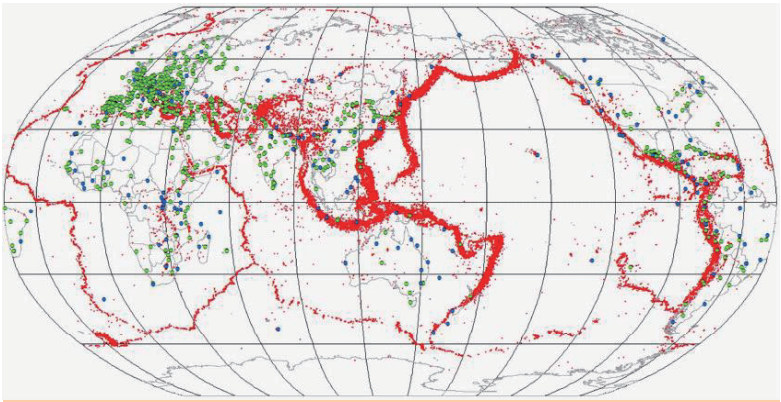
1.1 Background and Objectives of the 14th International Training Course 2019

Disasters and Cultural Heritage

Recent disasters such as fires in the Notre-Dame de Paris in 2019 and National Museum of Brazil in 2018, 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, including historic buildings, archaeological sites, historic cities and cultural landscapes, is highly vulnerable to disasters caused by natural as well as human induced hazards such as earthquake, the Tsunami, fire, floods, cyclones/typhoons, armed conflict, theft, and terrorism. These may also cause secondary hazards such as the Tsunami, landslides, and fires thereby exacerbating the damage to cultural heritage. Climate Change is further causing increase in the frequency and intensity of hydro-meteorological hazards such as floods and typhoons/cyclones.

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. During emergency phase, the challenge is how to assess damage and stabilize built heritage properties, which are at risk of demolition as well as salvage movable heritage fragments and collections, and 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 to which the region is exposed.



(●: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 disaster risk management. 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.

164 participants in total from 63 countries have participated in our training courses till date. These participants are from East Asia (Indonesia, South Korea, China, Philippines, Malaysia, Myanmar, Vietnam, Thailand and Laos), South Asia (India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka and Maldives), Oceania (Palau, Fiji, New Zealand and Australia), Central and South America (Argentina, Costa Rica, Peru, Chile, Jamaica, Haiti, Colombia, Mexico, Ecuador, Honduras, Brazil and Panama), Europe (Armenia, Serbia, Moldova, Italy, Albania, Croatia, Bosnia and Herzegovina, Spain, Netherlands, Romania, France, Georgia and Belgium), Middle East (Iran, Iraq, Turkey, Afghanistan, Syria, Palestine, and Jordan), Africa (South Africa, Ghana, Kenya, Uganda, Nigeria, Tanzania, Egypt, Morocco, Malawi, Ethiopia and Zimbabwe).

Objectives and Methodology of the Training Course

The main objective of the course is to provide theoretical and practical knowledge on 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 natural and human induced hazards that can cause disasters;
- ✓ 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, national and regional plans and policies for disaster risk management and development as well as 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 various stakeholders ranging from the decision makers to local communities; and
- ✓ Strengthen 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).

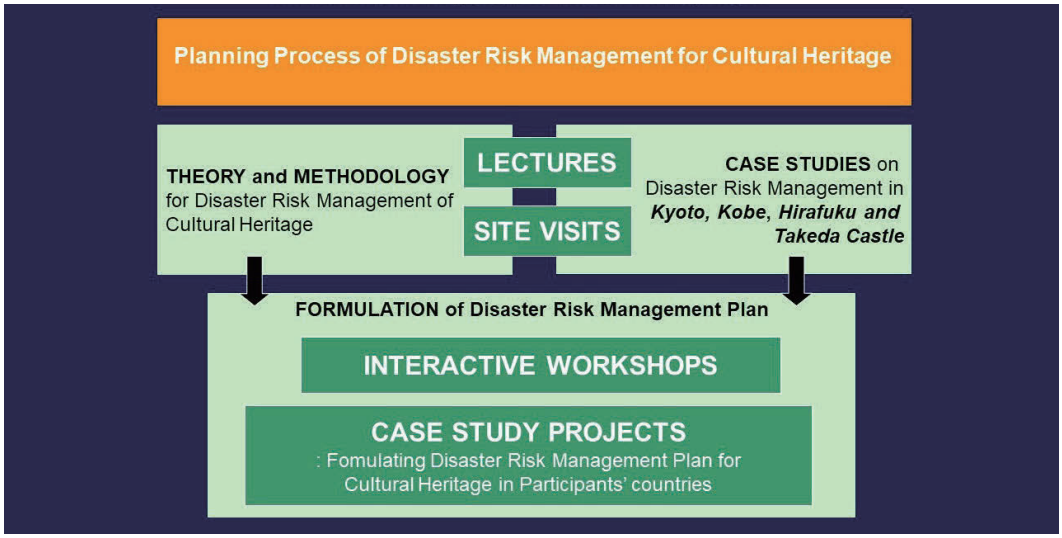


Fig.2 14th International Trainig Course on Disaster Risk Management of Cultural Heritage 2019

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, economic and institutional context. In order to do so, the Institute asked the selected participants to collect relevant data/information related to the cultural heritage, hazard characteristics and local context before coming to Japan.

Sub Theme of 2019 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 natural and human induced 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 and policies. Considering these aspects, the 14th International Training Course on Disaster Risk Management of Cultural Heritage will specifically focus on "Integrated Protection of Immovable and Movable Cultural Heritage from Disasters".

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. Various cultural heritage disaster mitigation measures, many developed in response to Japan's special circumstances, will be shared in this training.

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

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

The buildings related to Hanuman Dhoka Palace Museum damaged in the 2015 earthquake, Kathmandu, Nepal

Previous International Training Courses (2006-2018)

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, 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 2017-2018

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.**

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.

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	Bam and its Cultural Landscape, WHS
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	Dujiangyan, WHS
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	Patan Durbar Square Monument Zone in Kathmandu Valley, WHS
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	Bai: Traditional Meeting House
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	City of Cuzco, WHS
7	Marilene TERRONES DIAZ	PERU	Professor, Sagrado Corazon University	City of Cuzco, WHS
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	Kosancicev Venac, 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	Eskigediz Heritage Site

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

ITC 2018, the 13th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Marcia Furriel Ramos GALVEZ	Brazil	Architect at the Architectural preservation group - associated to the Memory and Information Center, FUNDACAO CASA DE RUI BARBOSA - MINISTERIO DA CULTURA (House of Rui Barbosa Foundation - Ministry of Culture)	Museu Casa de Rui Barbosa (Rui Barbosa's Historic House Museum)
2	Jamyang Singye NAMGYEL	Bhutan	Architect, Division for Conservation of Heritage Sites, Department of Culture, Ministry of Home and Cultural Affairs, Royal Government of Bhutan	Trashigang Dzong
3	Kundishora Tungamirai CHIPUNZA	Zimbabwe	Chief Curator, National Musuems and Monuments of Zimbabwe	Great Zimbabwe World Heritage Site
4	Abel Assefa GIRMAY	Ethiopia	Heritage Conservator, Authority for Research and Conservation of Cultural Heritage	Taitu Hotel
5	David Antonio TORRES CASTRO	Mexico	Full Time Conservator, National Bureau for Cultural Heritage Conservation part of National Institute of Anthropology and History (Coordinacion Nacional de Conservacion del Patrimonio Cultural, Instituto Nacional de Antropologia r Historia, CNCPC-INAH)	EX DOMINICAN CONVENT OF SANTO DOMINGO DE GUZMÁN, TEHUANTEPEC, MEXICO
6	Sumeru TRIPATHEE	Nepal	Country-Humanitarian Preparedness & Response Coordinator, Oxfam GB (Oxfam in Nepal)	Pashupatinath Temple Area, Kathmandu, Nepal
7	Irakli KOBULIA	Georgia	Independent Consultant	Upper Svaneti
8	Vikas Namdeo KURNE	India	Disaster Management Coordinator, Indian Red Cross Society	Chhatrapati Shivaji Maharaj Vastu Sangrahalaya

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
9	Idrees JEHAN	Pakistan	Disaster Risk Reduction Officer (DRRO), FATA Disaster Management Authority (FDMA)	Peshawar Museum
10	Farhad BANIZAMAN LARI	Iran	Project manager at Tarh e-No Andishan Consulting Engineers Co.(Thinking New Approach(TNA)), Lecturer at University of Applied Science and Technology (Red Crescent Organization/ Tehran Disaster Mitigation and Management Organization(TDMO)	Bazar Qaisary, located in the city of Lar(my home town), south of Fars State, southern Iran
11	Grace DE SMET	Belgium	Autonomous researcher on endangered Cultural Heritage; student Master after Master in Urban Studies at Vrije Universiteit Brussel (Belgium); Intern at UNESCO Culture Emergency Preparedness and Response Unit	The city-center of Brugge
12	Catalin Andrei NEAGOE	Romania	Architect at the National Institute of Heritage, Romania, Visiting Lecturer at "Ion Mincu" University of Architecture and Urbanism, Bucharest, Romania	Historic Centre of Sighişoara
13	Rosa Grazia DE PAOLI	Italy	OFFICIAL, Calabrian regional Council	Historical Center of Reggio Calabria
14	Enrica DI MICELI	Italy	Post-doctoral researcher, Sapienza University	The Archeological Area located in the ancient city-center of Rome, which is known as Palatinum Hill, with special focus on the so-called Gallery of the Collapsed Vaults
15	Francesca GIULIANI	Italy	Ph.D. student in Civil Engineering at the Department of Engineering of Energy, Systems, Territory and Construction, School of Engineering, University of Pisa (Senior Member of the Italian Youth Association for UNESCO)	Historic Centre of San Gimignano (Italy)

Observers

No	Name	Country	Work Position and Affiliation
1	Aditia Rahma Putra	Indonesia	Spatial Planning Division, Municipal Government Of Semarang
2	Kasaqa Temoinunia Tora	Fiji	Project Manager The National Trust of Fiji
3	Sehyun KIM	South Korea	Research Assosiate National Research Institute of Cultural Heritage

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

	9/8 Sun	9/9 Mon	9/10 Tue	9/11 Wed	9/12 Thu	9/13 Fri	9/14 Sat	9/15 Sun	9/16 Mon	9/17 Tue	9/18 Wed	9/19 Thu	9/20 Fri
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 Understanding the Risk Assessment	Self Study	Vulnerability and Risk Assessment	Emergency Response and First Aid to Cultural Heritage	Visit to Cultural Heritage Areas Affected by Typhoon	Planning for Response and Recovery: Lessons from Kobe	Kiyomizu-District
Venue		DMUCH	Ponto-cho	Ponto-cho	DMUCH	DMUCH	Peace Museum	Kyoto	Kyoto Museum	DMUCH	Takeda and Hirafuku	Kobe	Kiyomizu-District
9:00			Recap	Recap		Recap			to Kyoto Museum	Introduction to scenario	Site Visit 2 Post Disaster Recovery of from Typhoon and Land Slide: Takeda-Castle Site (Asago City Local Municipality, Y. MURAKAMI and D. KIM)		to Kiyomizu-Dera
10:00		Registration Opening Address Orientation of the Course (R.JIGYASU)	Lecture 2 Core Principles of Disaster Risk Management for Cultural Heritage (R.JIGYASU) to Ponto-cho (field work aiming at developing observation)	Lecture 3 Assessing the Values of Cultural Heritage (R.JIGYASU) Lecture 4 The Loss of Value in Objects (A. TANDON)	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? (K. CHMUTINA)	Lecture 11 Formulation of Scenarios (A. TANDON)		Lecture 13 DRM System in Kyoto National Museum (N. NAKAYA, Kyoto National Museum)	Workshop 4-1 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)		Site Visit 4 Sawanotsuru Sake Brewary	
11:00		Lecture 1 The Need for Disaster Risk Management for Cultural Heritage in Historic Cities: The Case of Kyoto (K.TOKI)	Field Work 1 Ponto-cho Townscape Improvement Area (A KANBE, R NISHIMURA, R. JIGYASU, A. TANDON, K. CHMUTINA, T. OKUBO and D. KIM)	Lecture 5 The Value of Movable Heritage in the Historical Context of Built Heritage (K. OKADA, NICH)	Lecture 7 Introduction of Disaster Imagination Game (T.OKUBO)	Lecture 9 Disaster Risk Reduction and Integrated Risk Management of Historic Cities: Who is Responsible? (K. CHMUTINA)	Exercise 3 Scenario Making for the Individual Cases		Site Visit 1-1 Kyoto National Museum and its Exhibition Rooms			Lunch	Lecture 16 Environmental Water Supply System in Kiyomizu Area (T.OKUBO)
12:00		Lunch and Vulnerability Game	Lunch	Lunch	Lunch	Lunch	Lunch		Lunch	Lunch	Lunch	Site Visit 5 Exhibition of Disaster Reduction and Human Renovation Institution	Lunch
13:00				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 and PAR Model Exercise (K. CHMUTINA)	to Peace Museum Field Work 3 Peace Museum: Risk Assessment for Collections (A. TANDON)		Site Visit 1-2 Kyoto National Museum and its Exhibition Rooms		to Hirafuku		Site Visit 6-1 Introduction to the Maintenance System in Kiyomizu-Dera World Heritage Site (A.KOMIYA, Kyoto Pref.)
14:00		The First Presentations and Discussion by the Training Participants/ Cultural Heritage and Disaster	Field Work 1 Ponto-cho Townscape Improvement Area (A KANBE, R NISHIMURA, R. JIGYASU, A. TANDON, K. CHMUTINA, T. OKUBO and D. KIM)	Field Work 2 Ponto-cho Townscape Improvement Area (A KANBE, R NISHIMURA, R. JIGYASU, A. TANDON, K. CHMUTINA, T. OKUBO and D. KIM)		Discussion 1 Stakeholders Engagement Session - Including Communities	to DMUCH		to DMUCH	Workshop 4-2 Emergency Preparedness and Response: First Aid to Cultural Heritage "Salvage" (A. TANDON)		Lecture 14 Planning for Disaster Mitigation of Cultural Heritage Training of Heritage Manager (Y.MURAKAMI, Kyoto Tachibana University)	Site Visit 6-2 Landslide Damaged Area
15:00			Exercise 1 Terminology and Initial Risk Assessment (R.JIGYASU, A. TANDON, K. CHMUTINA, T. OKUBO and D. KIM)	Exercise 2 Assessing the Values (R.JIGYASU, A. TANDON, K. CHMUTINA, T. OKUBO and D. KIM)			Exercise 4 Vulnerability and Risk Assessment for Collections (A. TANDON)		Workshop 3 Making Coordinated DRM Plans: Introduce First Aid and the Method for Situation Analysis Based on the Scenario (A. TANDON)		Site Visit 3 Post Disaster Recovery from Typhoon and Land Slide: Hirafuku Area (Sayo Town Local Municipality, Y. MURAKAMI and D. KIM)	Lecture 15 Emergency Response and Damage Assessment for Site (Y.MURAKAMI)	to Sannei-zaka
16:00					Case Study Project Work	Lecture 10 Landslide Assessment (M. FUJIMOTO) Case Study Project Work	Lecture 12 Mitigation Strategies for Collections (A. Tandon) Case Study Project Work					to Kyoto	Site Visit 6-3 Sannei-Zaka Important Preservation District: Observation of Fire Mitigation Strategies (T.OKUBO)
17:00										to Takeda	to Kobe		to DMUCH
18:00		to Dinner Venue	to DMUCH	to DMUCH									
19:00		Welcome Dinner											
	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Takeda	Kobe	Kyoto	Kyoto

# of Cultural Heritage 2019, 14th year, Ritsumeikan University

9/21 Sat	9/22 Sun	9/23 Mon	9/24 Tue	9/25 Wed	9/26 Thu	9/27 Fri	9/28 Sat	9/29 Sun	9/30 Mon	10/1 Tue	
Self Study	Middle Presentation	From Response to Recovery: Great East Japan Disaster	Design of Cultural Heritage Recovery and Resilience	Coping Method/Technology for Prevention and Mitigation	Disaster Education and Fire Fighting System in Heritage	Technology and System for DRM, Emergency Response and Recovery	International Involvements and Frameworks for DRM	Prepartion for the Final Presentations	The Final Presentation	Bon Voyage!	THEME
Kyoto	DMUCH	DMUCH	DMUCH	DMUCH	Higashihongan-ji	DMUCH	DMUCH	DMUCH	DMUCH		Venue
		Recap	Recap			Recap					9:00
	Discussion and Case Study Project Work	Lecture 17 Thinking About Disaster Through a Social Science Lens (W.CHEEK)	Lecture 21 The Lessons from Respons and Recovery Process of Mexico Earthquakes (D.GRIMALDI, INAH)	Lecture 24 Disaster Mitigation for Cultural Heritage by Kyoto City Fire Department (S KATSUDA, Kyoto City FD)	Case Study Project Work	Lecture 29 Quantifying Disaster Risk to Cultural Heritage Assets (R. GUNASEKERA)	Lecture 33-1 Emergency Response and Recovery Involvement by Smithsonian Museum at National and international levels (C. WEGENER)	Case Study Project Work	The Final Presentation		10:00
		Workshop 5-1 Group Work for Imaging the Disaster Risks on Historical Site (W.CHEEK)	Lecture 22 2011 Typhoon and Landslide on Kii Area and Awareness Raising by Cultural Tourism (Y. ISHIDA)	Lecture 25 GIS for Disaster Management of Historical Cities and Cultural Heritage (K.YANO)	Lunch	Lecture 30 PDNA and Post Disaster Recovery Frame Work (E. SELTER, SOAS University of London)	Lecture 33-2 Blue Shield and Hague Convention (C. WEGENER)		Lunch		11:00
	Lunch	Lunch	Lunch	Lunch	to Education Center	Lunch	Lunch	Lunch			12:00
	The Middle Presentations of Case Study Project by the Training Participants	Lecture 18 Post Disaster and Recovery Process by the Government and Community in Case of Minami Sanriku Cho (Y. HIRAOKA, Miyagi UNIV.)	Lecture 23 The Progress of DRM Plan for George Town World Heritage City (M. ANG, George Town World Heritage Incorporated)	Lecture 26-1 Climate Change and Risk Mitigation (Y.SATOFUKA)	Site Visit 7 Exhibition of Disaster Reduction Education Center of Kyoto	Lecture 31 Disaster Risk Management Technology for Built Heritage (Y. IWASAKI)	Lecture 34 Governmental Policies of Disaster Risk Management for Cultural Properties under the Legislative Protection in Japan (A. UMEZU, ACA Japan)	Preparation for the Final Presentation	The Final Presentation		13:00
					to Higashihongan-ji						14:00
		Lecture 19 Lessons from Post Disaster Recovery of Intangible Heritage (G.TANIBATA, Miyazaki SK UNIV.)	Workshop 5-2 Group Work for Designing the Recovery Process (W. CHEEK and Y. HIRAOKA)	Lecture 26-2 Flood Prevention and Mitigation Techniques (K.SAWAI)	Lecture 28 Fire Prevention Facilities and System to Wooden Built Heritage (T. SAITO, Y. KUSAKI, K. IKEGAME, Nohmi Bosai)	Lecture 32 Recent Development and Emergency Response to Cultural Heritage in Crisis Situations (E. SELTER and A.BORCHI, UNESCO)	Lecture 35 Management Systems and Management Planning for Heritage Sites (R.JIGYASU)				15:00
		Lecture 20 Principle for Sustainable Recovery of Cultural Heritage (R. RANJITKAR)		Lecture 27 Dynamic Analysis of Earthquakes and Seismic Performance of Japanese Historical Structures (S.YOSHITOMI)		Case Study Project Work	Case Study Project Work		Closing Ceremony		16:00
		Case Study Project Work	Case Study Project Work	Case Study Project Work	Site Visit 8 Fire Prevention Facilities on Higashihongan-ji (S. MOMOTA, T. OKUMURA, K. KAI, Nohmi Bosai)				Farewell Party		17:00
					to DMUCH						18:00
				to DMUCH							19:00
Kyoto	Kyoto	Kyoto	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 and its regional office in Sharjah, ICOM and ICOMOS/ICORP
Financially supported by (FY2019) Official Development Assistance for UNESCO Activities, MEXT Japan
Sponsored by NOHMI BOSAI LTD.

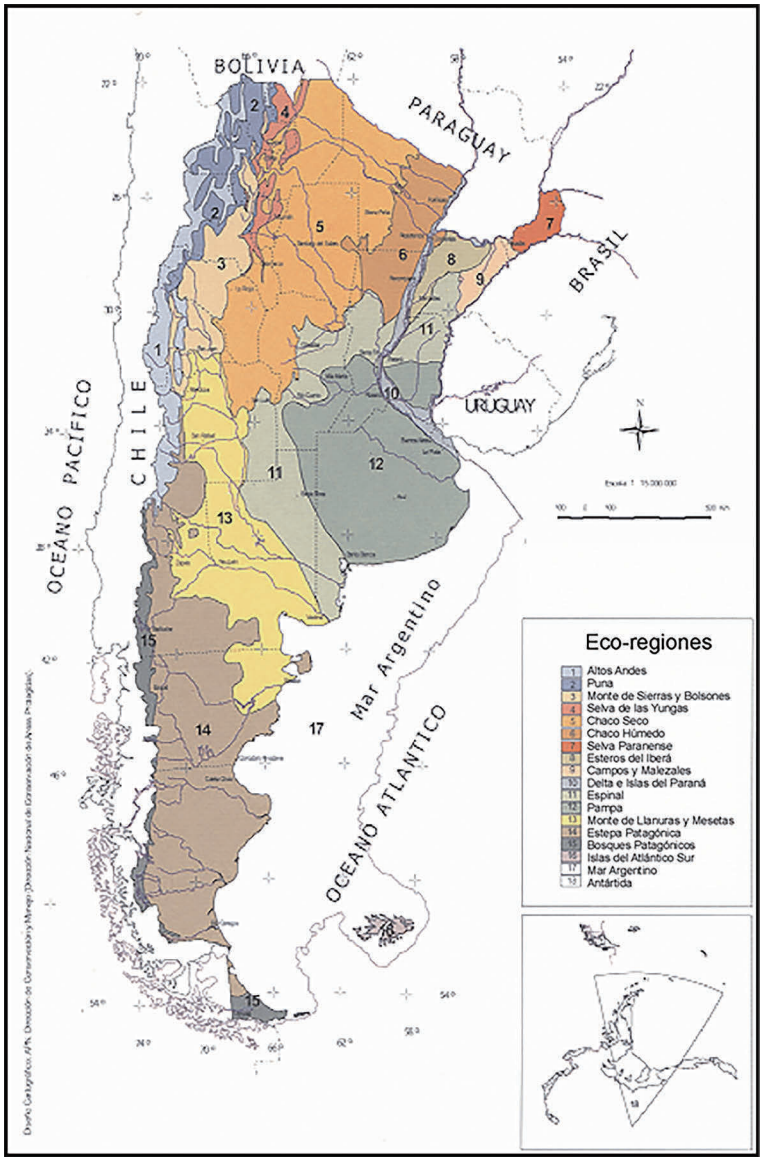
2 Outline of Disaster Risk Management Plans for Case Study Projects by ITC 2019 Participants

2.1 Proposal for Mitigation and Preparedness Measures, Argentina

Virginia Fernanda GONZALEZ
Manager
Sarmiento Historic Museum

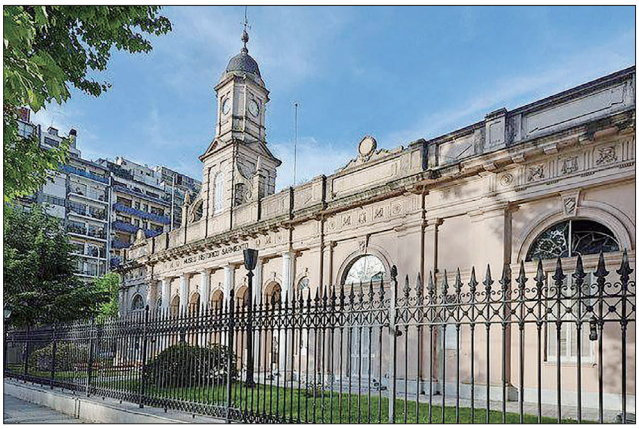
1. Introduction

The Sarmiento Historic Museum is a national historical monument dedicated to the history of Argentina at the end of the 19th century and its president at that time Domingo Faustino Sarmiento. Currently the collections in this museum are at risk due to several causes. Among the major risks are an aging electrical system and a susceptibility to heavy rains. There is also a serious problem of the collections being contaminated with microorganisms. This is due to a lack of ventilation, leaks, and lack of storage space. Heavy rains have caused a collapse in one of the roofs.



2. Characteristics of the Area

Buenos Aires is comprised of 48 neighborhoods. The Sarmiento Historic Museum is located in the neighborhood of Belgrano. It is one of the main shopping districts in the city. Belgrano was a town, then a city, and— for a brief period of time— the federal capitol. It was eventually absorbed into the city of Buenos Aires. Belgrano is a commercial and residential center. Demographically, the neighborhood is composed of high and middle class families. It has an approximate area of 8.02km^2. According to the 2001 census, Belgrano has a population of 12,816 people. The population density is 15,812 people per km^2.



3. Attributes and Values

The Sarmiento Historic Museum functions as both a museum and a national historical monument. It is dedicated to the life of former president Domingo Faustino Sarmiento. Sarmiento strongly contributed to the modernization of the country at the end of the 19th century. It has a collection of 3,500 objects, 12,000 letters, and 1,500 books. The museological collection contains furniture, sculptures, paintings, weapons, and personal objects.

Hazards	Causes	Impact	Vulnerabilities
Primary hazard: Fire	1. Electrical problems	High heat produce molecular collaps in the structure of the objets. Triage of objects that were not evacuated (evacuate those less damaged and remove those that completely burned)	Physical:Lack of maintenence and cleaning Lack of municipality check. Lakc of alarm against fire Social: we have 1 block person, because of the last fire Economics: not unough investment to improve equipment Enviromental: not T° and RH control
Primary hazard: Floods and heavy rains	1. Climate change 2. The uncontrolled growth of the city 3. Heavy rains in short time 4. Closed of the vega river	because of deterioration structures and the possible biological attack	Physical: heavy rain could be broke windows, collaps roffs and structures Social: many people with reduced mobility Economics: not unough investment to repear the roofs Enviromental: lack of ventilation
Secondary hazard: Collapse structures	1. Deterioration of structures 2. wear of materials by use	The dust and pests associated, generates abrasion on the surfaces and causes physical and visual alterations	Physical: serious structurals problems in the roof Social: 3 persons with fisical limitations Economics: burocratics problems Enviromental: dust

4. Risk Assessment

The Sarmiento Historic Museum is housed in a building that was built in the late 19th century. Lack of maintenance, poor electrical installation, and obsolete alarm systems increase the risk of fire in the building.

The Belgrano neighborhood is in a flood zone. Due to the proximity of Maldonado and Vega Rivers, flooding can result from a large amount of rainfall in a short period of time.

There are currently structural problems in some of the roofs on the building, which could generate major risks in the case of heavy rains or fires, as it is likely the roof would collapse.

5. Disaster Scenario

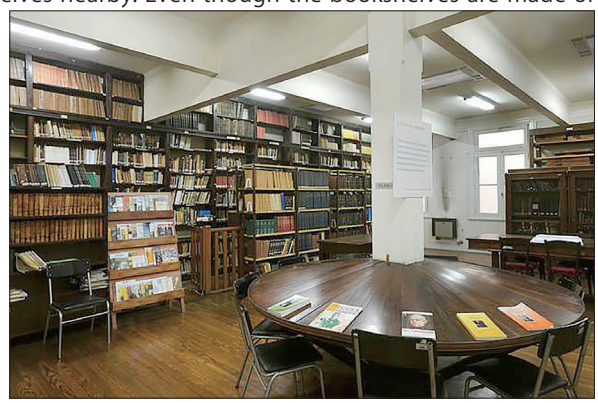
On a Tuesday at 6pm two guards remain in the museum. After changing of the guards, the lights are turned off. The security personnel have their office on the ground floor. Every two hours they make rounds of the museum. As they take their post at 6pm there are no new developments.

Two stoves in the library on the top floor have been left plugged in to a single outlet.

As it is late, the guards fail to take two of their rounds at 10pm and 12am.

At 11pm the plug overheats and catches fire. As the plug is near a wooden desk, the desk catches fire as well as the papers and books inside of it.

The fire spreads from the desk to the bookshelves nearby. Even though the bookshelves are made of metal, other wooden tables, chairs, and plastic begin to burn, which raises the temperature in the room quickly.



By 11:30 the guards smell smoke and begin looking for the cause. As they open the door to the library, oxygen enters the room and increases the fire.

The guards call their supervisor who sounds the alarm.

6. Mitigation Measures

For the effective implementation of a Disaster Risk Management Plan, we need to implement several steps: 1) completely change the old electricity wiring. 2) Activate the fire alarm system, which is currently deactivated. These two steps must be accompanied by awareness raising and capacity building activities. We have to engage wider stakeholders including the private sector and donor agencies. Increasing the avenues of communication might be the model to implement the mitigation measures and reduce risk.

7. Preparedness and Response Measures

To implement reparedness plan, we must first seek solutions already mentioned within the mitigation plan, such as; replacing the electrical wiring and renewal of fire alarms.

In addition to this, we must establish a network with the main stakeholders that allow us to react quickly to an emergency. We must clearly visualize evacuation routes, needs, temporary storages, etc. During the emergency we must be clear about when to give an alarm, how to implement the evacuation plan, while contacting firefighters, police, and civil defense. Finally, after the emergency, we must prepare a correct report on what happened, evaluating the critical points and how to improve the response to an emergency.

social	infrastructure	policy	Monitoring	Maintenance	
-look for psychological advice (psychology department of National Government)	- change the power grid (Maintenance Secretary of Culture) - installation of fire alarms and sprinklers (Private investment)	- Look for private investment (Director MHS). - establish good communication with police station and fireguard (coordinator of emergency MHS)	- Periodic supervision the all the electric systems (maintenance of MHS)	- Check frequently the electric installation (maintenance of MHS)	Fire
- mobilize visitors and staff to areas of easy evacuation (director MHS) - Documentation and list of prioritize object (collection management MHS)	- Lift the collections in the ground flour at 30 cm from the ground. (maintenance MHS) - buy water extraction pump (Secretary of Culture)	-elaborate a DRM on cultural heritage (MHS and Secretary) - Look for private investment (Director MHS)	- Systematic review of the systems and electronics supplies (maintenance MHS)	- Arm a grille for ceiling maintenance, drains system (maintenance of Secretary off Culture)	Flood and heavy rain
- mobilize visitors and staff to areas of easy evacuation (coordinator of emergency MHS)	- Restored that roof (in progress) (Secretary of Culture)	-Unlock the administratively process (Secretary of Culture). - follow the procedure (Director MHS)	- Supervise the reconstruction process (Engineers and architects of National Commission of Immovable heritage)	- Clean the space continuously (clean service MHS)	CS

8. Conclusion

The loss of type of collections in the museum would be an important loss for the entire country of Argentina. Formulating a DRM plan is an important exercise that requires compromise, taking responsibilities, and understanding the importance of the cultural heritage context. This includes identification of attributes, values, vulnerabilities, and possible hazards. This should be put together to build a risk map of cultural heritage. To reach a solid plan for the Sarmiento Historic Museum, it is important to correctly assess the collections and the risks to which they are subjected, in order to formulate possible risk scenarios and propose different mitigation and preparedness measures. In order to respond adequately to a disaster, it is important to be aware that risk plans are integral processes, where a large number of variables must be considered in order to reduce losses.

Reference

1. Área de pensamiento estratégico. Análisis preliminar de un estudio de zona de riego natural y no natural. Cámara Argentina de la Construcción. Buenos Aires, Argentina, Noviembre de 2012 (pp. 5-31).
2. ICCROM , A guide to Risk Management of Cultural Heritage. 2016-International Training Course (ITC) on Disaster Risk Management of Cultural Heritage, Ritsumeikan University, Kyoto, Japan. 2018.
3. Preservación de bienes culturales. Ley 25.750. Junio 18 de 2003.

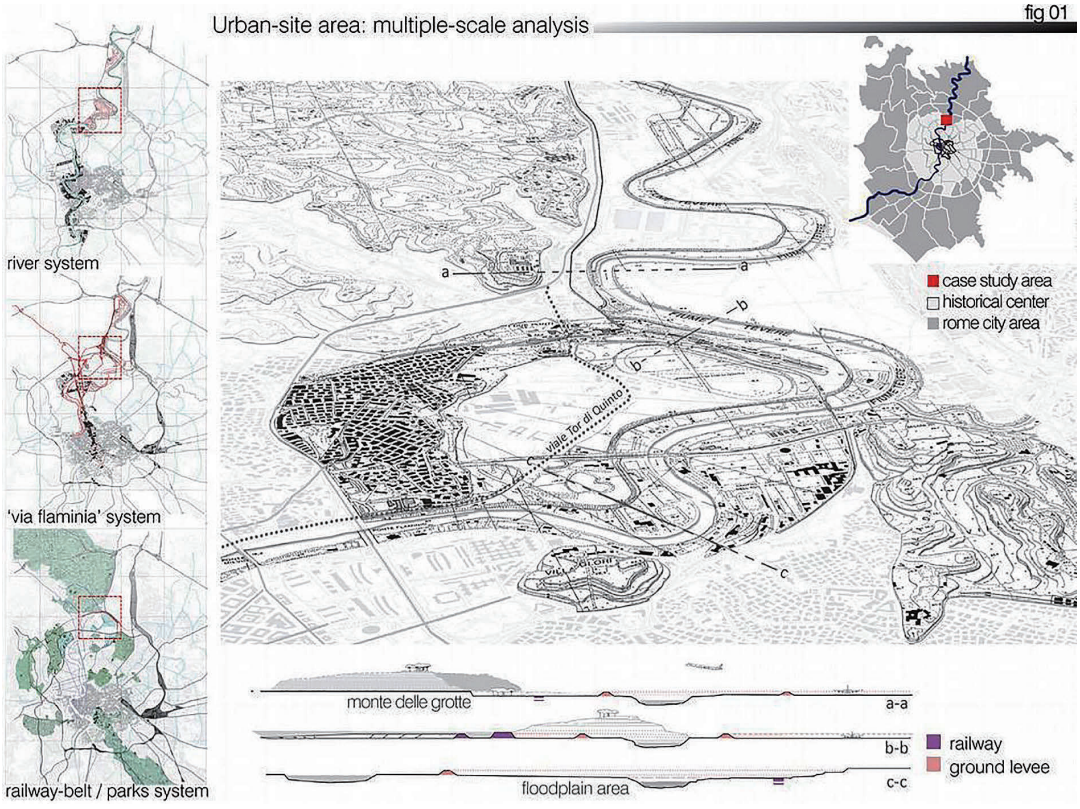
2.2 Tor di Quinto Riverside, Rome, Italy

Angela Maria MICELI
Architect
AIAPP, Italian Association of Landscape Architecture

1. Urban Site Area: Analysis Systems

This case study is an urban area near river Tevere. The Tevere crosses the northern part of the city of Rome. (Fig 1) The starting phase of this research aims to recognize the main features of the area: environmental, historical, social, and infrastructural. These features are used as guidelines for the whole process. This approach deals with:

- morphological and orographic features of the meandering river basin site. The site is characterized by a wide plain surrounded by sedimentary clay and pre-volcanic hill formations.
- riverside ecosystem and its transformations due to natural flooding phenomena.
- infrastructural issues, focusing on the strategic role of the area in terms of urban connections (ecological, mobility, historical connections) and planned urban development.
- land use and activities, social meanings and cultural landscape.

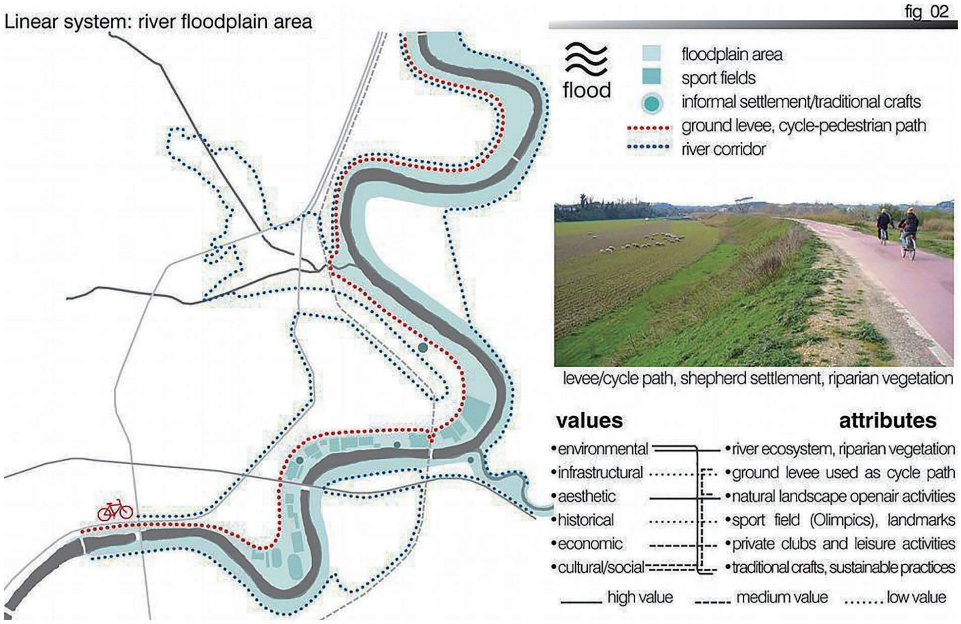


This approach identified two mutually related systems[1] where attributes and values (fig_02, fig_03), risk assessment, scenario, and consequent level of impact on values have been analyzed:

Linear system

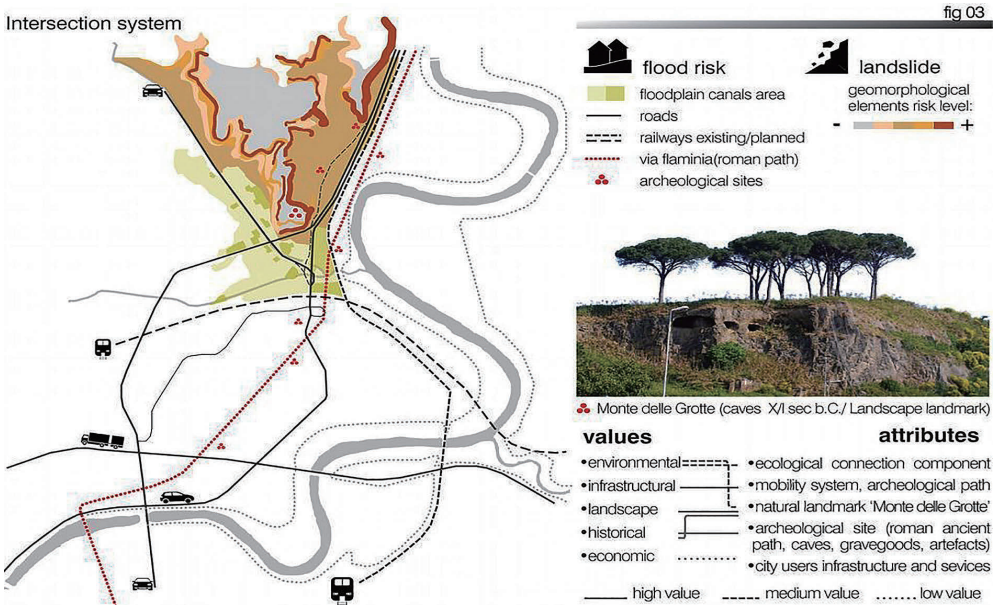
This system is represented by the flood prone area between the river and its earthen levee that is currently used as a pedestrian and cycle path. This wide floodplain developed historically with a culture based around sport, open-air leisure activities, and sustainable practices. These cultural practices have enhanced

the unique environmental value and distinguishes the area from other nearby urban riversides. Here a visual relationship with natural elements of a riparian buffer zone, surrounding landscapes and landmarks, informal settlements, and disappearing traditional rural/river crafts has been well preserved.[2]



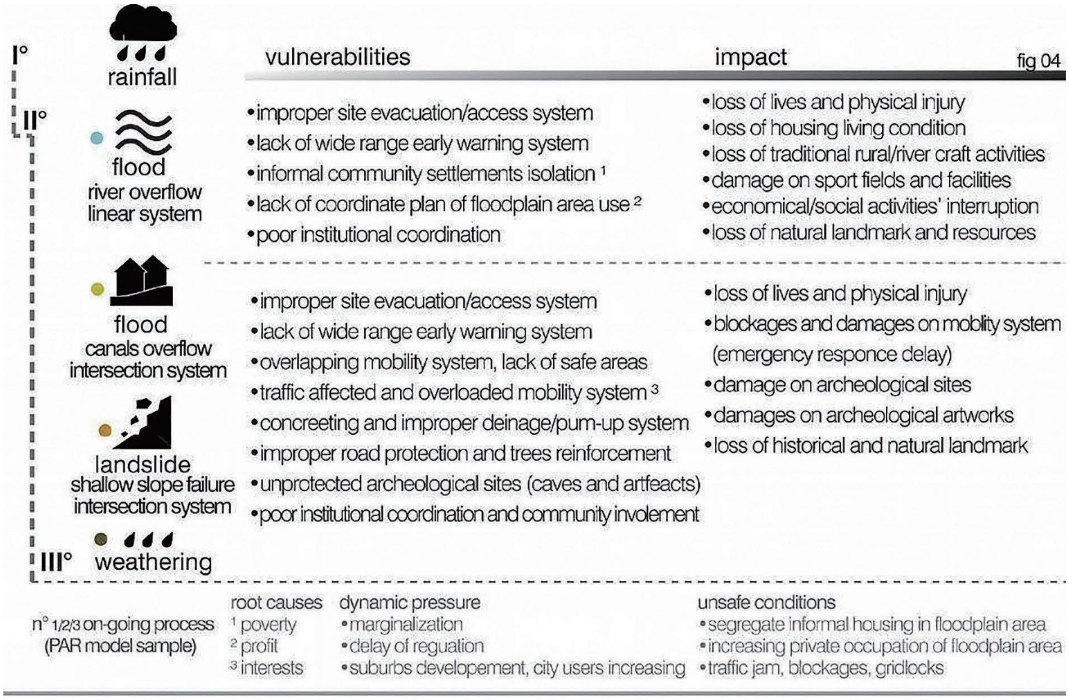
Intersection system

This system of cultural and natural values is represented by a particular 'hub'. This hub is characterized by multiple infrastructure intersections: the confluence of two canals into the main river, railway lines and high traffic urban and suburban roads. These junctions are under high pressure due to several factors 1) the increasing amount of city users 2) the presence of the ruins of the 'Via Flaminia'[3], an ancient Roman path 3) with developing tourist use. 4) the role of ecological connection ensured by Monte delle Grotte and its recognized historical and landscape landmark value[4].



2. Disaster Risk Assessment

The scenario refers to the main hazard[5] affecting both connected systems. The disaster is precipitated by heavy rainfall, which has been made more considerable due to climate change. The secondary hazards occur in the two systems consisting of river flooding and canal flooding. This flooding is combined with landslides at the Intersection System[6]. The corresponding impact, due to the vulnerabilities within these dynamic processes, negatively effects the cultural and landscape attributes and leads to a consequent loss of values. (fig_04).



3. Risk Prevention and Mitigation Strategies

Following a risk assessment that is focused on the two systems' peculiarities, and considers the likelihood of various natural hazards, and their possible disaster consequences based on the assumed scenario, the following integrated measures for risk mitigation have been proposed. These measures are formulated using a multidisciplinary perspective.

Furthermore, as summarized by the following examples referred to in this case study, I am taking a combined measures strategy to reduce risks to cultural heritage. This approach aims to bring together: ▶ tangible and intangible values ▶ people-centered approach and ▶ urban sustainable development.

a) Detection measures like monitoring and early-warning systems proposed for flood risk in the riverside area have been combined with engagement strategies involving communities living in informal settlements on the floodplain area. This includes outreach to traditional rural/river craftspeople, fishermen, and shepherds. Additionally, emergency response measures have been connected with long-term recovery strategies including training, education and participatory activities, stakeholders' coordination in order to manage social vulnerabilities and to enhance traditional sustainable local practices and values. (fig_05).

b) Technical adaptation measures, represented by the matrix design for the sport fields[7] along the floodplain area, balancing land use/social and leisure activities with natural ecological components, and river overflow phenomena utilizing vegetation and appropriate materials[8], (fig_06), have been combined with an evacuation plan and the detection measures mentioned above. This will enhance blue-green infrastructural values and move towards more sustainable development in line with the urban scale. Stakeholder coordination has been considered an essential measure in order to manage institutional vulnerabilities, especially concerning the regulation of private use of the floodplain area.

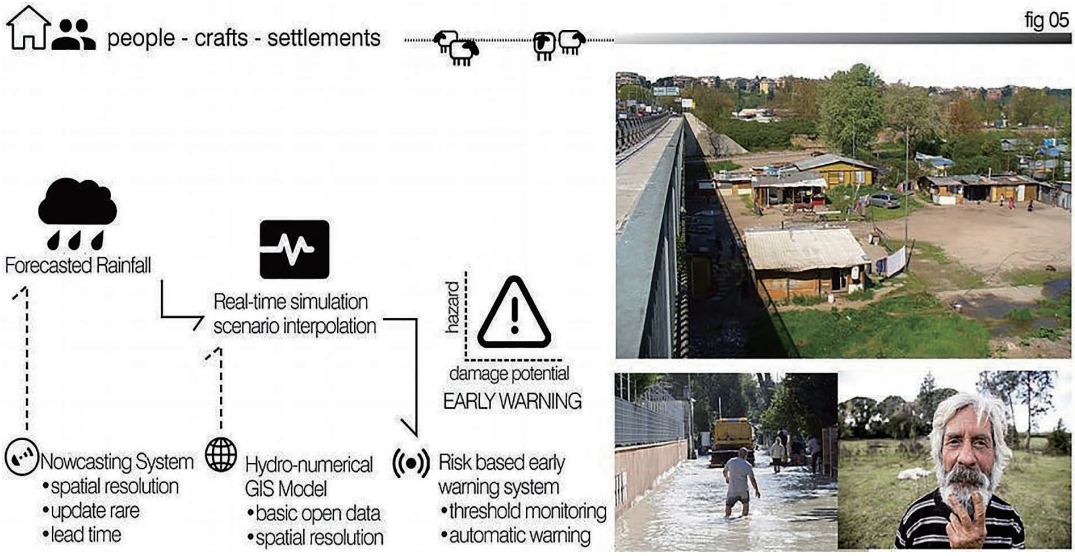


fig 05

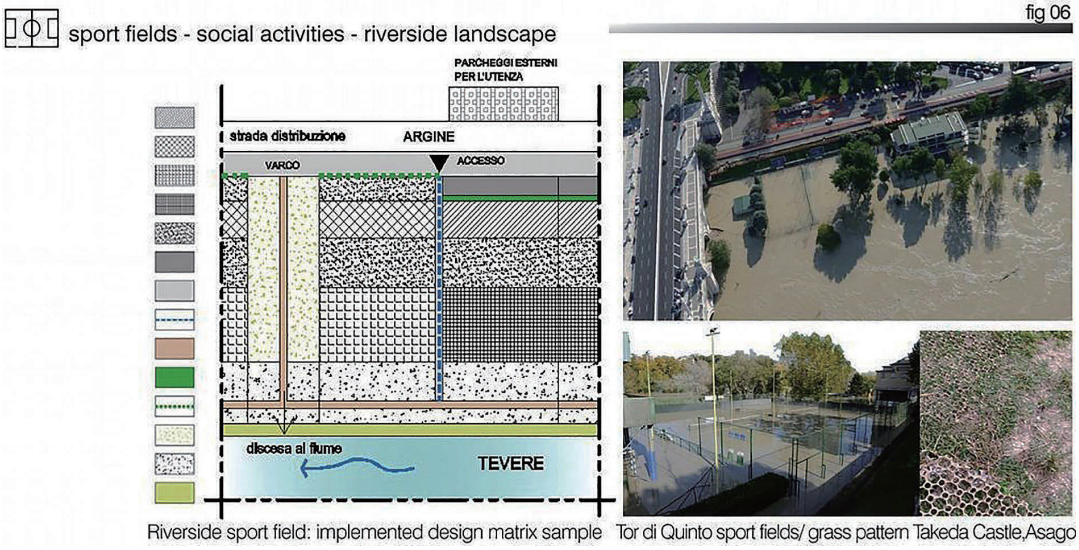
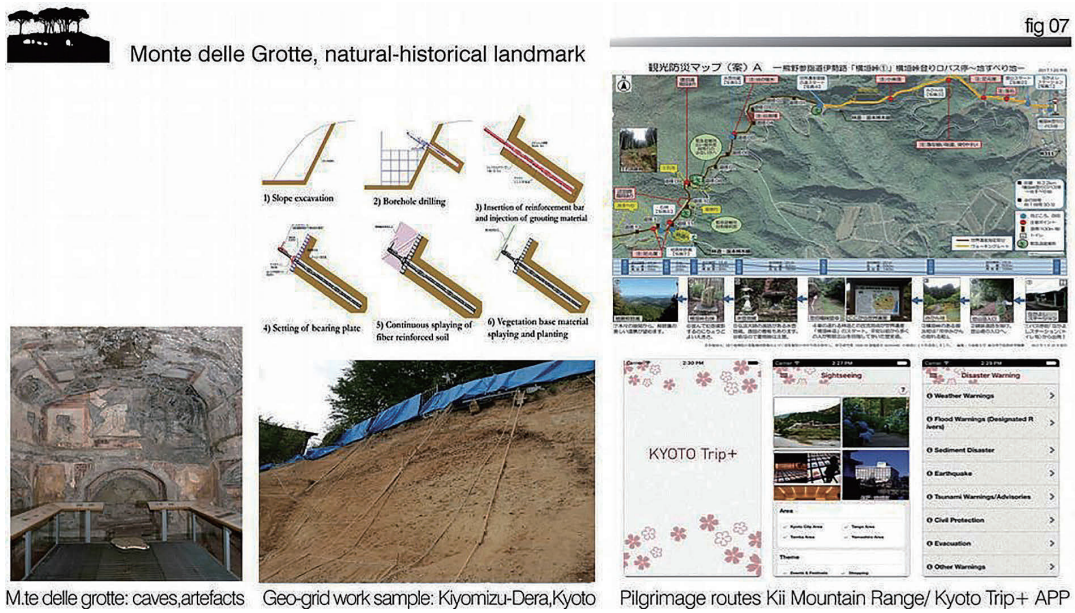


fig 06

Riverside sport field: implemented design matrix sample

Tor di Quinto sport fields/ grass pattern Takeda Castle,Asago

c) Structural adaptation measures on the areas affected by landslide risk (Intersection system, Monte delle Grotte) like ground slope and tree reinforcements[9] to reduce shallow steep slope failure, have been combined with early warning system. This is to minimize risk to people's safety, road blockages, and gridlock by reducing vulnerabilities associated with the increasing number of city-users and an overloaded transport system.
For tourism development at the historical Roman-path-system of Via Flaminia, adaptation measures like structural reinforcement of Monte delle Grotte's cave graves and non-structural interventions on artefacts, have been also proposed along with risk detection measures. These include information sharing, combined with learning, physical/virtual tools, and digital/social innovation strategies.[10]
Citizens and tourist engagement is essential in connecting the tangible cultural heritage values (archeological sites, artefacts), intangible values (historical and natural landscape landmark values) of cultural heritage with disaster risk management issues (fig_07).
Stakeholder awareness and coordination are crucial for disaster risk management of cultural heritage. Prevention measures are a part of long-term recovery strategies with the aim to link various institutional levels (local/municipal/governmental etc), knowledge, interests, and resources.



M.te delle grotte: caves,artefacts Geo-grid work sample: Kiyomizu-Dera,Kyoto Pilgrimage routes Kii Mountain Range/ Kyoto Trip+ APP

4.Conclusion

The present abstract summarizes a methodological approach provided by ITC2019 with the aim to formulate a disaster risk mitigation plan for an urban site case study area. This project starts from recognizing deep ties with territorial matrix of a combined integrated system of territorial resources such as morphological and orographic features of the river basin area (floodplain area surrounded by sedimentary clay formations), natural riverside ecosystem, infrastructures, and land use and activities, recognizing a relationship among the spatial, temporal, environmental, and cultural coordinates at multiple levels. It uses this perspective to focus design projects, actions, and strategies of risk prevention and mitigation and evaluate their outcomes.

Notes

1 V. Calzolari: Storia e natura come sistema.Un progetto per il territorio libero dell'area romana, Argos 1999.

2 National Geoghaphic official web site, Metropolitan shepherds in Rome, on line reportage: http://www.nationalgeographic.it/wallpaper/2018/06/08/foto/pastori_metropolitani_diroma-4012464/1/#media
RaiPlay official web site, "che ci faccio qui"on line video source: https://www.raiplay.it/video/2019/04/Che-ci-faccio-qui-Un-pastore-dentro-la-citta-36f60a1f-efcf-4b62-856f-f48d1308688a.html

3 G. Messino, A. Carbonara: Via Flaminia: da porta del Popolo a Malborghetto, Ist. Poligrafico Italiano 1991

4 Rome Municipality official web site: ecological net, on line data source: http://www.urbanistica.comune.roma.it/

5 ISTAT, Statistic data on annual/monthly rainfall/precipitation, weather-climate hydrological data, 2007-2016 on line data source: https://www.istat.it/

6 Rome Municipality official institutional web site:
Hydraulic risk and landslide risk site map, on line data source:
http://websit.cittametropolitanaroma.gov.it/, http://www.urbanistica.comune.roma.it/

7 P.Barone, V.Calzolari: Tevere Basin Authority techincal dossier, data sheet on floodplain river areas, 2007.

8 ITC2019, mitigation strategies examples provided by ITC course, case study suitable references: Takeda Castle, Asago city, site visit.

9 ITC2019, mitigation strategies examples provided by ITC course, case study suitable references: Kiyomizu dera, Kyoto, geo-grid work ,faillure 1999, site visit and lecture.

10 ITC2019, mitigation strategies examples provided by ITC course, case study suitable references: Pilgrimage routes in the Kii Mountain Range, Nara, lecture Kyoto + App affordable APP on tourist information, risk prevention and existing evacuation plans information, reference.

General references

– Civil Protection Department: Hydraulic/Hydrogeological Risk Civil Protection Plan, 2019.

– ICCROM: Guide de gestion des risques appliquée au patrimoine culturel, 2019.

– Proceeding of UNESCO Chair Programme on Cultural Heritage and Risk Management 11th 12th 13th editions.

2.3 Disaster risk management plan for heritage sites: A proposal for MuNDA, Museo Nazionale D'Abruzzo, L'Aquila, Italy

Monia DEL PINTO
Researcher
Loughborough University

1. Introduction

Until the 6th of April 2009 MuNDA, the National Museum of Abruzzo, located in the city of L'Aquila, was the most visited museum of the Region recording around 60,000 visitors every year. The museum's popularity was due to its location in the mighty structure of the Spanish Fortress, as well as the richness of its collections spanning from palaeontology to contemporary art and including local masterpieces from Roman Age to the Renaissance. On April 6th 2009, the building and part of the collections exhibited in the museum were heavily affected by an earthquake that hit the city of L'Aquila. Some of the artwork was permanently damaged, others required important conservation efforts, whereas the building recorded significant structural damage and was cordoned off, waiting for repair. Following a difficult salvage, the unbroken pieces were stored in temporary depots waiting for the museum to reopen, whereas the damaged pieces- including altarpieces, canvas, and wooden statues- were moved to restoration institutes. In December 2015, after six years of inactivity, the museum reopened in a temporary location, exhibiting a selection of artworks including part of the restored objects. The following sections introduce the proposal for a disaster risk management plan for cultural heritage, in order to provide targeted mitigation measures and prevent future loss of cultural heritage once the museum is reactivated in the permanent location of the Spanish Fortress.

2. Site

MuNDA, Museo Nazionale D'Abruzzo[1] , was established in 1951 in the city of L'Aquila and brought together collections from the former City Museum, dismantled in 1942 due to WWII, and the Archives of Superintendence. In 1966 its collections incorporated the artworks from the Diocesan Museum of Religious Art, moved to the Vatican Storage during the war and then returned to the city. The museum is located in the Spanish Fortress, also known in the city as "The Castle", built between 1534 and 1606 during the Spanish occupation. The construction is a model of military Renaissance architecture that became a landmark for the city of L'Aquila. Its features, such as the raised position on the hilltop, the four bastions and thick stone masonry walls slanted at the bottom, the ditch and the single gateway accessible from the bridge, were designed for a self-sufficient, fortified structure. Over the centuries, it was first turned into a prison and then into a military headquarters until WWII and the 1945 German occupation. In 1951, following the post-war restoration, the building became the seat of the newly established Museo Nazionale D'Abruzzo[2] , and the former military layout provided spaces for offices and exhibition halls at the ground floor, as well as storage rooms in the basement. During the 1980s, extension and restoration work added a loft hosting the archives between the first and second floor, and an additional exhibition gallery for the contemporary art collections at the upper floor.

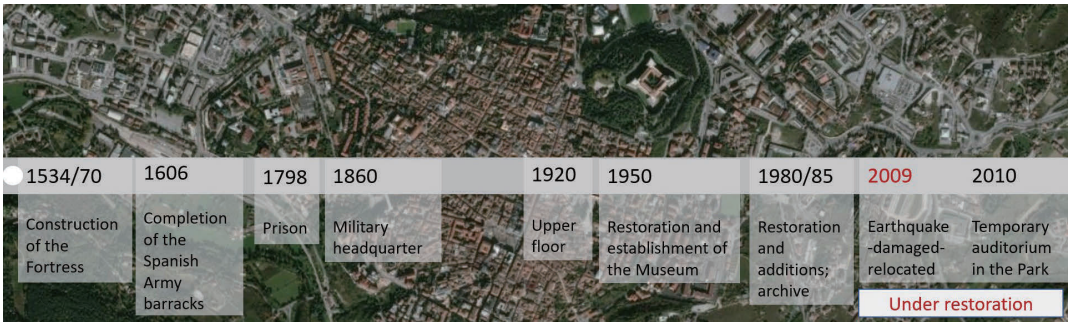


Figure0. timeline of the relevant construction works on the Spanish Fortress between 1534 and 2009 (source: author elaboration on Google image and MuNDA)

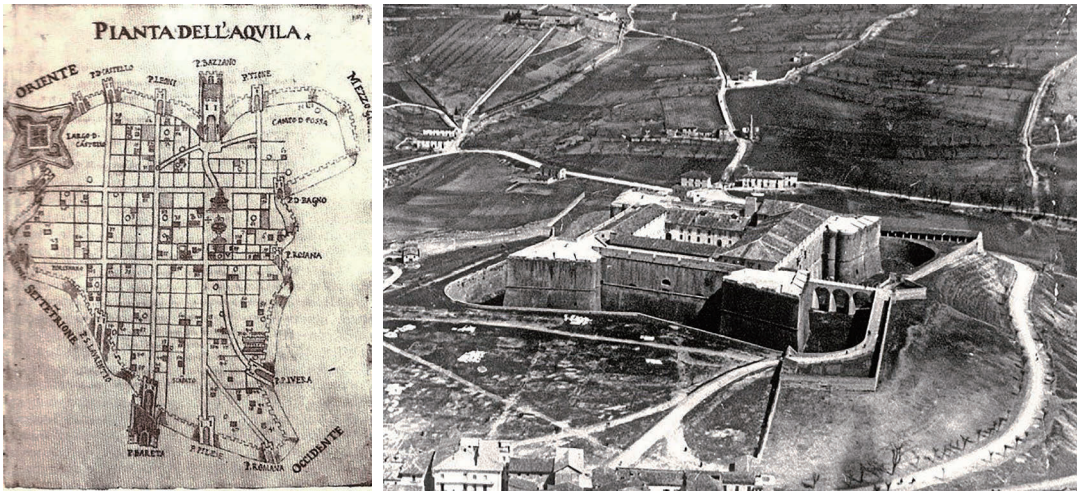


Figure 1. Plan of L'Aquila 1575 by Pico Fonticulano (source: Spagnesi and Properzi,1972) and aerial view of the fortress before the tree planting in the surrounding park, 1928-29 (courtesy of MuNDA)

3. Heritage components, attributes and values

The collections of MuNDA encompass palaeontology and archaeology sections, religious art from the Middle Ages to the Renaissance and contemporary art[3] (Moretti, 1968; MIBAC, 2000), each located in a dedicated area (Fig.2)

Table 1. Sections and relevant heritage components in the collections

Sections	**Relevant heritage components**
Palaeontology section	Fossil of *Mammuth Meridionalis* found near L'Aquila in 1958.
Archaeology section	Findings from the Italic and Roman settlements of Amiternum (the Amiternum Calendar dating back to 20 A.D), Aveia and Peltuinum.
Religious section	- Paintings and statues from the Medieval tradition of Abruzzo including icons, wooden sculptures and several representations of Virgin Ladies; - gothic Tryptic of Beffi (1410); thirteenth- and fourteenth-century artworks, - Renaissance paintings and statues from the renowned artist Saturnino Gatti, - seventeenth-century paintings from Neapolitan tradition.
Urban history	- The original, silk embroidered city banner dating back to 1579. - Baroque wooden ceiling of Santa Maria di Collemaggio Cathedral, removed from the church during the 1970s restoration and kept in the museum's deposit.

The relevant components selected for the current study are the fortress, the museum collections and the park (table 2). Each carries attributes and attached values to be preserved within a targeted disaster risk management plan for cultural heritage.

Table 2: The selected components, with the heritage attributes carrying higher values (Source: author)

Components	Values	Heritage Attributes
Fortress Original stone masonry building (1534)	Historical	Structure (renaissance military architecture)
	Architectural	Structure (renaissance military architecture); stone masonry walls, bridge, bastions, moat, anti-mine corridor
	Aesthetic / Landscape	Stone masonry walls, bridge, bastions, gate/portal
	Symbolic	Stone masonry walls, bridge, bastions, cannons
Collections -Religious c. (Beffi tryptic, gothic painting, 1410) -Archaeological c. (the fossil, Mammuthus Meridionalis Vestinus, Plesitocene) -Contemporary art -Storage (Baroque wooden ceiling of the cathedral) - Masterpiece: city banner (1579)	Artistic	Religious Art, Contemporary Art, the Baroque wooden ceiling of S. Maria di Collemaggio cathedral, original city banner (1579) Archaeological Collection
	Identity	Religious collection*, palaeontology and archaeological collection, original city banner (1579), the Baroque wooden ceiling of S. Maria di Collemaggio cathedral Contemporary Art
	Historical	Religious collection*, palaeontology and archaeological collection, original city banner (1579), the Baroque wooden ceiling of S. Maria di Collemaggio cathedralContemporary Art
	Cultural	Religious collection*, palaeontology and archaeological collection, original city banner (1579), the Baroque wooden ceiling of S. Maria di Collemaggio cathedral, Contemporary Art
	Economic	Religious collection*, palaeontology and archaeological collection, original city banner (1579), the Baroque wooden ceiling of S. Maria di Collemaggio cathedral, Contemporary Art
The Park	Ecologic	Green area/ pine forest; the system of paths, trails and gardens
	Aesthetic / Landscape	Green area; auditorium
	Social/ recreational	The system of paths, trails and gardens; auditorium

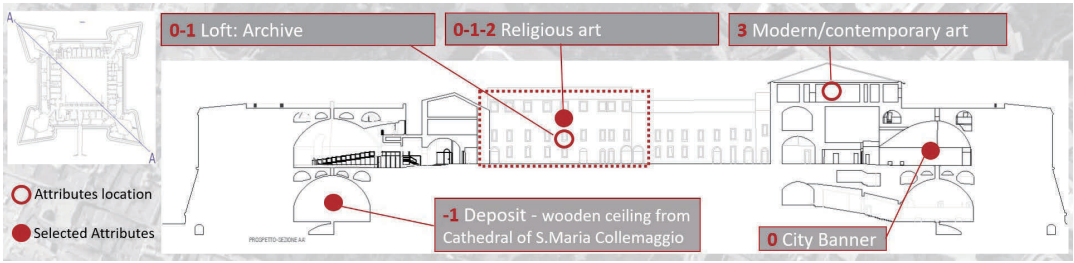


Figure 2: Cross section of the structure displaying the location of attributes within the building (Source: author. Technical drawings courtesy of Alessandra Tunno)

4. Hazards and vulnerabilities

For a DRM plan to be effective, it is important to perform a multiscalar hazard assessment and identify the possible risk path from the site up to the single heritage objects.

Hazard profile

The city of L'Aquila falls in the highly seismic core of the Apennine region (fig.3). Several destructive earthquakes have marked its history, the largest hitting the area in 1461, 1703, 1762, and 2009. The seismic micro zoning available after 2010[4] informs about the areas where local amplification is expected and can be used to map local exposure and vulnerability. In the recent years, seasonal heavy rainfalls have been recorded with the phenomena of local flood, which was previously uncommon in the area.

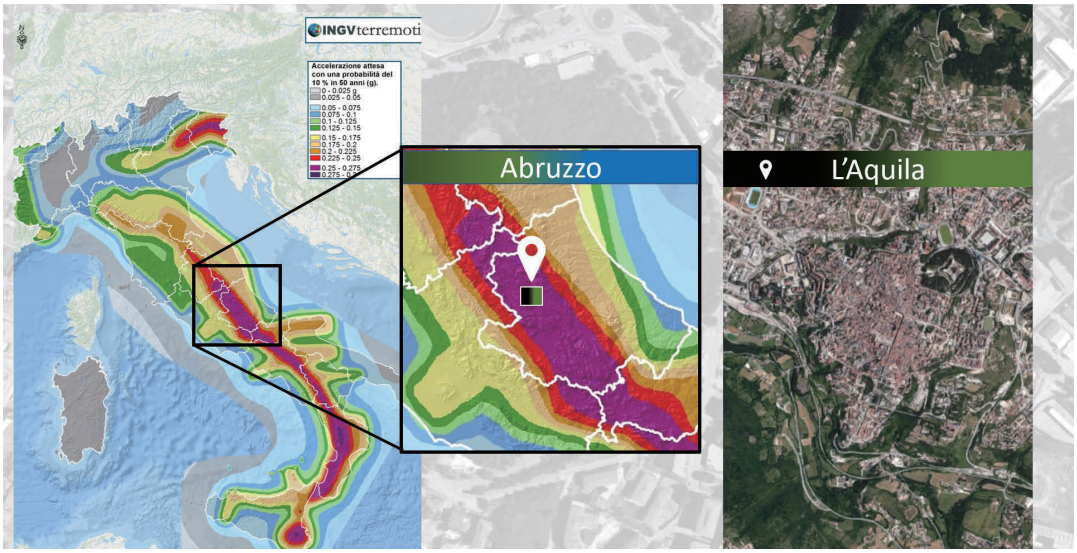


Figure 3. Location of L'Aquila on the seismic hazard distribution map (Images source: INGV, Google maps)

Vulnerabilities

The MuNDA vulnerability assessment is based on the 2009 post-earthquake scenario, using the proxy of damage and the available information about the former emergency plan – namely contents, implementation and communication. Pre-existing physical, structural, and attitudinal vulnerabilities are associated with the building typology in relation to the museum's functions, pitfalls in the emergency plan, and with the co-presence of multiple institutions and activities in the location. The physical vulnerability was prevalently due to:

- Structure: different materials and techniques for the additions made over the centuries to the original stone masonry walls. Particularly, the use of reinforced concrete slab and roof at the top floor and the removal of ties, performed in the 80s, caused the collapse of roof and the overturn of XVII century facades in 2009. Moreover, not reinforced barrel vaults collapsed, or lost plaster and ashlars, affecting the collections.
- Exhibition areas: the artefacts were not encased, and statues and paintings not anchored to ground or walls;
- Building typology: the fortress is only accessible through the stone bridge; in the case of emergency, the first available open area for occupants is the inner courtyard – unsafe as surrounded by untied facades.

The attitudinal and institutional vulnerability factors refer to content and implementation of the former emergency plan:

- The plan did not encompass multi-hazard scenarios and specific measures for heritage protection.
- The plan was not adequately shared among all the institutions located in the Spanish Fortress, namely the Superintendence for Cultural Activities, National Institute for Geophysics and Volcanology, and the Concert Society

The lack of communication of the emergency procedures implies the staff was not aware of their tasks and had little knowledge of evacuation routes. This resulted in reduced preparedness that was detrimental to both occupants' and heritage's safety. The mentioned factors could have determined fatal consequences in the presence of visitors and require mitigation measures to be undertaken, for the integrated safeguard of both human life and the museum's collections.

Scenario

The proposed multi-hazard scenario (fig.4) considers the simultaneous occurrence of persisting heavy rainfall and an earthquake during the daytime, in the presence of occupants (visitors, staff, INGV researchers, and guests attending a conference at the Superintendence).

Rainfall: affects the museum's surrounding area and the drainage system, flooding the inner courtyard.

Earthquake: affects both the structure and the collections, triggering secondary hazards and cascade damage.

The building records the collapse of structural elements, facades overturn, the bridge is damaged, and the water pipes burst. The effects of structural failure threaten the occupants' safety, as falling elements and debris block the evacuation routes – staircases, corridors, bridge – and make unsafe the gathering area in the courtyard. Staff and workers can't facilitate emergency management as they are unaware of the emergency procedures and roles.

The collections that were not adequately protected are damaged, with artefacts falling from shelves or walls, being impacted by the damaged structure, and walked upon by occupants during the evacuation.

Short term impact: several degrees of damage affecting structure and collections.

Long term impact (from heritage to territory): progression of damage, loss of information (archive), closing of the museum and consequent loss of jobs, loss of knowledge and values (local history, urban identity).

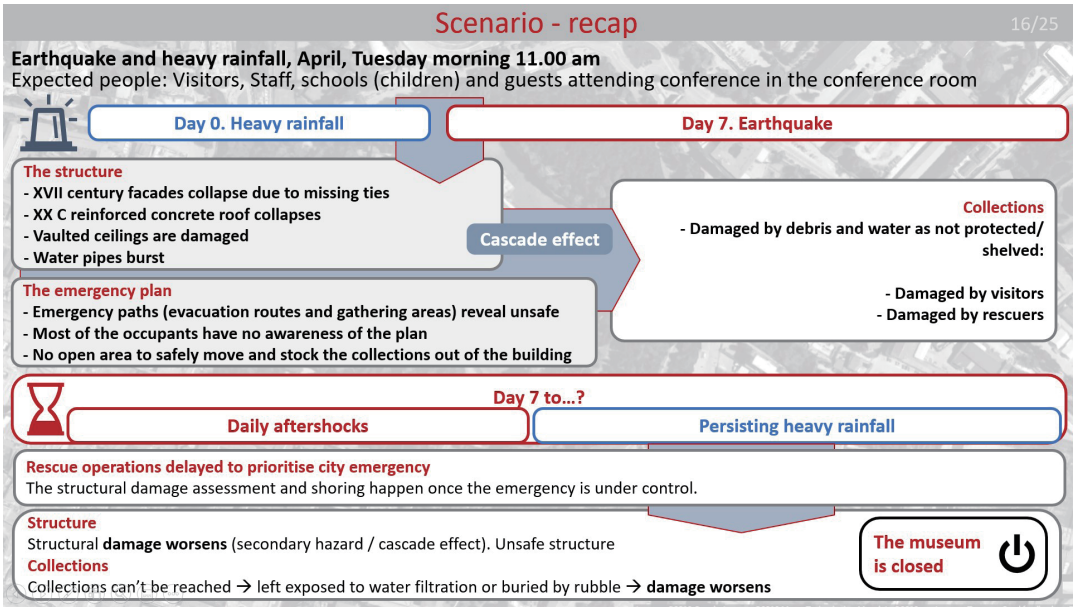


Figure 4. The proposed scenario (source: author)

5.Mitigation and preparedness measures

The proposed mitigation measures aim to reduce the vulnerabilities acting at several scales and are built to avoid, block, detect, reduce the hazard, or to build on to existing capacities (fig.5).

Structural measures: retrofit of the structural elements, consolidation of walls and vaults to prevent loss of fragments, floor isolation to reduce the shaking in the exhibition rooms, use of appropriate shelving solutions.

Non Structural measures: monitoring humidity level, digitalising the archive, creation of heritage ID cards, improvement and communication of emergency plan, design of evacuation paths and gathering areas, coordination of actors in emergency, engagement of the relevant stakeholders (drills).

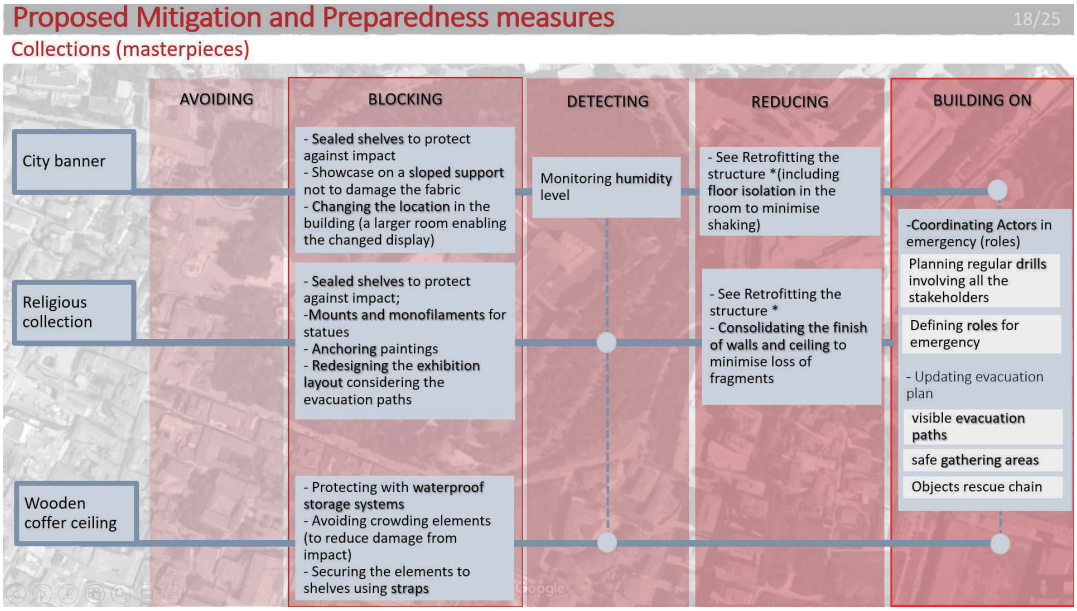


Figure 5. Example of proposed mitigation and preparedness measures for the collections (source: author)

5.Recovery plan

The recovery plan includes implementing targeted measures for cultural heritage protection, starting from the post-disaster phase (ICCROM, 2018, pp.129-135). Currently, both the building restoration and the collections' conservation works are supervised by the Superintendence for Cultural Heritage, in charge of monitoring the damage assessment, outlining the repair measures and budget, farming out the restoration works.

To further improve the existing framework, the proposed measures act on post-disaster damage assessment, restoration and operational continuity of the museum, as shown in table 3.

Table 3. Recap of the proposed recovery measures

Stage	Measure
Post-disaster damage assessment	-Digitalization of archive -Introduction of ID card for heritage elements (with location, features, values, and history) to facilitates salvage and prioritisation
Restoration	-Designation of safe temporary storage areas in the emergency plan -Introduction of ID card for heritage elements (with location, features, values, and history) to facilitates salvage and prioritisation
Business continuity plan	-Temporary Relocation -Creation of museums' network – thematic or territorial approach -Partnerships with other national and international institutions, as well as schools

The final aspect to be considered is stakeholders' engagement, achievable through a proposed pilot project carried on by MuNDA and integrating cultural heritage protection and disaster risk management. The project, to be run during the school year, involves local primary and secondary schools, Fire Brigades and Civil Protection volunteers, and culminates in final drill at the end of the year. The participation of students' families, as well as the engagement of institutions and sponsors (i.e. Superintendence for Cultural Heritage, Concert Society) obtaining visibility for supporting a CH/DRM activity, would contribute to promote the activities and building awareness among different groups of citizens.

References

1. ICCROM, 2018, 'First aid to cultural heritage in times of crisis handbook'.
2. MIBAC, (2000), 'Guida alla visita dei musei statali in Abruzzo- progetto potenziamento dei musei statali in Abruzzo'.
3. Moretti, M., (1968) 'Museo Nazionale d'Abruzzo nel Castello cinquecentesco dell'Aquila'.
4. Spagnesi, G., Properzi, P. (1972), 'L'Aquila, Problemi di forma e storia della città'.

Notes

1 http://www.musei.abruzzo.beniculturali.it/musei?mid=63&nome=munda-museo-nazionale-dabruzzo

2 later shared with the Superintendence, the Concert Society and the Institute of Geophysics and Volcanology.

3 For the complete and updated collections http://www.musei.abruzzo.beniculturali.it/musei?mid=63&nome=munda-museo-nazionale-dabruzzo

4 http://www.comune.laquila.it/pagina1755_microzonazione-sismica.html

2.4 Disaster Risk Management in the National Museum of Egyptian Civilization, Egypt

Mahrous Eid Moustafa ELSANADIDY
Chief Curator
The National Museum of Egyptian Civilization

1. Introduction

The National Museum of Egyptian Civilization (NMEC)(figure.1) is a governmental institution that acquires, cares, conserves, preserves, and exhibits Egyptian tangible and intangible heritage (figure.2). In addition, it provides many services for study, research, education, and reaction to the public. It collaborates with the national and international community for enhancing world peace and sustainable development in Egypt and all around the world. The NMEC museum is one of the largest cultural institutions in Egypt, the Middle East, and the world. Its size is about thirty three acres containing about one hundred thousand square meters of spaces for curating and exhibiting more one hundred thousand artifacts from different Egyptian historical periods. Many of these artifacts date back to more than thousands years.

The museum is located in the Al-Fustat area in old Cairo. Al-Fustat is the first capital of Islamic Egypt that was built in 641 A.D. This location is distinguished because it is near downtown Cairo and surrounded by several famous landmarks of Cairo city (e.g prehistoric sites of Maadi culture before 5100 years ago, Bablyon fortress, Hanging church, Amr ben El-Aas's mosque, Salaheldin's Citadel, Ben Ezra synagogue, Imam Alshafie's mausoleum) (figure.3).

Although it has many facilities and values, it has not yet had a disaster risk management plan. So the researcher seeks to set a proposal for formulating a DRM plan that aims to:

- Secure the lives of museum visitors, and staff.
- Protect and preserve the Egyptian tangible and intangible heritage for future generations.
- Reduce losses of heritage values that are embodied in museum collections.
- Prevent and mitigate disaster risks to the museum.
- Raise skills and abilities in Egyptian heritage protection for effective response to potential hazards at all levels.

2. The Values of NMEC Museum

The museum has many values related to its attributes as following:

Value	Attributes	Value score on basis of Qualifiers of Attributes (Authenticity, integrity, sustainability, uniqueness) Low(1) medium (2) High (3)
Historical	It has a historical location as mentioned above, and it now owns more fifty thousands objects of different Egyptian historical periods.	3
Cultural	It has a theater hall with five hundred seats, Cinema hall with three hundred thirty seats, nine Exhibition galleries and cultural programs for its audiences	3

Value	Attributes	Value score on basis of Qualifiers of Attributes (Authenticity, integrity, sustainability, uniqueness) Low(1) medium (2) High (3)
Educational	It has exhibition galleries, guiding tours programs. five classrooms for Learning programs, meeting, conferences, lectures halls, a training center with five rooms and training programs.	3
Social	It conserves and maintains Egyptian heritage for future generations through proper documentation, conservation labs and storage of objects in well equipped store rooms. It has awareness raising programs for community engagement through exhibitions and interacts with community to adress various issues such as reviving traditional crafts, skills, customs and traditions.	3
Scientific	It has a study and research center for humanities, natural sciences and applied sciences equipped with modern labs such as DNA, X rays, chemistry with Carbone 14, Microbiology, geology, Human remains… It holds local and international scientific meetings conferences and training workshops.	2
Economical	It has facilities for sustainable community development such as priceless artifacts, exhibition galleries, cafeterias, restaurants, a commercial center, theater, and cinema halls as an economic resource for the national income and providing direct and indirect job opportunities in Egypt.	2

3. The Hazards, Threats, and Vulnerabilities

The NMEC museum suffers from many hazards related to its geology, hydrology, weathering, location, and structure of buildings:

3.1 Natural Hazards:

a- The earthquake : The location of the museum is 20 km from the earthquake center in Helwan area. So, if the museum is exposed to earthquake vibrations, they could cause fire, damage to its buildings built of concrete and glass. (figure.4). Then, we might experience a loss of life (whether museum staff or museum guests), artifacts, and some of its artifacts values.

b- Fires: fires are due to many reasons such as an earthquake hazard, arson, human threats, human bad behavior, or ignition materials (figure.5).

c- Heavy rain water can cause damage to the museum's buildings and artifacts existing in basement storerooms because there are technical defects in the design of the museum as the ground level of museum is lower than the street. Therefore the museum is exposed to

accumulation of rain water during heavy rains, particularly in the case of failure of pumping engines during heavy rains.

d- Biological hazards due to existing dust on western and northern side where there is an infestation of rats, reptiles, and insects. There is no anoxia machine to fight bacteria and fungi.

e- The underground water hazard is due to the nature of geographical compositions of the museum area, which is composed of limestone layers with cracks and fractures. This can lead to leaks in the building foundations .

3.2 Human threats and vulnerabilities:

a- Looting (figure.6): The museum is threatened by criminals who are living in slum areas existing around the museum. They represent real threats to the museum properties including ancient artifacts, in particularly, at times of unrest. The number of security staff at the museum is not sufficient, and their skills and abilities are limited to secure this huge museum.

b- Bomb attacks: the political situation in Egypt is unstable. Therefore the museum is exposed to destructive attacks by terrorists because the museum is so large that the security can't watch the entire premises as its numbers are few and staff is not qualified enough to adress such situations.

4. Developing a Disaster Scenario Relevant to Potential Hazards

- A strong earthquake hits Egypt on Sunday at 2:00 p.m. during the working hours.
- The Helwan area was the center of earthquake. Helwan is about 20 kilometers from the museum.
- In the meantime, a lot of visitors were watching displays of artifacts.
- The vibrations of the earthquake caused cracks and fractures in buildings and electricity cables were broken causing fires in the exhibition galleries.
- The exhibition galleries contain big organic and inorganic artifacts from Pharaonic and Islamic periods displayed in showcases. Glass objects are displayed in showcases without taking consideration of earthquake vibrations.
- So, glass objects fall down due to the earthquake and they are broken.
- There were three security people working during the earthquake, one in each gallery.
- When they see fires: one of them cries for evacuating visitors pointing at exit doors, but some doors are without an exit signage so, the visitors are directed to doors bearing exit signage causing crowding.
- The other two security people try to search for fire extinguishers. One tries to open it but they can't do so. Another one manages to open a fire extinguisher but it does not work, so they try to use the hydrants but there is no water in the hoses because the water engines are broken.
- At this moment, the fires spread due to flying sparks causing loss of many organic objects and damage to others.
- Then, one of security personnel goes down to call the director of the museum and the curators, who are in the lower floor. They shout "there are fires in the exhibition galleries and some showcases are broken".
- The director tries to call the fire department but there is no reply and it takes more than ten minutes to get an answer.
- The police and fire fighters arrive after one hour, so, a lot of priceless organic objects are lost and others damaged.

5. Effects and Impacts

The results of any catastrophic disasters such earthquakes or fires may lead to loss the lives of museum visitors, and staff or to cause injuries to them. They may also lead to loss or damage to artifacts, which will result loss of intangible and other heritage values for the future generations.

6. Mitigation and Preparedness Plan for Potential Hazards

Mitigation aims to reduce loss of life and property by lessening the effects and impacts of disasters and to reduce or prevent long-term risk from hazards on the existing built environment, artifacts, and future construction . I propose this mitigation plan that will be based on five strategic levels as follows:

6.1 Avoidance level:

This level takes into consideration the national legal framework and international conventions. Thus, the museum will need an official decree of the Minister of Antiquities for establishing a disaster risk management department. In the following step, the director of the museum based on this decree will form a department structure defining roles and responsibilities of actors and stakeholders built on how interested and how powerful these stakeholders are. Then, they will set mitigation plans and measures to be undertaken before, during, and after a disaster and others for short, medium, and long term. This table shows actors and stakeholders according to how interested and how powerful they are:

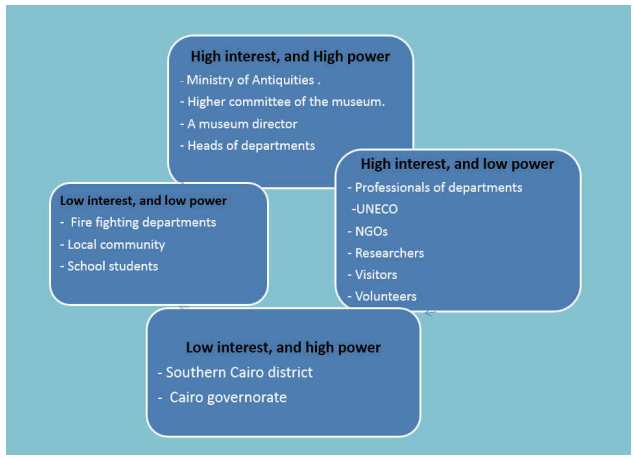


Figure1 Diagram of Actors and Stakeholders of the NMEC Museum

6.2 Blocking level :

- **Physical: Land use, transportation, development plan:** in case of fire, we should define evacuation areas (figure.8), remove unnecessary ignition sources, upgrade electrical wiring, regulate dedicated smoking areas, using electricity power for cooking in restaurants instead of gas, building cisterns.
- **Technical Level : Structural and Material:**
  We should prepare tools and equipment for an emergency response team, documentation, packing, and relocating.
- **Maintenance and Monitoring Systems:**
  Restoration and packing material, environmental control system equipment (humidity, temperature).

6.3 Detecting level:

We should have alarm systems for fires such as flames, smoke and heating censors, and different types of monitoring cameras which can work 24/7.

6.4 Response level:

The emergency response team should consist of members or groups who cover the following responsibilities: coordinator, safety and security, administration and finance, spokesperson for the media, cultural heritage (to include building and maintenance, and salvage of collections or fragments). The team members should be aware of their roles and responsibilities that are determined and prepared in advance .

6.5 Recovery level:

This level includes these steps:

Assessing a situation and condition of damaged objects and buildings, and their values. Record the description, material, dimensions, and diagnose the current situation/condition (poor, fair, good, excellent), as well as methodology and techniques for implemention .

Finally, collecting funding from different entities whether governmental funds, national and international institutions, NGOs, or individuals to implement recovery strategy.

7. A Pilot Project on a Conservation Training Course

7.1 Project objectives will focus on:

a- Raising capacity building of conservators.

b- Protecting and preserving the living heritage.

7.2 Activities: workshops, lectures, and awareness programs.

7.3 Actors: Curators, conservators, professionals, experts…

7.4 Duration: 3- 6 months.

7.5 Raising resources related to this project by presenting the proposal to governmental funding agencies, national and international institutions, NGOs, or individuals interested in heritage preservation.

7.6 Seeking to engage powerful people with a low interest in the site via communicating with them to know their issues and problems.

8. Conclusion

Establishing a disaster risk management department in the museum has become essential and inevitable for many reasons. The first reason is the need to formulate mitigation plans and preparedness measures before the disasters. The Second reason is that the museum can secure the safety of the museum visitors and staff through a proper evacuation plan, as well as prevent and mitigate disaster risks to its artifacts. Hence, the museum can protect and preserve its assets including artifacts values for future generations.

Figure2 overview of the national museum of Egyptian civilization

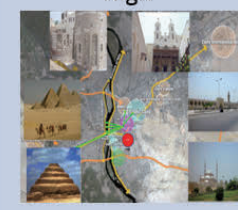
Value	Attributes	Authenticity-integrity-Uniqueness
Historical   	- A historical location: Museum built on ruins of the first capital of Islamic Egypt Al-Fustat and surrounded by historical landmarks of Cairo (e.g. Babylon fortress, Hanging church, Amr ben Alaas'sMosque, Salaheldin's citadel, …) - A museum owns more 50 000 objects of different Egyptian historical periods representing the Egyptian tangible and intangible heritage. - A museum Owns 22 mummies of the greatest Egyptian Kings (e.g. Amenhotep I, II, III, Thothmesis I, II, III, IV, Queen Hatshapsut, Ramsses I, II, III, ..).	High   

Figure 3 a table shows tangible and intangible heritage displayed in exhibition galleries

Figure4 location the national museum of Egyptian civilization site include ALfustat area

Hazard	Vulnerability	Effects and impacts
Earthquakes	- Location near from the earthquake center at Helwan Area - Geological area layers cracked and fractured lime stone. - No considerations in museum buildings design for occurring Earthquakes . - Bad display practice (No consideration for glass material objects)	■ partial damage ■ fractured ■ distortion ■ loss for values 

Figure 5 a table shows earthquake hazard, vulnerabilities, and effects and impacts.

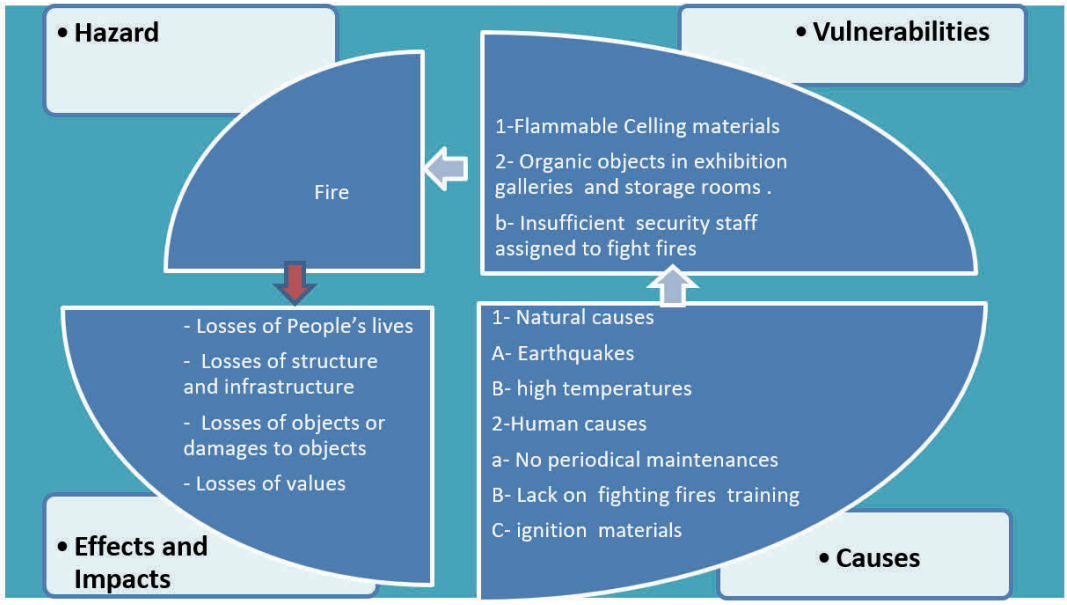


Figure 6 a diagram shows a fire hazard and its relevant vulnerabilities, causes, and impacts

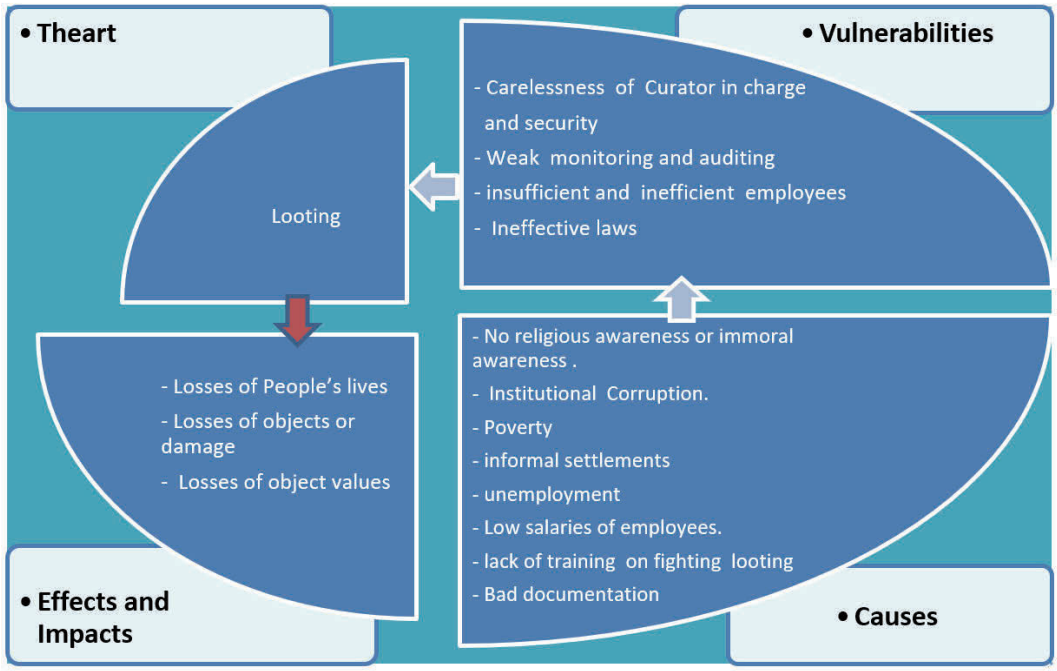


Figure 7 a diagram shows a looting threat and its relevant vulnerabilities, effects, and impacts

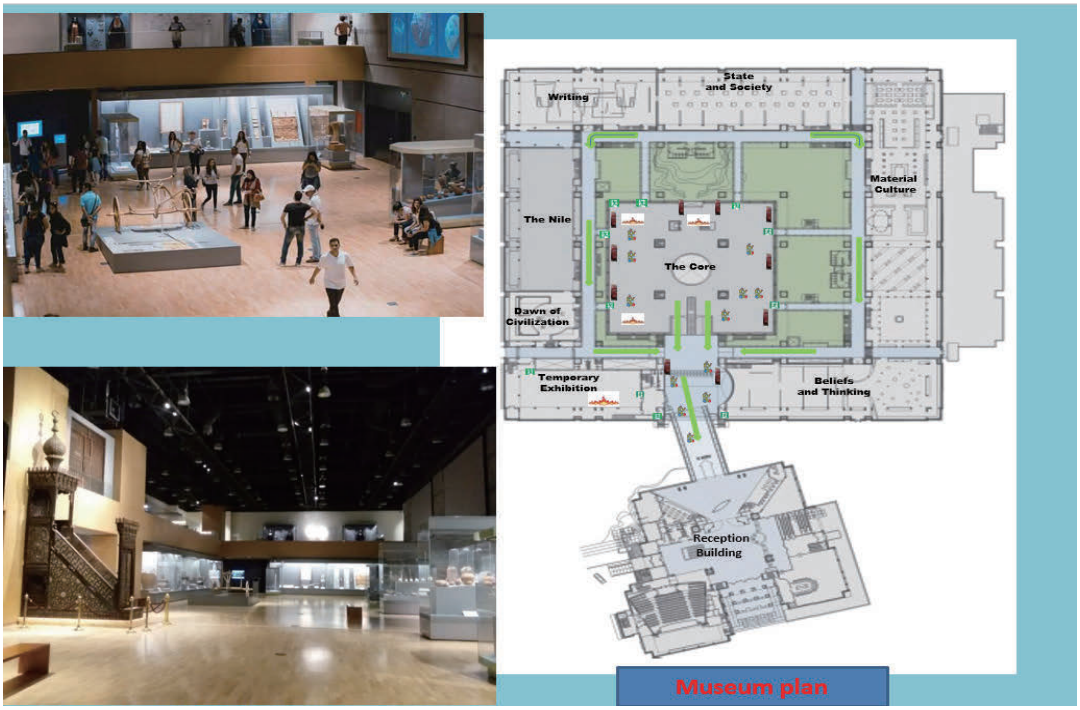


Figure 8 photos and plans of exhibition galleries show an evacuation plan proposed

References

1) Holtorf, C.: (2018) Embracing change: how cultural resilience is increased through cultural heritage, World Archaeology, vol. 50:4, pp. 639-650, DOI. Accessed on 2019 Nov. 10 ; Heritage and Resilience , Issues and Opportunities for Reducing Disaster Risks Report for UNUSDR, p. 25, 2013. Accessed on 2019 Nov. 5.

2) A Guide to Risk Management of Cultural Heritage, ICCROM, p. 15, 2016.

3) Cooper, J., Sheets, P., et al: Surviving Sudden Environmental Change: Understanding Hazards, Mitigating Impacts, Avoiding Disasters. Boulder, Co.: University of Colorado Press, 2012; Warsaw Recommendation on Recovery and Reconstruction of Cultural Heritage, Ministry of culture and National heritage of Republic of Poland, 2018.

4) Managing Disaster Risks for World Heritage, UNESCO and ICCROM, p.12, 2010.

5) National Disaster management Guidelines for museum, India 2017; Romão, X., et al: A framework for the simplified risk analysis of cultural heritage assets, Journal of Cultural Heritage, vol. 20, pp. 696–708 , Porto 2016; Conolly, J., Lane, P. J. : Vulnerability, risk, resilience: an introduction, World Archaeology, 50:4, pp.547-553, DOI,2018. Ekblom, A.,: Livelihood Security, Vulnerability and Resilience: A Historical Analysis of Chibuene, Southern Mozambique, Published online 2012 Apr 28. Doi, Accessed on 2019 Nov. 10 ; Field, C. B, et al: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, Cambridge, p.7, 2012.

6) Fitzhugh, B.: Hazards, Impacts, and Resilience among Hunter-Gatherers of the Kuril Islands, J. Cooper, and P. Sheets, et al: Surviving Sudden Environmental Change, University Press of Colorado, p. 30, 2012.

7) Nagy, A.A.H. et al: Dewatering using groundwater modeling in Al-Fustat area, Old Cairo, Egypt, Ain Shams Engineering Journal, December 2012.
8) Jigyasu, R.: Socio-economic recovery, Research Center For Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University, Japan 2008.
9) Factsheet: what is mitigation, Federal Insurance and Mitigation Administration, https://www.fema.gov/what-mitigation, Accessed on 2019 Nov 3.
10) Factsheet: FEMA's Federal Insurance and Mitigation Administration, https://www.fema.gov, Accessed on 2019 Nov 3; Heritage and Resilience, Issues and Opportunities for Reducing Disaster Risks Report for UNUSDR 2013. Accessed on 2019 Nov. 5.
11) Fitzhugh. B: Hazards, Impacts, and Resilience among Hunter-Gatherers of the Kuril Islands, J. Cooper and P. Sheets: Surviving Sudden Environmental Change, University Press of Colorado, p. 40, 2012.
12) Endangered Heritage Emergency Evacuation of Heritage Collections, UNESCO and ICCROM, p. 12 2016.
13) Managing Disaster Risks for World Heritage, UNESCO and ICCROM, p.12, 2010.
14) Guide to Developing Disaster Recovery Frameworks, Sendai Conference Version, March 2015.

2.5 Disaster risk management plan for Los Amantes de Sumpa (The Lovers of Sumpa) archeological site and museum, Ecuador

Enrique RODRIGUEZ LEON
Emergency Manager and Security, Response Unit
Risk Management Department, City of Santa Elena, Ecuador

Introduction

Ecuador is located on the South American Pacific coast. It is a small yet diverse country with important archeological, historical, and cultural heritage to be preserved, maintained, and studied. Among its cultural assets we can count the museum and archeological site of Los Amantes de Sumpa (The Lovers of Sumpa). This museum integrates elements of the Las Vegas (also known as Sumpa) civilization, considered by scientists as a proto-culture of this region, and items from subsequent civilizations of the same area, such as the Valdivian (the first ceramists in this part of the world), the Chorrera and the Machalilla civilizations.

The civilization of Las Vegas emerged around 10,800 years ago and for 4,000 years continuously occupied the field between two streams that form the Las Vegas River and which gives the name to this human group. Among several features that makes Las Vegas civilization notable is that Vegas is "a local manifestation of a variable pre-ceramic culture of the Ecuadorian coast (including the fluvial zones) product of the early adaptation of South America crossed the wooded areas of Central America"(Stothert, 1988). In addition, the Las Vegas culture was one of the earliest cultures in South America to practice agriculture. Burial customs underwent a major change in the later Las Vegas. Burials took place only at the two major sites (the Site 66/67 and Site 80, where nowadays is located the Site-Museum of the Lovers of Sumpa) of the culture, and according to archeologists, with the remains of people who died elsewhere transported to those sites for burial or reburial. The burial customs suggest that the two main sites had become base camps and ceremonial centers. It is also remarkable that the Site is considered the most ancient large cemetery of the American continent, identified by Edward Lanning in 1964.

The Vegas originated among the groups of hunter-gatherers adapted to the tropical forest that developed in Central America in the late Pleistocene. This is similar to Cerro Mangote of the Panamanian Pacific Coast with whom it shares funerary features, the very rudimentary lithic technology, without greater specialization in big game hunting and mollusk collection. Possibly their subsistence economy was mixed that included hunting, not very specialized fishing, gathering, and incipient cultivation of utilitarian plants like mate, and edibles such as squash, corn, etc.

The discovery area is inside a complex called "The Lovers of Sumpa", in approximately half a hectare and is currently within the urban perimeter of Santa Elena.



Location and Context

This museum is placed near the western end of the continental land of South America, in the city of Santa Elena, which is capital of the province with the same name. Karen Stothert started the excavations in this place back in 1971 and from 1977, under the auspices of the Central Bank of Ecuador, an extensive research program called the Paleo-Indian Project was started. It was declared as Cultural Patrimony of the Nation on April 25, 1977, by Ministerial Agreement and it was the trigger to develop the museum on the archeological site.

In the museum there are three elements that attract more attention and are key parts of the institution. These highlighted items are: 1) The Tomb that gives the name to the museum; 2) The burial site the forms an important part of the museum; and 3) The ceramic pieces of the cultures developed on the zone, mainly the Valdivian.

Attributes and Values

The cultural significance of the museum, its interactions with the city and a considerable part of its citizens has made it an important part of the social tissue. So, the museum adds values to the identity and function of the area in several layers. The more evident factors are: Cultural (the city, the province and several commoners have adopted the images as part of its identity), Historic (considering that it is one of the oldest burial sites in the continent); Scientific (only 20% explored or investigated so far, there are still important questions to be scrutinized); Educational (visits of schools and universities for the permanent exhibitions as much as for the temporary ones); Economic (many businesses around the site that are linked in one way or another with the activities of the museum, considering the tourist activities linked to the site); and also the Social (the site is used in social activities by a vast array of associations, communal groups, and citizens).

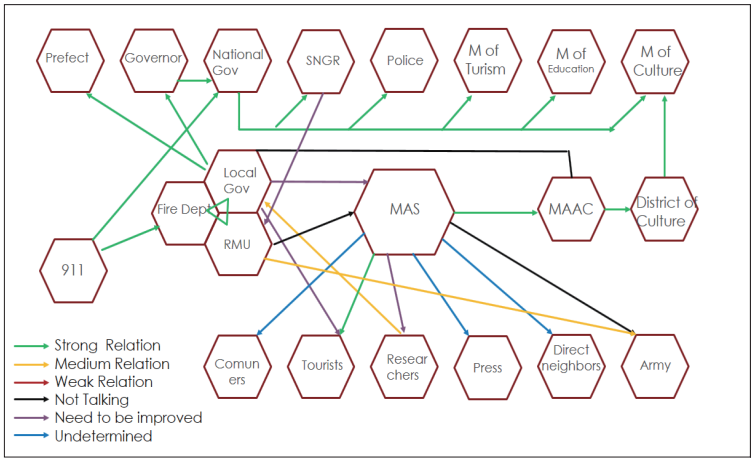
Stakeholders

It might be easy to define the stakeholders at different levels, by relating them to the attributes of the museum:

Institutional; These includes the Museum itself, but as it is under the management on the MAAC (Museo Antropológico y de Arte Contemporáneo) the main decisions are taken by the latter. It will be also important responsibility of the Ministries of Culture (and the Regional Direction N° 5), Education and Tourism; and The Prefectural, Provincial and Municipal governments;

Social; These includes neighbors, who carry out economic activities around the museum and cultural groups, social and cultural associations that carry out various activities in the museum; the school of the region that visit the museum; and

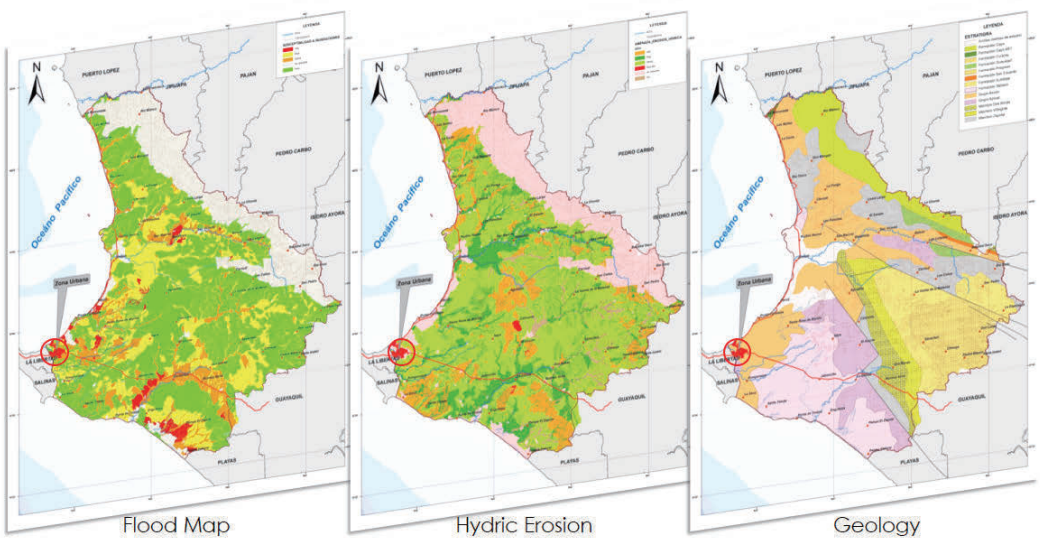
Academic/Scientific; this group includes the universities of the province, region and the country as well as the scholars of foreign universities and other entities such as National Institute of Cultural Heritage.



Risk Analysis

The country is located on the Pacific Rim, making it prone to earthquakes. There are records of events of high intensity with a return period of 100, 70, 50 years. The last significant earthquake struck on April 2016 in the province of Manabi with and intensity of 7.8 and in early 2019, an earthquake with the epicenter in Santa Elena during a national holiday caused mass evacuation of tourist in the middle of the night.

As it is located on the coastline, Santa Elena has been affected by the tsunamis, necessitating evacuations several times. The Japanese International Cooperation Agency (JICA) has been working with the local government on the development of technical maps of possible inundation caused by tsunami.



There are inherent vulnerabilities related to the attributes and are caused by:

- The fragility of the elements of the archeological ceramic collection.
- The use of traditional materials of the area (from the use of straw for the roofing to the use of thinner for treating the wooden structures in order to repel termites and ants).
- The use given to the museum by the authorities in case of a major incident (It has been used as a shelter in previous incidents).
- The decisions taken for display in the museum (inadequate and fragile showcases and overcrowded spaces).
- The location of archeological site. (The site location, not far from the ocean but over a small hill in an urban area about 33 m.a.s.l., gives it a relatively safe position in case of Tsunami thereby making it suitable as a refuge shelter, but at the same time as it is located between two streams that form Las Vegas River, the surroundings are relatively prone to inundations).

Risk Management

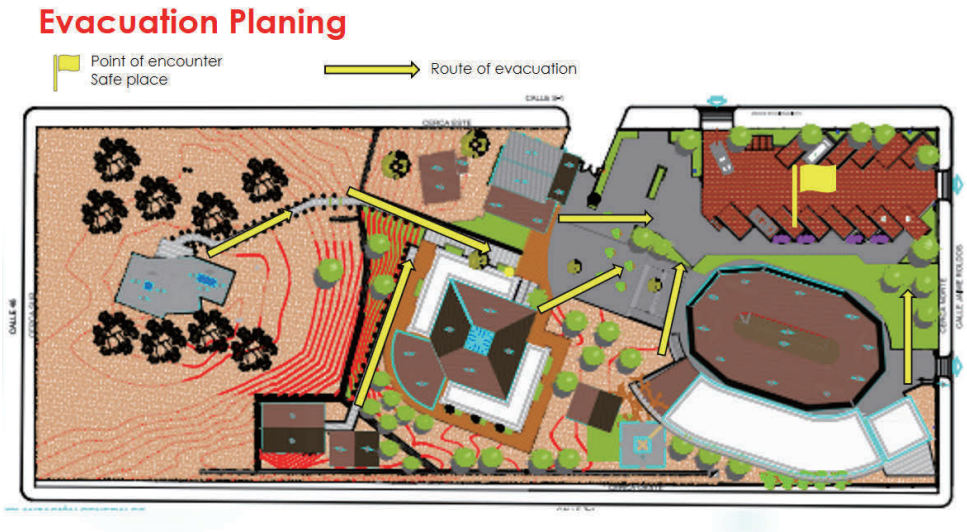
Mitigation measures should be implemented before any incident with the goal to reduce the loss of life as well as any damage to the assets, elements, visitors, and personnel. Following mitigation measures are proposed:

- Implementation of anti-slip mats on the showcases and store cases.
- Reduce the quantity of items stored per showcase/store case.
- Organize at least one evacuation drill every semester with the staff of the site.
- Reinforce the material of construction of the cases for storage and display.
- Determinate potential alternative places for storing items (within and outside the museum, considering that it is under management of a bigger museum located in Guayaquil, some 150 km away and that the routes between these two museums might be affected or destroyed in a major event).
- Strengthen the relationship with the local government, neighbors and other stakeholders (in order to be more seriously considered as an important actor in the planning process for emergencies).
- Use of geotextile on the hill of the archeological site (There is an effect of erosion of the surface layer of the burial site, due to natural factors. The implementation of a geotextile or vegetative cover is highly recommended to protect the site from weathering and further erosion that might destroy some attributes and distort values of this site).

In case of an adverse incident the **first response** should be precise, acting promptly and in order. The main procedures of the response personnel will be:

- Activation of the brigades (according the Ecuadorian legislation which uses the OSHAs normative as framework, the institutions should have 4 brigades: 1- First Aid, 2- Firefighting, 3- Evacuation, Search and Rescue, and 4- Order and Security).
- Evacuation of the visitors to a predefined safe area (according to the emergency plan).

- Cutting down the electric power.
- Lock down the exhibition rooms and the warehouse.
- Determinate potential hazards activated by the incident (such as fire, water leakage, deterioration of the containers, showcases, and storage cases).
- Contact the MAAC (Museo Antropológico y de Arte Cotemporáneo, which manages the activities of several cultural sites in the Ecuadorian coast) and receive information about the evolution of the incident.
- Provide support and information to the visitors and public in general (it is advised to train the personnel in psychological first aid).



Recovery Planning

Early recovery should comprehend the measures aimed at preventing a further loss and to achieve adequate administration of the incident, considering the continuity of operations, the accountability, an adequate transition from response to recovery and containing the cascade effect of the main event.

The initial steps to take in this part of the process are:

- Documentation of the scene (it should cover: check lists, photographs, video and all kind of possible documentation).
- Rapid triage (the triage of victims, infrastructure, and cultural heritage).
- Start the Cultural Heritage First Aid, considering the prioritization according to the value and condition/vulnerability of the objects.
- Put the items treated/rescued in a safe place, and mobilize to an alternative place, if necessary and feasible.
- Implement a logbook for the Cultural Heritage treated / rescued (aiming to have an accountability and official record of the people accessing the cultural goods).

Two strategies to consider in this phase are: 1 –The reactivation of the site as soon as possible, even adding the process of treating the archeological items to be considered as a temporary exhibition 2- the identification of other short terms activities of the site besides the museum that can create positive impact among the visitors.

References

1) Stothert, Karen E. (July 1985). "The Preceramic Las Vegas Culture of Coastal Ecuador". American Antiquity. American Antiquity, Vol. 50, No. 3. pp. 50.
2) Chancay Vásquez, José. Instituto Nacional De Patrimonio Cultural Del Ecuador, Dirección de Inventario Patrimonial, Ficha de Inventario SA-24-01-54-000-17-001001, Bienes Culturales Arqueológicos, Ficha de Inventario de Sitios Arqueológicos, Valdivia.
3) Chancay Vásquez, José. Instituto Nacional De Patrimonio Cultural Del Ecuador, Dirección de Inventario Patrimonial, Ficha de Inventario SA-24-01-02-000-17-001002, Bienes Culturales Arqueológicos, Ficha de Inventario de Sitios Arqueológicos, Las Vegas.
4) Moore, 97; Raymond pp. 82.
5) García Caputti, Mariella. "La Figurina Como Reflejo De Un Modo De Vida Valdivia" pp. 19-30.
6) Stothert et al (2002); Moore, Jerry D. (2014), A Prehistory of South America, Boulder: University of Colorado Press, pp. 96-97.
7) Stothert, Karen E., Piperno, Dolores R., and Andres, Thomas C. (2002), "Terminal Pleistocene/Early Holocene human adaptation in coastal Ecuador: the Las Vegas evidence, pp. 3.
8) Stothert, Karen E.; Dolores R. Piperno; Thomas C. Andres (Fall 2004). "New Evidence of Early Holocene Agriculture from the Coast of Ecuador: A Multidisciplinary Approach" Culture & Agriculture. pp.24.

2.6 Disaster Risk Reduction for the Dal Josafat Cultural Landscape, South Africa

Clinton JACKSON
Manager
National Inventory, South African Heritage Resources Agency

1. Introduction

The Dal Josafat Cultural Landscape is a declared National Heritage Site comprising of three farmsteads, now consolidated onto a single farm known as Dal Josafat Farm 1341, these being; Roggeland, Non-Parielle and Goede Rust.

The consolidated property lay in the custodianship of the state for many years, until the mid 1980's when the area was declared to be a township under the Apartheid area Group Areas Act. Through this process, the farmsteads were earmarked for demolition in order to make way for the proposed township. In 1985 the then National Monuments Council (Now South African Heritage Resources Agency) sought to protect the site from destruction by declaring the consolidated farm to be a National Monument, thereby preventing its destruction (O'Donoghue et al, 2017).

On 21 February 1986, the ownership of the property was transferred to the National Monuments Council in order to ensure its continued preservation. It was during this time that many of the buildings on the property were expertly restored to near pristine condition (O'Donoghue et al, 2017).

In 1999 the National Heritage Resources Act (Act 25 of 1999) was passed. This new legislation aimed to create a more integrated system of heritage management in South Africa. Within this new legislation all National Monuments declared under earlier legislation were now deemed to be Provincial Heritage Sites, under the protection of Provincial Heritage Resources Authorities rather than the national body.

With the expansion of the City of Paarl, pressure was placed on the South African Heritage Resources Agency for other governmental departments to use and develop the Dal Josafat property. This pressure prompted SAHRA to relook at the status of Dal Josafat in 2009, and the decision was made to include the property in the greater Cape Winelands declaration that was currently underway (Ida's Valley & Boschendal Founders Estate). On 31 December 2009, the Dal Josafat Cultural Landscape was formally declared to be a National Heritage Site, and part of the larger Cape Winelands Cultural Landscape.

Recent occurrences on the site, such as a fire which severely damaged one of the main structures on the Non-Parielle farmstead has highlight the need to effectively assess and mitigate risk within the declared landscape.

2.Attributes and Values of The Dal Josafat Cultural Landscape

The Dal Josafat Cultural Landscape is a multi-component site located within the Drakenstein Municipality, in the Western Cape Province of South Africa. With the declaration of the landscape as a National Heritage Site in 2009, the formal statement of significance is expressed as follows;

"The Daljosafat Cultural Landscape is significant because of its idyllic setting, rich history associated with living heritage and a distinctive cultural and natural environment. It boasts a distinct Cape Vernacular Architecture with an aesthetic landscape design, unique to South Africa. Further significant features of

the site are that it remains untouched, unaltered and it is authentic in its rural simplicity. The site exudes qualities less evident in other landscapes of its kind and exhibits magnificent cultural treasures ranging from fine historic monuments, rich social and linguistic history, with significant farmscapes with a Cape Vernacular Architectural tradition, to routes of scenic value with unspoilt views of the iconic Hawekwas and Klein Drakenstein mountain ranges as a backdrop.

The architectural design is predominantly in the Cape Dutch style, albeit that some of the buildings denotes architectural interventions of subsequent historic period."

Figure 1: Components of the Dal Josafat Cultural Landscape

3. Legal Protections and Site Management

The 232.5850 Hectare Dal Josafat property (Farm 1341) is protected under the National Heritage Resources Act, Act 25 of 1999 as a National Heritage Site and is owned and managed by the South African Heritage Resources Agency (SAHRA); the national body responsible for the coordination of heritage management in South Africa. However, despite the formal nature of the protection, there is currently no conservation management plan in place to guide the ongoing management of the site.

The Roggeland and Goede Rust farmsteads are currently leased out to private bodies as a Guest House (Roggeland) and a drug rehabilitation centre (Goede Rust), with the third farmstead (Non-Parielle) being vacant and in a state of disrepair. The site has however been registered as a Public, Private Partnership (PPP) project with the view of income generation for ongoing conservation of the landscape as well as beneficiation of the surrounding community through the creation of job opportunities.

Whilst the PPP project has the potential to secure the long-term conservation and use of the site, there are currently ongoing issues with vandalism and illegal dumping present in certain areas of the landscape.

Whilst South Africa has been making strides in the fulfilment of the Sendai Framework, cultural heritage is still not included in the disaster management value chain (NDMC, 2005, NDMC, 2017, Mtengwane, 2019), thus disconnecting the protection of heritage resources from disaster risk management initiatives.

In order to ensure that heritage is protected in the face of disaster, further policy is required to bridge the divide between cultural heritage resources management and disaster management.

4.Hazard Analysis

The Drakenstein Municipal Disaster Management Plan identifies fire, floods, transport incidents, communicable diseases, hazmat incidents, dysfunctional infrastructure, earthquakes, environmental pollution, and severe weather as the priority risk areas within the municipality (Drakenstein Municipality, 2019).

In the specific context of the Dal Josafat Cultural Landscape, the site is regularly affected by VeldFire events (Wild Fire). This is due to the fire adapted fynbos biome in which the site is located, as well as the ongoing concerns of vandalism, of which fire is a secondary impact.

An examination of sentinel imagery of the landscape shows the impact of a previous VeldFire event occurring during January of 2017.

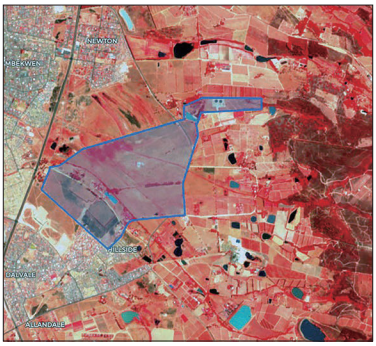


Figure 2: The Dal Josafat Cultural Landscape in 2016 before fire (Modified Copernicus Sentinel data, 2016/ Sentinel Hub).

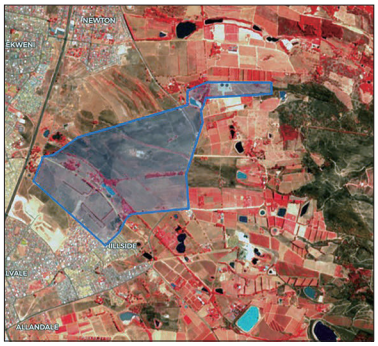


Figure 3: The Dal Josafat Cultural Landscape in 2017, post fire, burn scars are shown as black areas (Modified Copernicus Sentinel data, 2017/Sentinel Hub).

Whilst VeldFire has been identified as the primary hazard for the purposes of this exercise, there are other potential hazards that can affect the site, these being; vandalism (high probability of occurrence), flood, and seismic events. The analysis presented in the figure 4 shows the relationships between these various hazards, the vulnerability of the site, and the potential impacts of loss of the site.

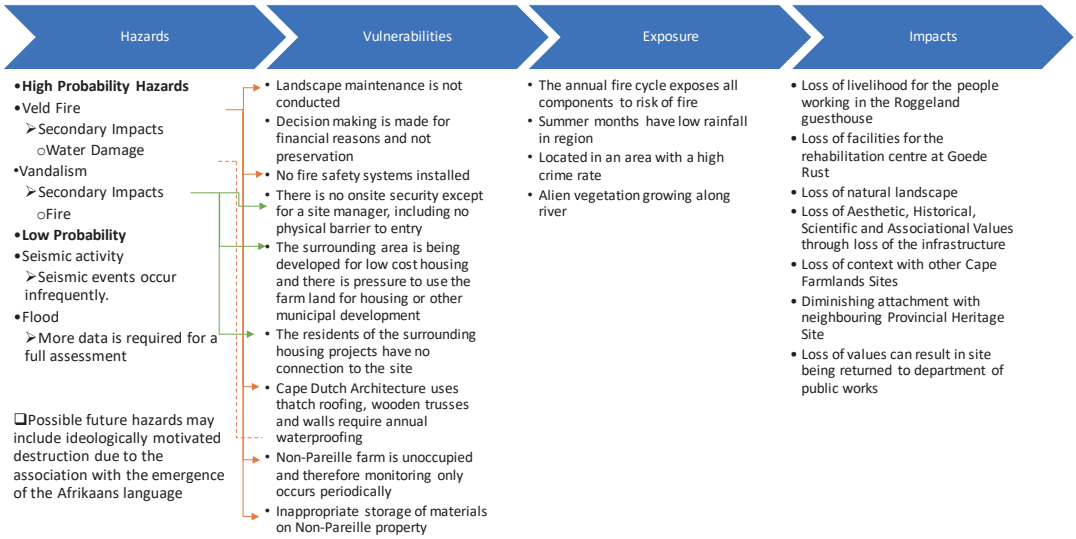


Figure 4: Hazard and vulnerability analysis

4.1. Impact of Fire on Values

As a multi component site, the impact of fire events on the components and their associated values varies. Noting this however, as a landscape, the impact on individual components affects the overall significance of the site, especially those values which are based on the accumulation of the components such as the Aesthetic and Historical values which require that the context and fabric of the site remain intact.

Value	Components	Value Score	Impact	Notes
Aesthetic	All components	3	High	As the site is a landscape, the loss of one of the components affects the vales of the entire site. There is also a greater contextual element that links with neighbouring farms as well as the Cape Winelands Serial Declaration.
Historical	Goede Rust, Non Pareille, Roggeland, and Hugo Cemetery	3	High	The historical authenticity of the site is reflected in the rural nature and layout of the site. Destruction of any of the components may also create avenues for unsensitive development on the site.
Scientific	Goede Rust, Non Pareille and Roggeland manor houses. Archaeological scatters	2	Low	There are other examples of this type of architecture. The ESA material won't be detrimentally affected by the fire, the visibility of the scatter would improve through the burning of surrounding vegetation.
Associational	Goede Rust, Non Pareille, Roggeland, and Hugo Cemetery	2	Medium	The Afrikaaner government during apartheid were willing to sacrifice this property through the group areas act. This value may increase in impact in the future. There are additional sites with a stronger link to this value.

5. Mitigation

Following on the analysis above, the following mitigation measures are suggested, based on the most likely risk of fire related events. In the formulation of these measures, achievability and impact were taken into consideration, noting the limited fiscal resources available for implementation of measures.

Importantly, fire hazards have already been identified on site and funding made available for the installation of physical mitigation measures such as fire detection and suppression systems.

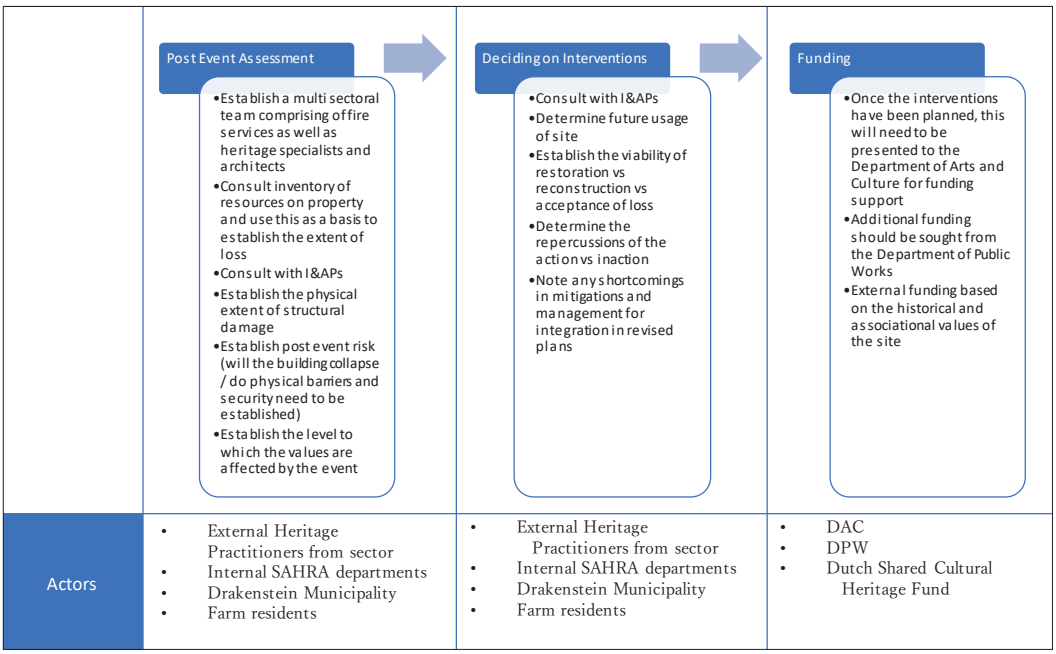
Noting the move to install systems for the detection and suppression of fire risk, measures based on community participation and awareness have the potential to be a high impact mitigation strategy.

S.No.	Attribute	Mitigation Measure	Scale of Intervention	Which hazards are eliminated?	Actors	Duration of implementation	Estimated Cost for developing, implementing and maintaining
1	Landscape (All attributes)	Open communication lines with farm residents and provide them with basic fire training.	Landscape level / Relationship	The vulnerability of the site to fire and to vandalism will be reduced as the residents will be more involved in the protection of the site	SAHRA Properties Manager, Site Supervisor, All farm residents	Short	Low

S.No.	Attribute	Mitigation Measure	Scale of Intervention	Which hazards are eliminated?	Actors	Duration of implementation	Estimated Cost for developing, implementing and maintaining
2	Non Pareille, Goede Rust, Roggeland	Installation of fire detection and drencher systems	Building	This intervention will create a notification system so that fire services can be alerted to a potential situation even in the absence of the site manager or farm residents	SAHRA Properties Manager	Short	Medium (Funding already available)
3	Landscape (All attributes)	Open communication with local Fire Watch Groups and the Drakenstein Emergency and Fire Services	Relationship	This will provide an early warning system	SAHRA Properties Manager	Short	None
4	Landscape	Development of a management plan for the site	Landscape level	The development of a management plan which can be followed by all staff as well as the occupants of the farmsteads	SAHRA Property Manager. SAHRA Built Environment Unit/ Farm residents	Short	Medium

6. Recovery Planning

In the event that a fire related disaster occurs, having a clear recovery framework will ensure that the situation is managed effectively, and minimise the risk of further damage to the site through uncoordinated action. The below figure presents a simplified three phase approach to the recovery planning process, whilst it was developed under the framework of recovery post a fire related disaster, it can still serve as a template for other occurrences.



7. Conclusion

As the Dal Josafat Cultural Landscape is a National Heritage Site owned by the national body responsible for the protection of cultural heritage in South Africa, the management of the site should serve as an exemplar for effective management countrywide. With this view, plans are already underway to address areas of concern, such as fire safety, and security measures to address issues of vandalism.

References

1) Drakenstein Municipality. Corporate Disaster Management Plan. Drakenstein Municipality, Western Cape, South Africa. 2019.
2) Forsyth, G., Kruger, F., Le Maitre, D. National veldfire risk assessment: Analysis of Exposure of Social, Economic and Environmental Assets to veldfire Hazards in South Africa. Report CSIR/NRE/ECO/ER/2010/0023/C. CSIR-National Resources and the Environment, South Africa, Pretoria. 2010.
3) Mtengwane, A. South African Delegation Attending the Global Platform for Disaster Risk Reduction in Geneva. Cooperative Governance and Traditional Affairs. http://www.cogta.gov.za/?p=6696 (03 November 2019). 2019.
4) NDMC. Guideline: Development and Structure of a Disaster Management Plan. Retrieved from: http://www.ndmc.gov.za/Guidelines/Disaster%20Management%20Plans%20and%20Minimum%20Infrastructure%20Requirements.pdf (03 November 2019). 2017.
5) NDMC. South African National Disaster Management Framework. Retrieved from: https://www.gov.za/sites/default/files/gcis_document/201409/275340.pdf (03 November 2019). 2005.
6) O'Donoghue, B., Orton, J., Pether, J. Heritage Impact Assessment: Dal Josephat. Unpublished Report. 2017.
7) Sentinel Hub. Sentinal Hub https://sentinel-hub.com/eo-browser, Version .19.3,, Sinergise Ltd. (27 June 2019). 2019.

2.7 The Historic Centre of Napoli, Italy

Roy GIAMPORCARO
Junior Professional Officer in Cultural Heritage
Culture Sector
UNESCO Amman Office

1. Introduction

In the past decades, several disasters struck Italy, its territories and its populations. These disasters are often related to natural hazards that are triggered by the complex geomorphology of the country and, due to its specific natural conditions. More frequently, the level of damage from such disasters can increase significantly when natural hazards are combined with the human induced ones.

Some of the most frequent natural hazards in Italy are earthquakes, flooding, volcanos, landslides, and wildfires. While the human induced hazards that most frequently occur are due to unplanned urbanization, lack of maintenance, and even organized crime.

Given this hazardous context, the cultural heritage in Italy is always vulnerable to disaster. Our cultural heritage is widely diffused all over the country and represented in all its different forms— landscape, historic cities, monuments, craftmanship, beliefs, and so on. This situation is even more complex if we consider the deep stratification of the cultural heritage and its indissoluble unity with the social fabric, where one complements the other and vice versa.

For these reasons, every time a disaster takes place, the probability of cultural heritage being affected is considerably high.

Figure 1 - Recent disasters in Italy

In this context, Italy has been improving the national prevention and protection system by giving more consideration to cultural heritage, in all the stages that come before, during, and after a disaster.

Within this improved framework, an institutional body has been established by the Government of Italy to manage the emergency situations. It is the National Service for Civil Protection.

Within this system, the Civil Protection adopted different strategies and methodologies to cope with this kind of situations, for planning the emergency preparedness and response actions in the case of a disaster, such as the "Augustus method ", which foresees specific regulations and procedures regarding cultural heritage.

In parallel, the Ministry of Cultural Heritage established specific internal units for the assessment of damages that, in case of disasters, should be deployed in coordination with the relevant authorities in charge of the management of the emergency situations.

Notwithstanding the improved efforts that the different stakeholders are deploying, the frequency and the intensity of disasters affecting cultural heritage is posing new and different challenges compared to the standard procedures that have been so far implemented.

Some of the most recent disasters, not only in Italy, have caused levels of destruction of the urban settlements and the disruption of the human life that, sometimes, make some question the necessity of recovering the cultural heritage.

Many in our society, especially the scientific community, have agreed on the importance of implementing a disaster risk management strategy for cultural heritage. Its recovery in each disaster situation is a fundamental step in the whole process. Recovery of cultural heritage can act as a binding factor for people and as the foundation of our social life. But still, new and more effective procedures that really address the complexity of the risks related to cultural heritage need to be elaborated and embodied at all the relevant levels, from local communities to the governmental level.

2. The historic centre of Napoli

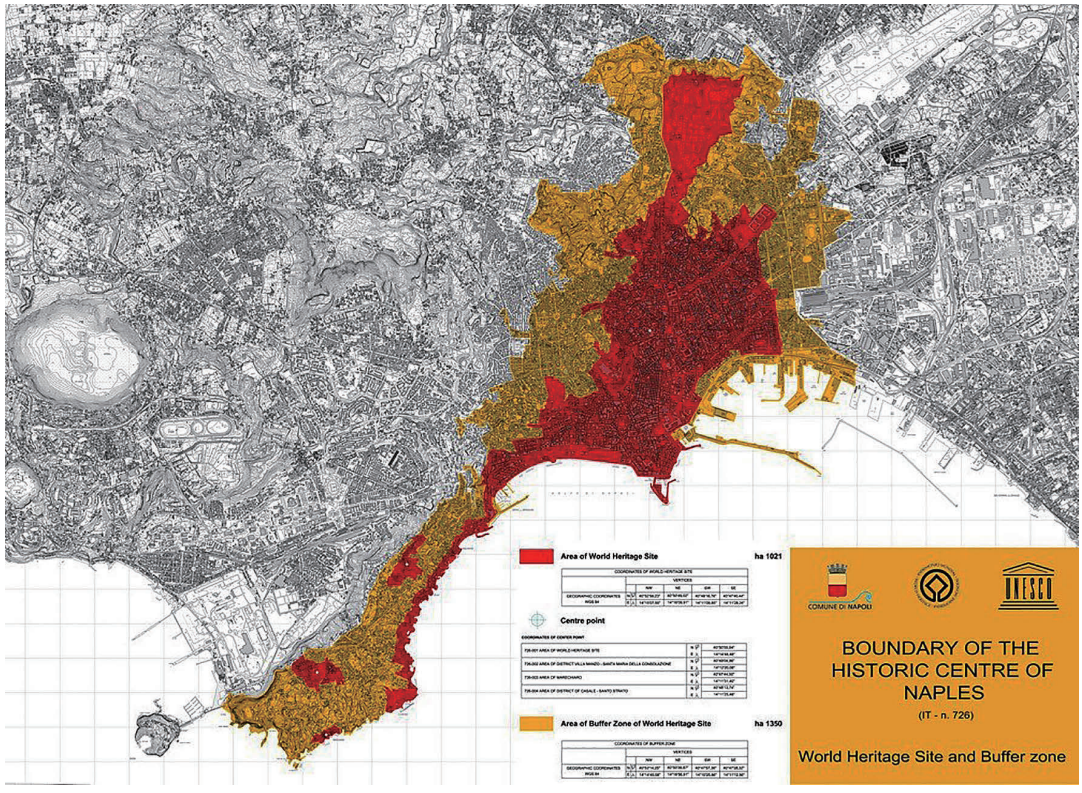


Figure 2 - UNESCO World Heritage map

The historic centre of Napoli constitutes a unique place in the urban history of Europe. The foundations of the contemporary city directly lie on the ancient Greek city and since then, Napoli has always hosted a civilization. Its population and traditions have no interruptions along its millenary history.

The historic centre – and many historic buildings – is an expression of complex and continuous stratification, which, is clearly readable in the city. Many contemporary structures are built over eighteenth century fabric, which is built on medieval structures, in turn built over Roman ruins that are founded on Greek edifices.

The constant succession of the ages left a complex stratified context in the urban fabric of the city as well as on the social component of it. The communities of Napoli keep and make use of traditions that come from all the different phases of the city's history. In the craftmanship, in the food, in the music, and even in the language, the Neapolitan dialect, the different influences are still nowadays used and preserved by the residents making them also a fundamental component of this cultural site.

In such a context the strong and indissoluble trait d'union that binds all the components of the cultural heritage; distinguishable but not separable is clearly recognized.

3. Attributes and Values

The historic centre of Napoli was included in the UNESCO World Heritage List in 1995. Its Outstanding Universal Value according to the inscription file lies in the criterion (ii), considering the great influence of Napoli in Europe and beyond, as one of the major cities, and the criterion (iv), given the complex and continuous stratification of the urban fabric and the architectures of the city that start from the Greek period until the contemporary era.

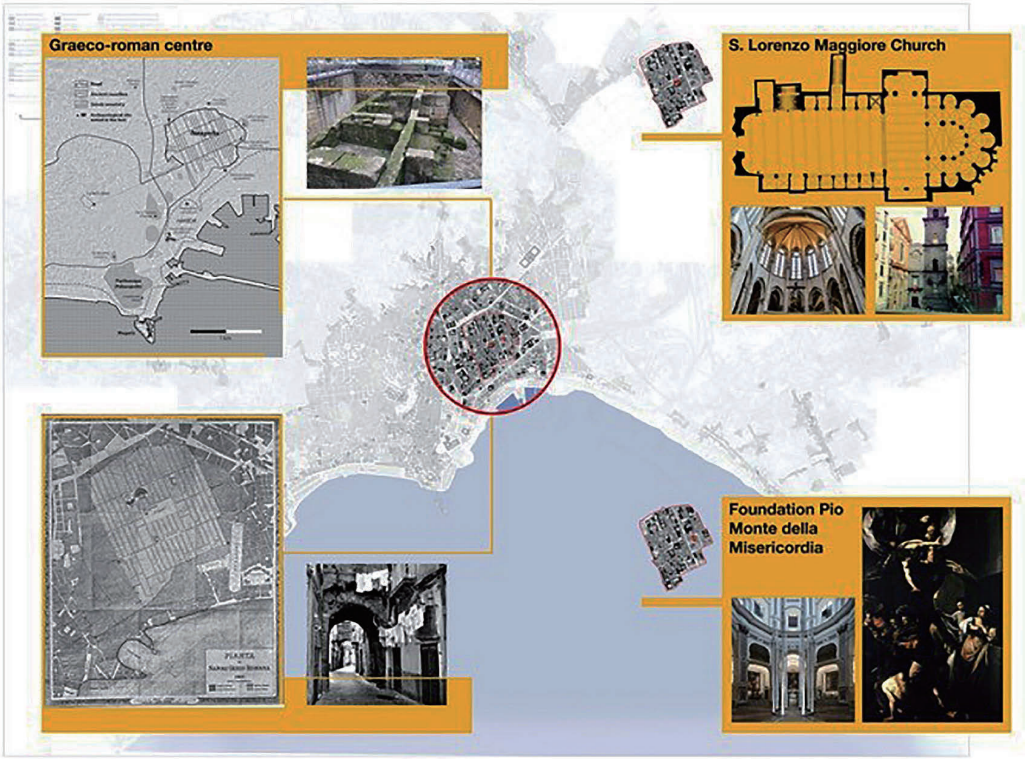


Figure 3- Identified components

In the difficult exercise of simplifying this complexity in defined, circumscribed examples, some important elements of the historic centre should be considered to identify and clarify the attributes and the values of the site.

One of the most important elements is the urban fabric of the historic centre, which is still the Greco-Roman urban layout that includes ancient structures such as walls, theatres, temples, and civic buildings. The aforementioned stratification is clearly readable in this area, and it goes along with the social components that created this set-up and that are, in turn, influenced by.

The church of San Lorenzo Maggiore also constitutes a valid example as a singular monument. The church is one of the most important original examples of French Gothic architecture in southern Italy. The church has been built over a previous basilica, and over a Greco-Roman market that still can be visited as part of the archaeological area. The church also has some very important elements of the Neapolitan Barocco, such as the chapel of Sant Antonio and the façade.

Furthermore, in order to consider also some of the many movable heritage objects disseminated in the historic centre of Napoli, the Pio Monte della Misericordia Foundation could be taken into consideration. The building houses a unique Caravaggio painting, the Seven Works of Mercy. The building itself is the birthplace of a foundation that has operated since 1607. This works on behalf of the weakest members of society. They commissioned Caravaggio to make a painting that represented the Pio Monte della Misericordia foundation's mission. Again here, even a movable object cannot be considered apart from its physical, social, and historical context. Each object is connected to the others.

4. Hazards and Vulnerabilities

The city of Napoli rises from a complex geomorphological context, surrounded by volcanos, at least of which are active. It is located in a seismically active area, prone to severe earthquakes.

There are many potential natural hazards that have caused, and could cause again, significant disasters in the city and its surroundings.

It is impossible to draft a list of the most probable events, giving priority to one or another, since all of them could occur and could cause a disaster. Some of them could be considered to be of catastrophic proportions, such a violent eruption of one of the volcanos (i.e. Campi Flegrei is considered a super-volcano, which through ancient eruptions affected the climate of the entire Mediterranean area).

Of course, based on the events statistics of past decades and centuries the most probable and dangerous events are earthquakes.

In a potential scenario a severe earthquake with a magnitude between 6 and 7 of Richter scale, could impact the vulnerabilities of the site causing serious damage and disruption to the city and its population.

Considering the components previously identified some of the most significant vulnerabilities to be considered are: 1) the weakness of the historical buildings that are not built and maintained to face dynamic actions such as a seismic event 2) the damage to historic buildings as a side effect of the high urban density and the low maintenance quality of the non-designated buildings 3) the difficulty to protect and evacuate movable cultural heritage that are stored and kept inside historical buildings 4) the very tight and complex urban fabric, which is not suitable in case of evacuation, with very tight alleys that could be easily blocked by collapsed buildings.

In addition to these structural and physical vulnerabilities, there is the fragile social component.

The social component has been identified as one of the foundational elements of the heritage site of Napoli. As part of this site its weaknesses and vulnerabilities could have a direct and irreversible effects on the cultural heritage values.

Traditionally the historic centre has always been inhabited by some of the poorest segments of the society, which, until the beginning of the 90s, made the historic centre a difficult area of the city to be lived in and managed. From mid-90s to nowadays a social transformation is taking place, supported by the several investments that have been made in past years, triggering a revitalization of the centre that in the recent years became a gentrification.

Notwithstanding the ongoing social transformation, the centre is still, and mostly, lived in by the low/middle class people who continue to keep and develop the old living traditions, preserving the historic centre from a deep gentrification process sustained by increasing tourism in the city.

In case of a disaster, such as an earthquake, these segments of the society will be the most affected and, most probably, the ones with much more difficulties in recovering after the disaster if they are not well supported by special provisions. The combination of the forced withdrawal of the residents' community, the installation of the bourgeois, and the flourishing of touristic activities (BnB, hotels, etc.) could seriously compromise the identity of the place and its values.

5. Mitigation and Preparedness Measures

Evaluating the risks of a site is a complex process that should take into consideration several variables and factors. In that sense, the historic centre of Napoli constitutes a very complex case, being a living city where one of the most important and vulnerable components is the social one.

An accurate and proper Disaster Risk Management Plan should also develop an articulated multi-hazards scenario considering the influence of each event on the others as well as their effects.

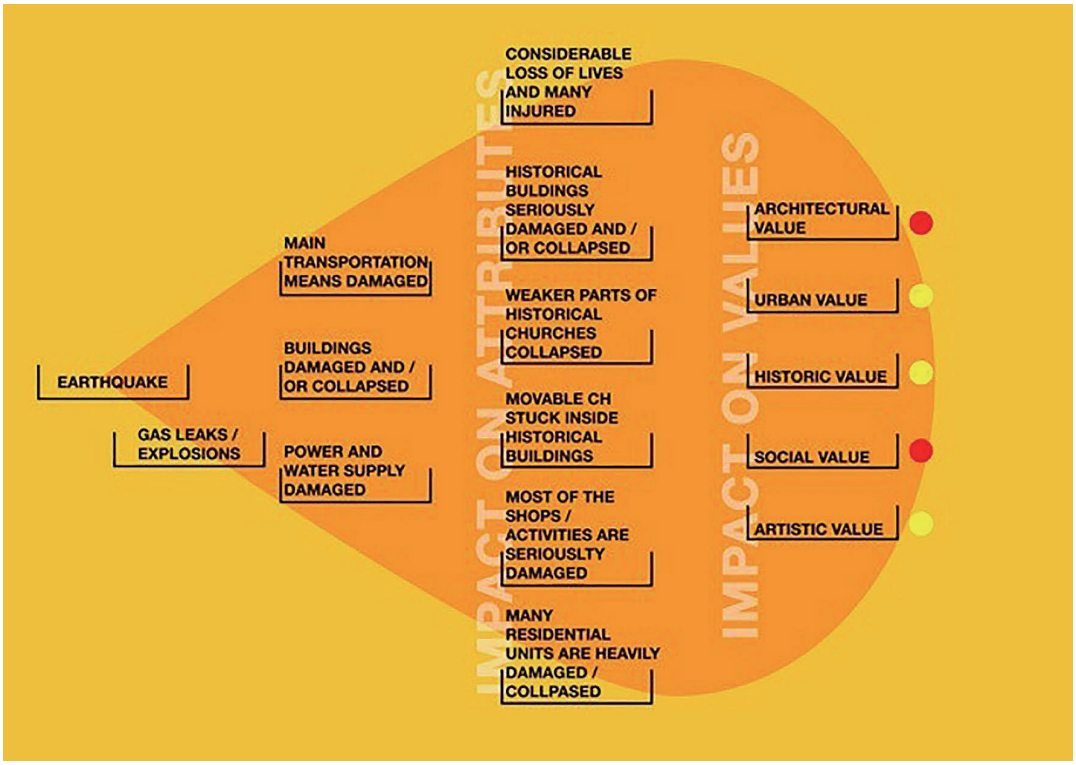


Figure 4 - Risk assessment

Based on the components identified and considering the vulnerabilities detected, the preparedness and

mitigation measures that shall be taken into consideration in case of an earthquake could be divided into two main groups: measures of the physical component and measures of the social component.

These measures shall follow the risk path in the opposite direction to go back to the vulnerabilities and mitigate the impact of hazards on them. In the case of the urban fabric, the historical buildings and monuments, some of the most important actions to be taken are the improvement of conservation and consolidation interventions on the buildings themselves as well as on the urban setting. This includes retrofitting and identification of evacuation routes. Considering the high urban density of the historic centre and the potential effects of the damages of non-designated historical buildings on designated ones, an important non-structural measure could be elaborating a cultural heritage typological designation for all the traditional buildings in the historic centre. This would mean that by law the experts of the Ministry of Cultural Heritage will apply all the necessary procedures in order to preserve them and reduce the vulnerabilities of the urban setting.

As preparedness actions, a detailed evacuation plan should be elaborated by taking into consideration the complexity of the urban setting and the locations of cultural heritage (especially movable culture heritage for evacuation). This would be supported by an inventory of non-designated cultural heritage. The evacuation plan should also identify the closest safe place to store the cultural heritage objects, based on the type and extent of disaster.

Regarding the social component, several measures at different levels shall be implemented, such as: 1) a subsidy system to support people in restoring their houses 2) the establishment of a subsidy system to support the residents in reestablishing the commercial and business activities 3) promote the establishment of an association of the local commercial and business activities which could provide help in the recovery phase; limit the creation of new touristic activities (BnB, hotels, etc.).

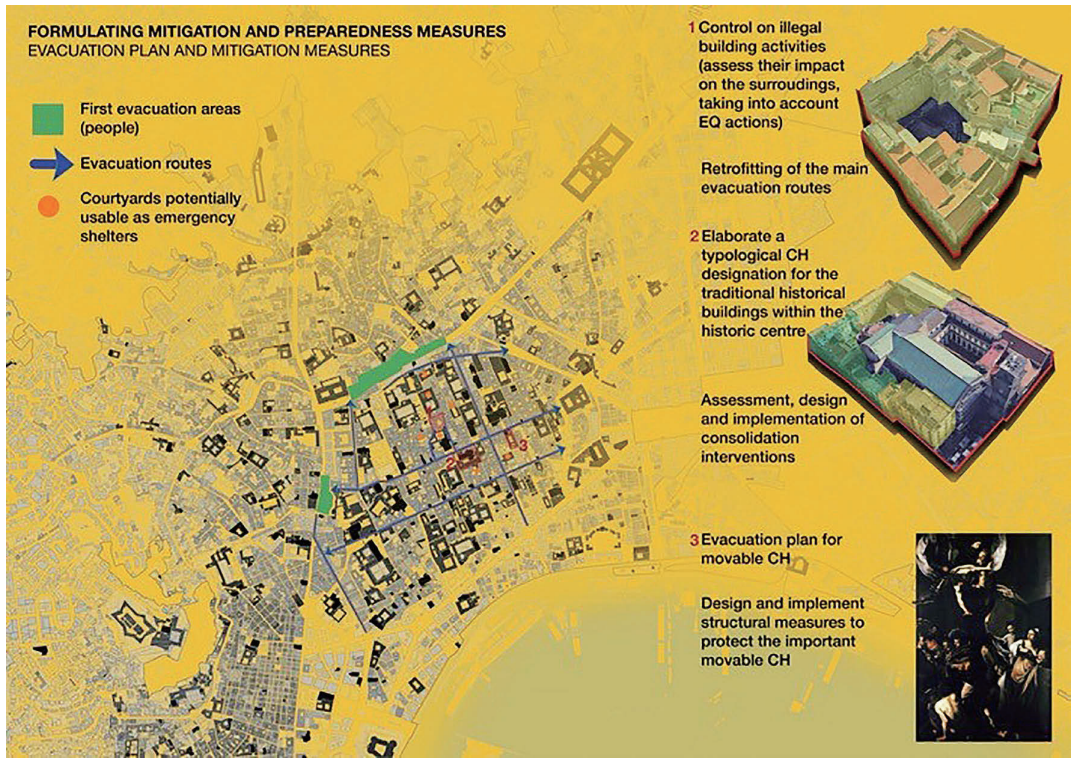


Figure 5 - Evacuation plan and mitigation measures

6. Conclusions

The historic centre of Napoli showcases a crucial example of managing a complex heritage site exposed to several hazards. The complexity of the site poses difficult challenges and some of them go far beyond the heritage management, falling under the regulations of social life.

In recent years Italy has been significantly improving the protection system of cultural heritage, becoming a leading country in the management of cultural heritage in case of disasters, although many steps are still necessary to consider the importance of protecting cultural heritage beyond just the physical.

To face such challenges the first and most important step is the establishment of a common platform where all the stakeholders and actors could bring their interests and where a synergy could be developed in order to provide a coordinated response. This approach should consider all of the necessary actions that will be taken at different levels to identify and protect all the values of the cultural heritage.

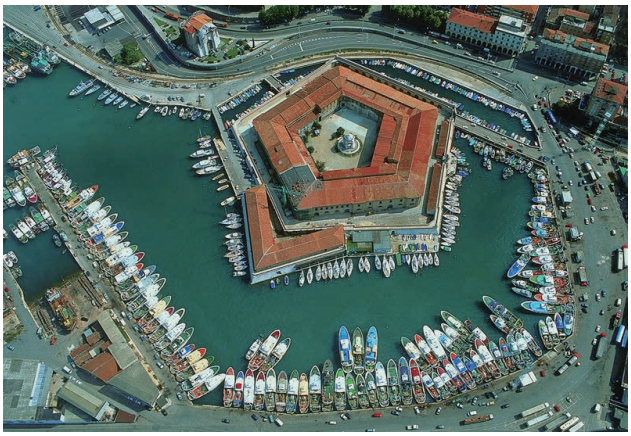
Reference

1. L. 225, 24/02/1992.
2. "Augustus method", B.9, 1 and 2.
3. World Heritage Committee, Nineteenth Session, Berlin, 4-9 December 1995.

2.8 Integrated DRM plan for People and Cultural Heritage needs for Mole Vanvitelliana in Ancona, Italy

Alessia STROZZI
Officer
Ministry of Cultural Heritage, Marche Region's branch

1. Introduction



The Mole Vanvitelliana (or Lazzaretto) is a landmark feature of Ancona city. It is a historic building built in the 18th century and designed by famous architect Luigi Vanvitelli. Its original purpose was to be a lazaret: a quarantine station for maritime travellers. Over the years, the site has taken different functions, mainly as a military citadel since the 19th century. Today it houses the Omero Tactile Museum, La Mole temporary exhibition space, and the storage for movable Cultural Heritage rescued after the Central Italy earthquake in 2016. In the summer, concerts, open air cinema, a restaurant and a bar popular among young people (Lazzabaretto) complete the scene. This area also functions as a meeting point for the Ancona's inhabitants.

Unfortunately, it lies on an artificial island where the sea level is rising. It is also in an earthquake prone area: Ancona city was destroyed during the 1972 earthquake. It has a high percentage of visitors, who are disabled. These visitors usually need special attention in case of a disaster. This site has social and aesthetic value among others, which qualifies it for conservation.

2. Plausible Risk Scenario

It is Friday afternoon, just before the beginning of the August holidays in the Mole Vanvitelliana. The workers in the wing that is under restoration are busy finishing the work. At 4 pm they close the restoration site and leave, forgetting to isolate the electrical supplies.

In the meantime, the workers in the courtyard are preparing the scene for the evening theatre. It is free opening ceremony with 400 seats plus 100 people standing.

At 6.30 p.m. everything is settled and people (average around 50 years old) start to arrive for the Aperitivo in the Mole's courtyard. The younger people will approach the Lazzabaretto to listen some Jazz music later on, while the Omero museum is open from 5 p.m. to 8 p.m.

At 8.30 p.m. everything is settled and the theatre-play starts.

At 9:10 pm an earthquake occurs: people are in panic, but the staff, which is trained for this situation, controls the situation and starts to evacuate the courtyard through the two evacuation paths.

An impediment put up at the end of the street for security against possible terroristic attacks creates a bottleneck for effective evacuation. In addition, since the evacuation is through a tunnel, people start to scream, which complicates the situation. The people with disabilities have also been evacuated with special attention.

The bridge, which is the only access to the Lazzabaretto, collapses due to earthquake. Due to panic, some young people who are stuck there, try to save themselves by swimming across the divide.

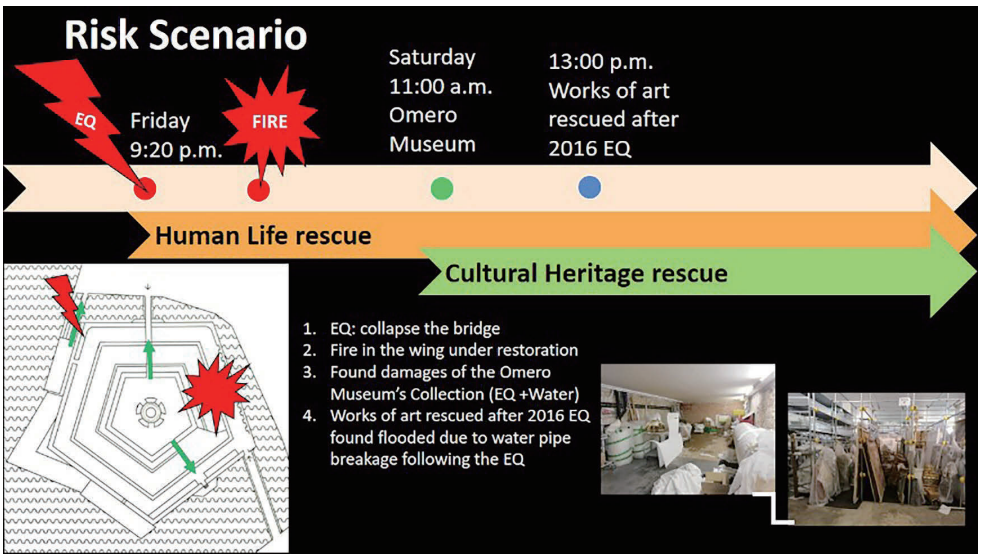
There are some injuries due to panic behaviour and the Red Cross, together with Yellow Cross volunteers are present to provide first aid.

At the same time, a blackout occurs due to the earthquake: Emergency Teams of the National electrical systems are working to solve the problem, while the Fire Brigade is responding to the calls received to assist citizens in the city. There are no injured amongst the citizens. Few damages are seen on the buildings, and no houses have been declared unsafe.

At 10 p.m. the electricity comes back.

At 10: 15 p.m. the fire fighters are called due to a fire in the construction area in Mole Vanvitelliana. Close to the construction site lies the Omero Museum, which have replicas of famous statues and artworks of the world. It also contains a particular collection of contemporary artworks specially made for the Tactile Museum. The Carabinieri are on the scene and have reported the situation to the Omero Museum's Director and the Ministry of Cultural Heritage, through the regional branch: Soprintendenza ABAP of Marche Region. The day after Omero Museum's director and his team are allowed to access the museum and have concerns regarding the contemporary collection of 75 pieces, which are on the mezzanine of the museum.

In addition to this, there is concern about the objects stored from the previous earthquake. The Carabinieri are called to check the storage. The storage for movable cultural heritage rescued after the Central Italy EQ is found with water on the floor. It comes from a little room used as a temporary conservation lab, 20 centimetres higher than the storage floor.



3.Integrated Disaster Risk Management

Despite the fact that Mole Vanvitelliana has never faced severe damages due to earthquakes, we can see

from the above scenario that multiple hazards are present.

Developing this scenario is a tool to identify the vulnerabilities and the strengths of the site/museum in order to find answers. In case of Mole Vanvitelliana, it is possible to plan an alternative route by sea with Red Cross or Fire Brigade boats by asking permission for using the private boats nearby. We should also plan for retrofitting the bridges and to prepare two kits for opening the gates. For the wing under restoration, electrical isolation of the construction site every day, implementation of fire detectors and fire extinguishers and, training for the workers is important. Regarding the wooden roof, we can put in place a drencher system, use back up water system with seawater only in case of emergency, and use the traditional water resource of the fortress for drinking.

For movable cultural heritage, we have two different aspects: for Omero Museum we have to prioritise the contemporary art collection, prepare safety measures tailored for each piece following the priority list. The UCCR Task Force for cultural heritage should be reached quickly and in coordination with volunteers in the City/Marche Region. We can create access to fresh water from the fortress, prepare and store kit for drying objects.

In the case of works of art rescued after Central Italy Earthquake, the priority list of the objects has to take into account three parameters: values, damage, and the specific scenario. This means we will have different priority lists, one for each scenario (fire, water). In addition, we need to work on retrofitting the storage area and fixing the water leakage. We should also elevate the items (no objects under 40 cm). Safety measures should be tailored for earthquakes. This includes protection from falling from shelves, anchoring the status and vertical paintings.

We should also work through policies:

- Policy for identifying a safety temporary storage for collections: Memorandom of Understnadings (MoU) with owner (private/public), plan the evacuation through a safety route, make a list of the stakeholder & volunteers for the evacuation, training and re-training as an emergency team once a year.
- Policy for overtime work of Ministry cultural heritage officers during disasters
- Policy regarding evacuation exercise for Ancona's inhabitants from Mole

The integrated DRM Plan for Mole Vanvitelliana is a tool that can be used to assess and reduce the impacts of various potential hazards.

4. Way Forward

This study presents two opportunities: to think ahead and organise the Museum Omero's new exhibition with anti-seismic support for most important statues of the contemporary collection, and organising the Integrated DRM plan for People and Cultural Heritage needs. This will be useful in coordinating the emergency response. Therefore, this pilot project will be tested through a simulation and used as a model to educate the public and professionals as a safeguard not only people's lives, but also of their values.

Reference

1) Omero Tactile Museum (http://www.museoomero.it/)
2) La Mole temporary exhibition space (https://www.lamoleancona.it/)
3) Italy vulnerabilities: Climate Knowledge Portal by World Bank Group: https://climateknowledgeportal.worldbank.org/country/italy/vulnerability

2.9 Wamala Tombs, Uganda

Samson Lukabya NABBIMBA (OMUTAKA NAKIGOYE)
Kabaka's Trail Coordinator
KABAKA FOUNDATION

1. Introduction

Wamala Tombs (also known as Ssuuna II Wamala Tombs) is located in Nansana, Wakiso District in Uganda, East Africa. The Site, which is gazetted by the Government of Uganda, and therefore is nationally protected, is the burial place of King Suuna II (1836 -1858). He is recorded as the 29th King of Buganda. He fathered Muteesa I who is buried at Kasubi Tombs World Heritage Site. Ssuuna II was the last King to be buried in his palace and the last to have his jawbone removed after death. He was the first monarch to admit foreign traders into Buganda Kingdom and consequently introduced Islam in the Kingdom. The first Quran is kept at the Site.

Wamala Tombs has a large hut that is placed at the top of Wamala hill. The hut that was once a palace is a mausoleum now. Wamala Tombs Site has similar characteristics with Kasubi Tombs World Heritage Site. Both sites have mausoleums built with vegetal materials, the main huts at both of these sites are thatched and have the same shape. Additionally, the main huts have names. This particular house is called *Batandabezaala*. The Site has supporting structures such as the homes of the wives[1] of the King, a building for the safe keeping of the King's twin[2], the gate house called *Bujjabukula*, a fire place and a shade at which the thatch, reeds and vegetal materials are kept and sorted. Kasubi Tombs World Heritage has similar structures. In 2010, the main hut at Kasubi Tombs World Heritage Site was gutted by fire and is currently under reconstruction. Wamala Tombs faces similar threats and requires Management Plans including a Disaster Risk Management Plan.

<The Key Components, Values and Attributes of Suuna ii Wamala Tombs>

Components	Values	Attributes	Type of attribute (Movable/ immovable, tangible/intangible, natural/cultural/mixed	Scores for each value 1 (Low) 2 (Medium) 3 (High)
Mausoleum (Main Hut)	Historical	Burial place of King Suuna II (1836 -1858). The first Quran is kept at the Site.	Immovable, cultural Movable, tangible	3
	Cultural	• People from King Ssuuna II's lineage come to the Site for pilgrimages • Others come to the Site for spiritual purposes • The Hut houses several cultural artefacts	Immovable, cultural intangible	2
	Architectural	The construction of a very large circular hut built with wood and vegetal materials	Tangible, movable, cultural	2
	Economical	The Tourists and other visitors pay fees		2
	Educational	The stories about the Site are narrated inside the main hut	Immovable, cultural, intangible	2
	Spiritual	Shoes are not allowed in the Hut and people make requests of the King	Immovable, natural, Intangible	3

Components	Values	Attributes	Type of attribute (Movable/immovable, tangible/intangible, natural/cultural/mixed	Scores for each value 1 (Low) 2 (Medium) 3 (High)
King's twins House	Cultural	It houses the Twins to the King, and other cultural artefacts	Cultural, movable, tangible	3
	Spiritual	Some people visit this house for spiritual purposes	Immovable, intangible, natural	3
Fire place	Spiritual	People visit the fireplace for spiritual purposes and some are required to light the fire	Immovable, natural, intangible	3
	Educational	Over time people have listened to the story about the Kingdom at the fireplace which is outside the main hut	Immovable, tangible and intangible, cultural	2

2. Significance of The Site

The Site is over 150 years old and yet it is still functional. It presents the history of Buganda as a Kingdom and continuously reminds us of the strength and self-sustenance of the Kingdom, which needs to be studied and embraced for posterity. The main hut at the site presents the original architectural prowess of a Kings Palace in Buganda. The building's idea of the main hut at the Kasubi World Heritage Site originates from here. During the reconstruction of Kasubi Tombs World Heritage Site, a study was done on Wamala Tombs; the place is a living site and still functions as a palace. It has a spiritual significance to the Kingdom of Buganda. Consequently, it hosts cultural ceremonies throughout the year and some people visit the site as a cultural requirement as it is the mausoleum of King Ssuuna II, the father of Muteesa I who introduced formal education in the Kingdom of Buganda.

3. Challenges of Managing The Site

Wamala Tombs is currently managed by the Kabaka Foundation. The Kabaka Foundation is a Non-Government Organisation that is presided over by the Kabaka (King) of Buganda, His Royal Highness Ronald Muwenda Mutebi II. It is one of the properties in the Kabaka's Trail[3]. Like all other heritage properties, Wamala Tombs faces conservation challenges. The Cross-Cultural Foundation of Uganda advances that the culture sector in Uganda faces a number of challenges arising from a lack of awareness of the importance of cultural heritage, limited political will, and resources to develop and promote heritage.

There is also a lack of relevant and updated legal instruments to protect cultural heritage. These factors, coupled with negative perceptions of culture as backward, and the increasing challenges that modern development and globalization present, calls for a deliberate effort to save our quickly vanishing heritage.

Others advance that although there is a shared vision of the need to preserve and conserve urban cultural heritage, the management process is a contentious one. Stakeholders have different ideas as to how to achieve conservation goals which leads to increasing conflicts among stakeholders. The limited financial resources available to local government agencies compound this situation, as well as political interference

in the work of implementation agencies and the lack of capacity in local government to enforce rules and carry out conservation projects. There are also significant power differentials among stakeholders in the decision-making process that often means that local residents are excluded from the process of conserving their built urban heritage.

Others advance that although there is a shared vision of the need to preserve and conserve urban cultural heritage, the management process is a contentious one. Stakeholders have different ideas as to how to achieve conservation goals which leads to increasing conflicts among stakeholders. The limited financial resources available to local government agencies compound this situation, as well as political interference in the work of implementation agencies and the lack of capacity in local government to enforce rules and carry out conservation projects. There are also significant power differentials among stakeholders in the decision-making process that often means that local residents are excluded from the process of conserving their built urban heritage.

Figure 1. Map showing location of Wamala Tombs

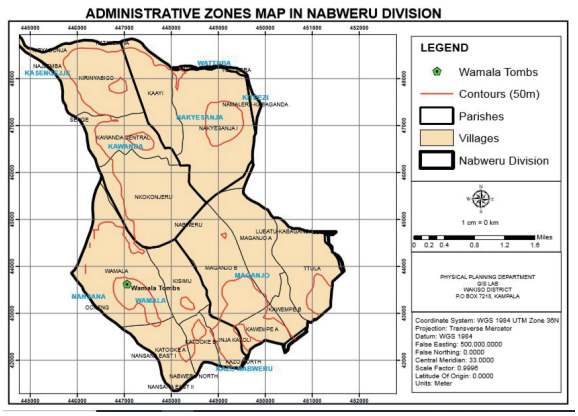


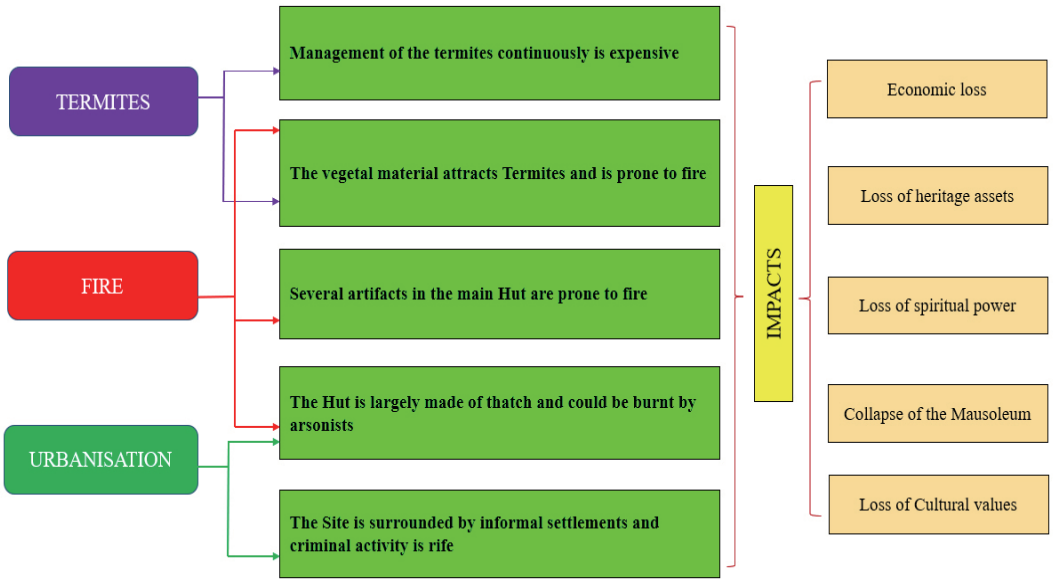
Figure 2. Administrative zones Map in NABWERU Division

Figure 3 WAMALA Tombs Main Hut called Batandabeezaala

Figure 4 Interior of WAMALA Tombs

4. Risk Analysis and Evaluation of The Site

Wamala Tombs is a very old site that was first used in the 1800's. Therefore, it needs strategic protection. Kabaka Foundation reports that general maintenance of the Site is very expensive and at times the Hut is in a bad shape. Several times the main hut has been attacked by ants and trees were growing out of its roof. Both phenomena could bring down this age-old treasure. A disaster risk management plan could save the site for posterity.



5. Disaster Scenario

One Monday evening, in February at around 19:35 o'clock, I was travelling back home. At this time of the year, it is pretty hot with temperatures at about 83˚ F. At this time, people are stuck in traffic after a long busy day.

The traditional Site keepers at Wamala Tombs, who live at the site, had moved out for shopping. One of the two guards was out of the site and the second one was taking a bath when a fire from the main hut started. The smoke coming from one side of the hut, which is next to the farm, was seen by one of the wives of the 'King'. She is an old woman who could hardly do anything to put out the fire on her own.

She made an alarm to attract the other residents at the Site. The guard who was taking a bath heard the scream and responded but unfortunately the fire had spread and the Main Hut, *Batandabeezaala*, was visibly on fire. The old lady and the guard managed to enter the burning hut and luckily, they were able to rescue some of the most important artefacts.

The people passing by the Site also saw the fire because the hut is on a hill. They called upon others who entered into the palace and tried to stop the fire from escalating with the little water at the site. When the water was used up, the fire continued to rage on. The fire hydrants at the site were of no use because they had expired. People resorted to throwing sand and soil into the fire but this was all in vain. At 20:15 the fire brigade that had been alerted by an unknown caller arrived, and the fire was stopped using the fire fighting equipment they brought with them.

By the time fire was stopped, some of the valuables in the main Hut were burnt to ashes. The metal truss structure connections, steel ties, spear bundles, hard stick cladded with reeds, sisal strings connecting the smoked reed ceiling to rafter, steel beams, hard sticks to stiffen reed cladding, hard *muvule* wood rafters, thick reed bull noses with lemon grass cladding, and sliding doors were destroyed.

6. Prevention and Mitigation Measures

Against the scenario above, and the Kasubi Tombs World Heritage Site 2010 fire incident, some mitigation measures against fire have been developed as follows;

MITIGATION MEASURES AGAINST FIRE AT WAMALA TOMBS				
Activity/ies that need to be done	**Stake holders Involved**	**Responsibilities**	**Duration of Implementation**	**Estimated Cost**
Organise awareness workshops and fire fighting drills	Traditional Site Keepers (TSK), Area Police (AP), Fire Brigade (FB), Immediate Neighbours (IN), Security Guards (SG) at the Site, Kabaka Foundation (KF) Buganda Kingdom (BK) Uganda Museum (UM)	TSK, SG & IN participate in the awareness workshops and fire fighting drills AP & FB Train and guide on proper usage of fire fighting equipment KF, UM & BK - Mobilise funds for awareness Programme a	Awareness workshop-At least twice a year Fire Drills- once in a quarter	Low
Alternate security guards (to ensure that there is a guard at the Site at any one moment)	Traditional Site Keepers, Security guards at the Site, Kabaka Foundation Buganda Kingdom	TSK Make regular follow up SG- Implement a schedule KF & BK - Mobilise funds for salaries	Continuous	Low
Promote vigilance at the Site	Traditional Site Keepers, Security guards at the Site, Kabaka Foundation Buganda Kingdom	TSK Identify risks and report SG - Implement and enforce security rules KF & BK - Mobilise funds and monitor	Continuous	Low
Installation of Fire extinguishers, Fire Hydrants at Site	Kabaka Foundation, Buganda Kingdom Uganda Museum	KF, BK &UG Mobilise funds to purchase the extinguishers and water hydrants	Short term	High
Routine maintenance of Extinguishers and other fire fighting equipment	Traditional Site Keepers, Security Guards, Kabaka Foundation, Buganda Kingdom	TSK, SG checking on the functionality of equipment and report KF & BK Mobilise funds for routine maintenance	Continuous	Low
Installation and management of CCTV camera	Kabaka Foundation, Buganda Kingdom, Security Guard	KF & BK Mobilise Funds for installation SG Operate the camera and report	Continuous	High

References

1. Hanaw M. Taqi M. Amin, Emmanuel Akwasi Adu-Ampong: Challenges to urban cultural heritage conservation and management in the Historic Centre of Sulaimaniyah, Kurdistan-Iraq, Journal of Cultural Heritage Management and Sustainable Development, ISSN: 2044-1266, Publication date: 21 November 2016.
2. The Cross-Cultural Foundation of Uganda: Culture in Development.

Notes

1 The wives of the King have inherited this position for generations and they still exist up to now.

2 In Buganda, each king has a twin that is revered and kept for posterity.

3 The Kabaka's Trail has 7 sites including Naggalabi Buddo Coronation Site, Wamala Tombs, Katereke Prison Ditch, Baagalayaze Heritage Site, Kanyange Tombs, Ssezibwa Falls and Ntwetwe.

2.10 Formulating Disaster Risk Management Plan for Persian Qanats of Baravat, Iran

Ameneh KARIMIAN
Independant Cultural Heritage and Disaster Risk Management Researcher and Consultant

1. Introduction

In the aftermath of the destructive 2003 earthquake, Bam Cultural Landscape was enlisted on the UNESCO WH List with its exceptional tangible and intangible components, including the Qanats[1] within its buffer zone. In 2016, two of these Qanats (twin Qanats), Akbar-Abad (AAQ) and Qasem-Abad Qanat (QAQ), were also inscribed on the WH List (under the criteria [iii] and [iv]) as the Persian Qanats serial property which reaffirmed their outstanding values. Typically, Qanats run for tens of kilometres with various water structures, passing through different geological formations and territories, with many shareholders. Since these Qanats are still active and in use; formulating their management plan is much more complicated. In spite of all the steps taken globally towards the revival of Qanat networks, still no disaster risk management plan has been formulated for them. In Bam and Baravat, in addition to common factors that affect the Qanats, there is a high risk of earthquakes. In fact, all the Qanats of Baravat take origin from the same strike-slip fault that causes earthquake (Fig. 1). Preparing a risk management plan is of the utmost importance according to the UNESCO annual state of conservation for Persian Qanats.

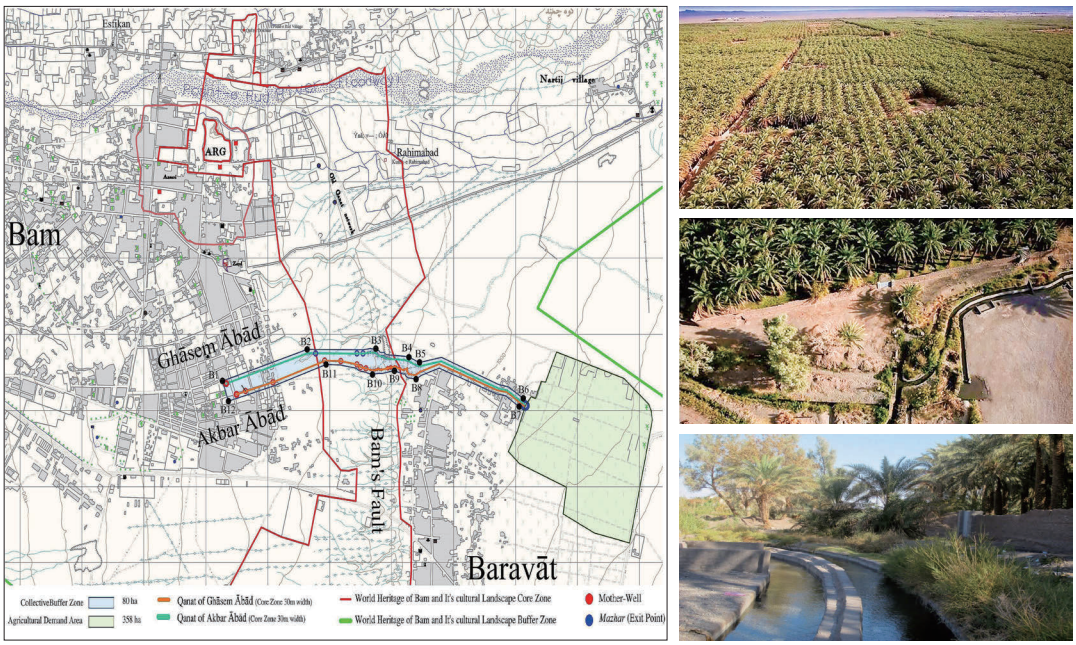


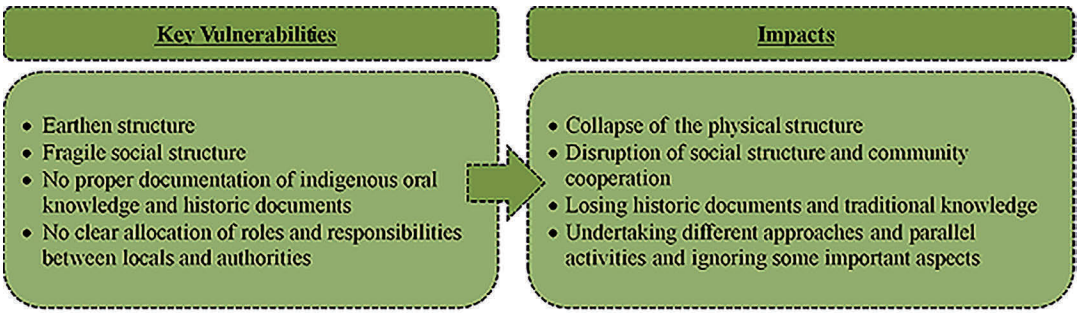
Figure 1 Left: Core zone, buffer zone and agricultural demand area of twin Qanats. Right: Aerial view of agricultural area and outlet of twin Qanats in Baravat (ICHHTO, 2015).

2. Key Components and Values

Qanat is considered as a man-made ecosystem, comprising of different tangible and intangible elements. The key component of a Qanat is its physical earthen structure, including the vertical shafts and horizontal channel. Its intangible heritage consists of a strict social structure a wealth of indigenous knowledge, and traditional practices and rituals (cultural value). The genesis of Baravat, as a significant oasis in the southeast desert of Iran completely relies on Qanats. This sustainable hydraulic system endured for more than two thousand years, reflecting the desert-specific style of architecture and landscape (architecture value). AAQ and QAQ are considered as relatively new Qanats that are 100 years old. They clearly show the transfer of traditional knowledge from ancestors to new generations. The precise layout at the fault has been done so skillfully that they are regarded as two of the best newly dug Qanats of the region (technical value) (ICHHTO, 2015). With 640 shareholders and 358 ha of agricultural demand area (economic value), they attract 16,000 tourists annually (touristic value).

3. Key Hazards and Impacts

Bam region is prone to multiple natural and human-induced hazards. The main primary natural hazards affecting Qanats of Baravat are earthquakes, floods, sandstorms, and droughts, leading to secondary hazards like landslides, block falls, and sinkholes. Urban sprawl and environmental pressure are the key threats, results in violation of their buffer zone and depletion of the groundwater table and consequently malfunction of Qanats. Some of the significant vulnerabilities and impacts associated with the possible hazards are mentioned below.



Earthquake is the most probable and destructive hazard in the region, threating the twin Qanats as well. The reconstruction process after the 2003 earthquake overlooked the dynamic relationship between the components of this system and invested mostly in structural engineering measures which caused irreversible changes in the social structure and managerial system. Before the earthquake every Qanat had a council which traditionally managed water division and ownership. In the wake of the earthquake all the traditional ownership documents went missing and the qanat management system fell into the hands of such governmental organization as Ministry of Jihad Agriculture (MoJA) who did not know too much about the intricate mechanism of traditional water management systems in a multidisciplinary context (Semsar Yazdi & Labbaf Khaneiki, 2017). To address these issues the main focus of the proposed measures in the following sections are placed on both earthen and social structure.

4. Mitigation Measures

One of the major phenomena that extremely degrades the condition of Qanats is the urban sprawl. Qanats have a buffer zone that differs along its path. Generally, there should be no construction within 5 meters of its course on each side. In Baravat, however, this buffer zone is not preserved accurately anymore (Fig. 2), like many other cities in the country. Besides endangering the integrity of this heritage property, the uncontrolled sprawling development can also directly damage buildings and lifelines at the time of disaster as the qanat might collapse. To address this issue, the boundaries of their buffer zones should be marked on the ground permanently and also strict laws and regulations should prevent any construction within their buffer zone.

Figure 2 The course of QAQ (blue line) and AAQ (orange line) in 2004 (left) and 2019 (right), showing construction sprawl within the Qanats' buffer zone through time.

Moreover, to reduce the impacts on the values, authenticity, and integrity of the Qanats, a number of mitigation measures are listed below, addressing different vulnerabilities associated with the mentioned hazards, particularly the earthquake.

✓ Mitigation measures for earthen structures

- Strengthening of Qanat structure against collapsing, by utilizing ceramic or concrete hoops, especially in the most vulnerable parts
- Conducting research to develop more sustainable techniques to strengthen the structure with softer interventions, employing modern technologies which preserve the authenticity of Qanats
- Undertaking field observations to map the precise course of Qanats and making sure that the collapse of Qanats will not cause damages to the buildings and lifelines

✓ Mitigation measures addressing fragile social structure

- Identifying and documenting the precise traditional social structure behind each Qanat
- Acknowledging and strengthening the bonding and cooperation of local community by governmental organisations
- Investing in the younger generation to participate in Qanat conservation and utilizing their capacities for community-based interventions after a disaster

✓ Mitigation measures addressing no proper documentation

- Proper documentation of the oral knowledge associated with Qanats, traditional techniques and know-how, and also the latest information of all the shareholders

- Digitalisation of the collected data, especially paper documents like the endowments
- Founding a museum to store the historic documents and to keep the indigenous knowledge of the Qanats of the region alive

✓ Mitigation measures through clear allocation of roles and responsibilities

- Allocating clear roles and responsibilities to all the actors and stakeholders (both authorities and locals)
- Reaffirming the intricate mechanism of traditional water management system of Qanat (like before the 2003 earthquake) and giving the management system back to the local council instead of MoJA
- Specifying which national and international NGOs and private sectors can intervene in the aftermath of a disaster and how they can be the most efficient

5. Emergency Measures

Generally, no evacuation plan, warning systems and drills are needed for Qanats, during the first 72 hours following a disaster. But the following measures should be undertaken to avoid further problems.

✓ Emergency measures addressing earthen structure

- Conducting rapid damage and risk assessment of Qanats and agricultural areas at the early stage of the disaster for a comprehensive situational analysis by employing the help of beneficiaries and local volunteers
- Holding meetings with Qanat steering committee (emergency response team) to decide the best approach for Qanat rehabilitation based on the damage and risk assessment and previous studies

✓ Emergency measures addressing no proper documentation

- Rescuing and undertaking first aid measures for Qanats' documents and endowments

6. Recovery Measures

In the recovery phase, taking non-structural measures as well as structural measures into account is imperative. As Garnier et al (2013) states the objective is not only to reconstruct built environments but to reconstruct the social and cultural fabric of communities, strengthening links between populations and their environment. Some recovery measures regarding the earthen structure and social structure are suggested below:

✓ Recovery measures addressing earthen structure

- Conducting detailed damage and risk assessment of Qanats and agricultural area, by employing the help of Qanats' beneficiaries and local volunteers
- Allocating budget, providing tools and equipment and mobilising local Qanat masters and workers to start the rehabilitation of collapsed Qanats

✓ Recovery measures addressing fragile social structure

- Ensuring the engagement of Qanat's beneficiaries in the decision-making process: reviving the traditional council, Shora-yar (Town Council's Friend) system, based on the

cooperation system revolving around Qanats

- Allocating seed money to start small scale businesses for short time economic recovery, e.g. prompting the traditional handicrafts, to avoid the total collapse of Qanat-based economy
- Holding training sessions for women empowerment and capacity building to engage them in the continuity of economic and social activities and find out how they can contribute to Qanat rehabilitation

7. Conclusion

Qanat is a man-made ecosystems and revolve around the communal water management system. Consequently, any intervention including mitigation, emergency, and recovery measures should be community-based and address all the components of this system. After identifying the components and values of Baravat's Qanats, and the key hazards and vulnerabilities that impact them, this paper tried to suggest some of the basic measures that should be included in the DRM plan of Qanats of Baravat. As a result it will:

- minimize the impacts of hazards and potential threats on the Qanats of Baravat and accordingly lead to better preservation of the city's economy and identity;
- take the first step towards more efficient collaboration between CH organisations and DRM sectors in the country and mobilises the main stakeholders;
- help to develop the basic framework of DRM for WH Qanats which is applicable for the other Qanats as well; and
- address UNESCO's State of Conservation for Persian Qanats which urges the State Party to include, as a matter of priority, sections on strategic risk management and sustainable tourism management in the integrated management system.

References

1) Bonine, M.: From Qanat to kort: traditional irrigation terminology and practices in central Iran, Journal of the British Institute of Persian Studies, Vol. XX, London, 1982.
2) ICHHTO: The Persian Qanat: for Inscription on the World Heritage List (Executive Summary), UNESCO World Heritage Centre, 2015.
3) Semsar Yazdi, A.A., Labbaf Khaneiki, M.: Qanat knowledge: construction and maintenance, Springer, Netherlands, 2017.
4) Garnier, P., Moles, O., Caimi, A., Gandreau, D., Hofmann, M.: Natural hazards, disasters and local development, CRAterre Editions, 2013.

Notes

1. Qanat is a gently-sloping subterranean channel which taps a water-bearing zone at a higher elevation than cultivated lands (Bonine, 1982).

2.11 DRM Plan for the Buddhist Vihara at Paharpur,Bangladesh

Shah Zahidur RAHMAN
Shelter Specialist
UNDP Bangladesh

1. Introduction

Somapura Mahavihara in Paharpur is located in the northwest of Bangladesh in the district of Naogaon. The site's Latitude / Longitude is 25.0311° N 88.9773° E and the nearest city is Bogra. It is the second largest single Buddhist monastery on south of the Himalayas and is a declared World Heritage site based on it's architectural, archeological, religious and landscape value. The site is one of the most spectacular and important pre-Islamic monuments in Bangladesh dating back from late 8th to the 12th century. Over the historic periods, it has undergone many changes. The structures have been buried and disappeared or have been restored and today we have an oversimplified picture of the site. Under the World Heritage Convention, Bangladesh signed up to the obligation of preserving Somapura Mahavihara in Paharpur properties for future generations.

2. Values, Criterion and Attributes

Table 1: Values, Criterion and Attributes

Values	Criterion (i) as per OUV	Attributes
Artistic	The symmetrical layout and massively built single unit of the monastery was perfectly adapted to its religious function. Simple, harmonious lines and its profusion of carved decoration, in stone and terracotta.	A large square quadrangle measuring approximately 920 feet, with the main entrance, an elaborate structure, on the northern side. The outer walls of the monastery are formed by rows of 177 cells that face inwards toward the main shrine in the center of the courtyard.
Architectural	The striking architectural form introduced at Paharpur is first time in Asia, profoundly influenced the subsequent construction of temples of Pagan in Myanmar, Java and Cambodia. The craftsmanship of Paharpur terracotta still endures since the 8th century A.D. in the whole of deltaic lands around.	The main central shrine has a cruciform ground plan. A terraced superstructure that rises in three terraces above ground level to a height of about 70 feet. The upper level is a massive rectangular central block that forms the central brick shaft. A wide circumambulatory 15 feet terrace path that passes four main chapels or mandapas architectural plan. Bands of terracotta plaques running around the full perimeter of the shrine.
Religious	The Great Monastery evidences the rise of Maharaja Buddhism in Bengal from the 7th century onwards. A renowned centre of Buddhist religion and culture during the royal Patronage of Pala Dynasty and was a renowned intellectual centre until the 17th century.	At the base of the shrine, there are over 60 stone sculptures which depict a variety of Hindu divinities. Epigraphic records testify that the cultural and religious life of this great Vihara, were closely linked with the contemporary Buddhist centres of fame and history at Bohdgaya and Nalanda. Many Buddhist treatises were completed at Paharpur. A centre where the Vajrayana trend of Mahayana Buddhism was practiced.

3. Key hazards, Attributes and Vulnerabilities

The Somapura Mahavihara is exposed mainly to earthquakes, climate change, and rapid urbanization that may threaten its integrity and compromise its value. The site falls under a tectonic block at the Bogra fault zone with a maximum predicted magnitude of earthquake 7.0. This makes the site most vulnerable to earthquake among other natural hazards. Given the exponential rate of urbanization, and the inherent risks of earthquake and climate change impacts, disaster risk at Somapura Mahavihara is not only a measure of external potential threats but also of the inherent vulnerabilities existing at site i.e. poor drainage, absence of skilled conservation experts, unplanned excavation with a risk of land subsidence, and limited fire safety protective measures at museum site.

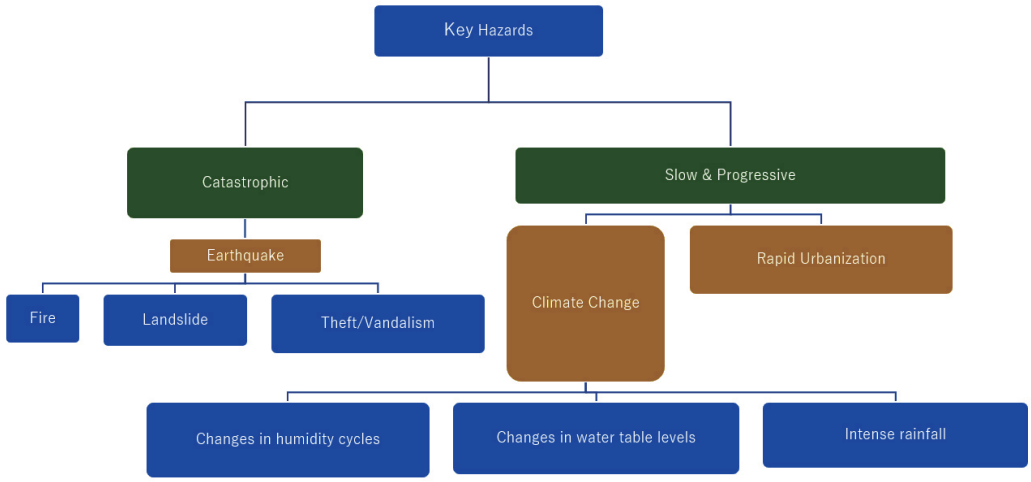


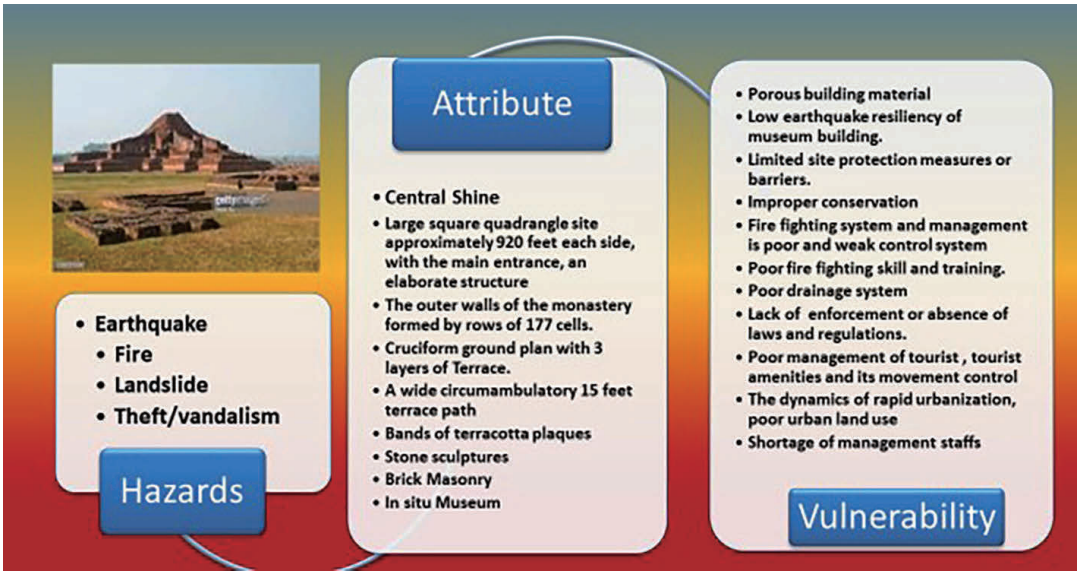
Chart 1: Hazards and Potential Threats

The entire area is in a suburb or rural setting with rural people, crop fields, ponds, canals, and local habitation. There is no defined buffer zone yet and the site location is easily accessible by trespassers because of absence of any physical or visual boundary. Illiteracy about the historic value of the site and being a developing country are issues. Activities like illegal acquiring of land, looting, vandalism and stealing precious evidences around the site are considered as threat. Given that context, this DRM plan will be limited to earthquake and its secondary hazards only i.e. fire, landslide/subsidence and theft/vandalism.

4. Hazard, Attributes and Vulnerability Relations

The Bangladesh Archaeological Department is the only authority responsible for excavation and preserving ancient structures. An adjacent museum established by this department exhibits evidences of collected sculptural pieces, terracotta plaques, pottery, domestic tools, ornaments, coins, seals, sealings, votive stupas etc. from excavation, which is a major tourist attraction. The site custodian also runs the site museum, guesthouse and other site properties with limited resources. The following box describe in detail the various built and natural attributes of the site and their vulnerability to hazards:

Table2: Hazard, Attributes and Vulnerability Relations



Disaster Scenario

- The central shrine subsided and suffered cracks
- Collapse of bricks elements along the thick exterior masonry wall.
- Terracotta plaques faced severe cracks and at places dislocated and broken down into pieces.
- Some stone carvings found sagging.
- Approximately 35 monastic cells suffered subsidence with split within.
- The adjacent museum building partially tilted with several cracks in the walls where a good number of salvaged from Paharpur that has been housed; which include sculptural pieces, terracotta plaques, pottery, domestic tools, ornaments, coins, seals, sealings, votive stupas etc.
- Concrete segment of museum roof dropped in the floor caused damaged to the number of shelfs and showcases.
- Fire breaks out in the Museum and the staffs didn't know how to respond effectively with their existing fire fighting system.

Disaster Scenario-Continue

- Some of the fire extinguisher are found dysfunctional. Authority called the fire service but due to subsidence of linking narrow roads being blocked.
- Some local and tourist are seen running towards the museum for immediate fire fighting and first aid.
- Few of the surrounding buildings also collapse and the distressed and panicked local people tried to evacuate themselves at the open space at the heritage site.
- This has put tremendous pressure on heritage sites thereby exposed to increasing its vulnerability to looting, misuse of bricks for temporary shelter construction and theft of valuable terracotta plagues.
- The distressed locals and tourists took shelter in the open ground and started to avail the tourist utilities services without any coordination.
- With limited resource and manpower, the local Police force came to the site in the evening and cordon the sites. City Mayor also reached the site in the evening and instructed the local police to trace out the missing terracotta plagues.

5. Drawing Risk Scenarios for DRM Plan

I will describe a hypothetical disaster describing a sequence of possible events triggered by an earthquake during daytime. Due to a tectonic movement near Dauki Fault; 350 km east of the site, the Bogra fault zone felt a jolt of a magnitude of 5.0 that caused cracks and land subsidence at the central shrine, collapsing the museum roof. Fire breaks out inside the museum. Poor tourist management triggers uncontrolled movement and causes theft and vandalism resulting in diverse impacts on one or more attributes and values.

6. Proposal of Mitigation Measures for Prevention, Response and Recovery

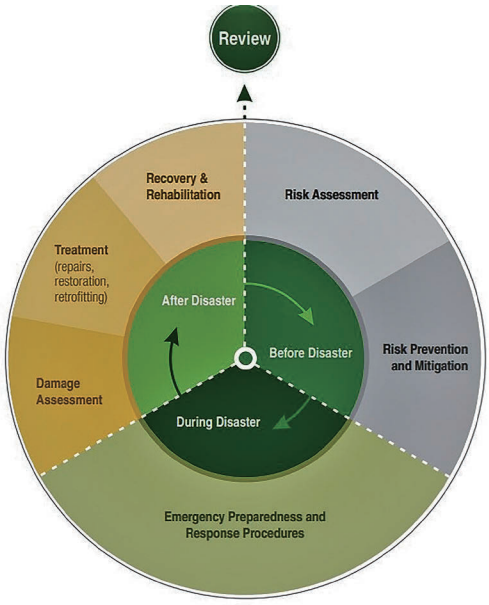


Fig 1: DM Phases for Cultural Heritage
(Source: A Training Guide | DRM of CH in Urban Area, Page 34)

With this scenario, the DRM plan for a catastrophic event, i.e. earthquakes, possible actions at various stages of disaster management cycle have been planned. As part of the disaster risk mitigation and preparedness measures immediate actions that should be developed for the site are planned which includes; upgrading and adapting modern and automated firefighting system, earthquake resistant display of items at the museum, delineation of a buffer zone, tourist control guidelines, an evacuation plan, training of community volunteers, and a post disaster damage and loss assessment format etc.

An evacuation plan for the central shrine and the interior of the museum has been planned deliberately, which depicted possible actions for site management authority, area for salvaging of the collection, location and routes towards assembly area, and engagement of community volunteers. In the event of fire risk, a plan for rescuing valuable museum items, and tourists inside the museum has been dealt with at a different time frame than for the evacuation.

In the response phase, planning for restoration of the damaged site and museum with rapid assessment is crucial. Scaffolding and shoring arrangement for structural stability of the brick masonry walls has been planned for the central shrines and museum building. Security arrangements and cordoning the site along with first aid, salvage, stabilization of the damaged parts of museum and shrine have also been considered. Relevant stakeholders' involvement and evacuation plan have also been outlined.

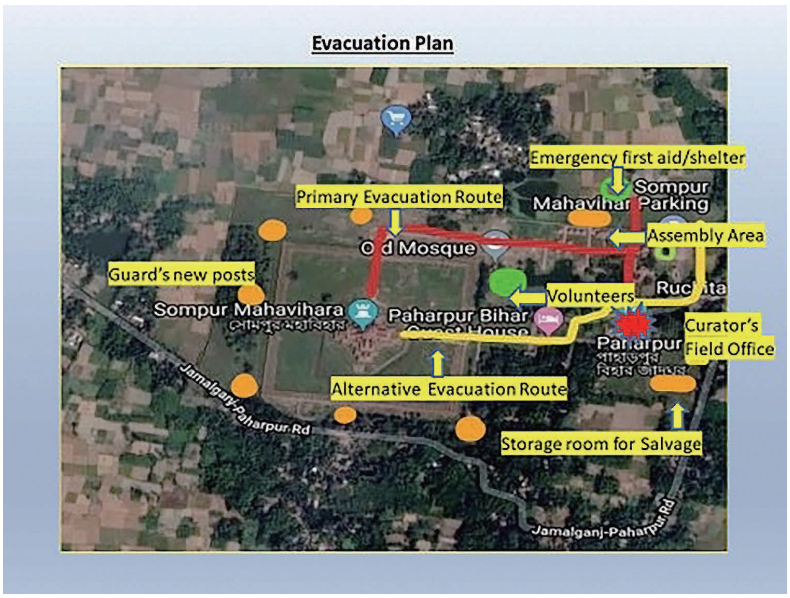


Fig 2: Evacuation Plan-CH Site and Museum

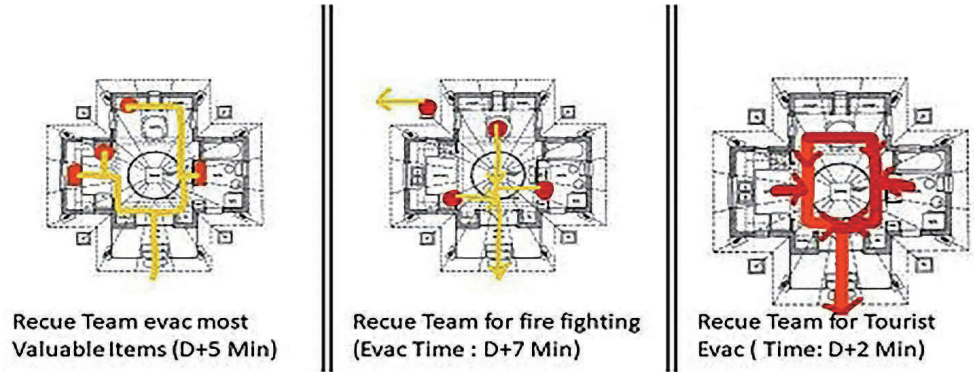


Fig 3: Evacuation Drill at Museum Site (The most realistic museum building plan is assumed)

It is essential to coordinate with different stakeholders and actors with their specific roles and responsibilities during different phases of DRM plan. Involvement of national and international actors during recovery was found to be a major issue where it is essential to coordinate and link with different stakeholders' specific roles and responsibilities.

For post disaster recovery, a two-stage approach has been outlined. Within three months of the disaster, restoration of damaged sites and the museum will be given the priority with necessary safety measures like scaffolding and shoring arrangement for structural stability of brick masonry walls. To support the post disaster needs assessment (PDNA) planning, a probable damage and loss calculation for the heritage site and museum will be proposed.

Table 3: Recovery Planning -Damage and Loss Assessment for PDNA

Attributes	Estimated Cost
Built heritage Site	1. Cost of **rehabilitating** (repair of cracks, broken terracotta, central shrine land filling), cost for **restoration** works (Brick walls, retrofitting, cost of engaging labor and cultural practitioners, reproducers of bricks and terracotta). 2. **Loss of income** (goods and services related to cultural tourism and services), loss of business opportunities by local shops owners.
Museum	1. Cost of **demolishing** and debris removal, rebuilding the collapse rooms, **retrofitting, s**alvage storage construction, cost of restoration of shelve and **labor**. 2. Cost of expert **Professionals, consultants**, site management, cost of service staff for immediate temporary functioning of the museum.

7. Conclusions

Bangladesh is committed to implement the Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction (SFDRR), where the protection of cultural heritage has been given due importance. Considering the risk & vulnerability of the heritage sites we must give priority to disaster preparedness such as preparing a DRM Plan, conducting simulation exercises, identifying evacuation routes, and implementing mitigation measures while linking with government policies. All of these measures should be applied during various phases of disaster management cycle.

References

1. Web https://whc.unesco.org/en/list/322/
2. Study Report by David Michelmore on "Management Plan for the Buddhist Vihara at Paharpur (Unpublished)

2.12 Development of Disaster Risk Management plan for Geological Museum, Armenia

Lilit GEVORGYAN
Researcher
Institute of Geological Sciences of National Academy of Sciences of Armenia

1. Introduction

Armenia is a small mountainous country in South Caucasus lying between Turkey, Iran, Georgia, and Azerbaijan. A brief review of Armenia's natural hazard risk profile shows that more than 80% of the population is exposed to multiple geological and weather related catastrophic events.

Cultural heritage affected by catastrophic earthquakes in Armenia

Cultural heritage sites could not evade the adverse effects of catastrophic events either. Armenia is home of many cultural heritage sites such as museums, medieval monasteries, monuments etc. Many of Armenia's centuries old monasteries— famous as research centers of art, literature, and philosophy— have been destroyed by strong earthquakes, fires, and conflicts. These losses can be explained by the absence of effective DRM plans.

This work discusses the safety of the Geological Museum of the Institute of Geological Sciences (IGS) at the H. Karapetyan and proposes a Disaster Risk Management (DRM) plan for it. The museum has national importance and its collections have scientific and educational values. The natural and man-made hazards are identified, the most valuable objects are defined, and structural and organizational capacities, and vulnerabilities are discussed. Adopting an integrated risk management approach, vulnerability assessment of the most valuable objects has been carried out and urgent and yet feasible preparedness and mitigation actions that could be carried out immediately are proposed. The plan also envisages establishing close collaboration between various museums, municipal authorities, and emergency services as long-term actions for disaster risk reduction. These actors and stakeholders are identified and mapped based on a careful consideration of national local policies regulations and their involvement during and after a disaster.

2. Qualitative Risk Assessment

Armenian research institutions were developed during the 20th-century. The Armenian Academy of Sciences was established in 1935 and the Geological Museum after H. Karapetyan which was established in 1937. Since 2012, museum located on the ground floor of the main building of IGS. Having an independent entrance enables fire fighters and other emergency personal to have a quick access to museum. On the other hand, any accident happening at the IGS chemical laboratories might pose a great treat to the museum and its collection thus making it vulnerable to unexpected external events. In this context, the museum cannot be analyzed in isolation from IGS.

2.1. Identification of primary and secondary hazards

Yerevan is located in a seismically active region. Several closely located faults, soil conditions, climate change, and the location of the museum makes it prone to several hazards such as earthquakes, floods, fire, chemical leaks and/or explosions. Given the high probability of earthquakes, in this work earthquakes are considered the main hazard and water leakage is taken as the secondary hazard to analyze cascading risks (Figure 1).

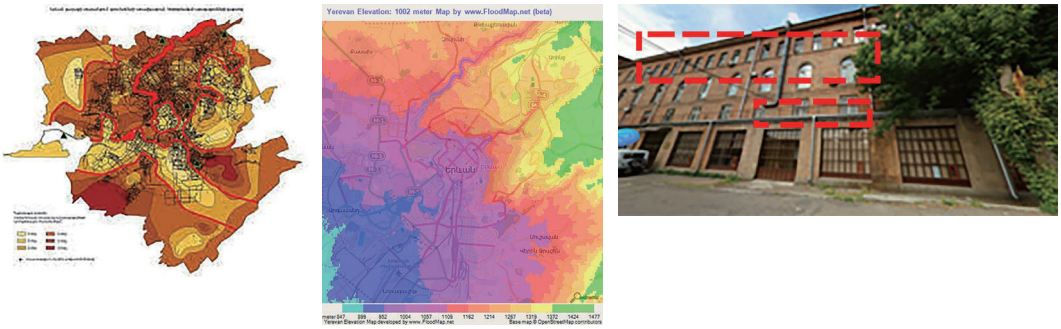


Figure 1. Natural and man-made hazards: Seismic hazard map of Yerevan (left), Elevation map of Yerevan as a proxy for flooding (middle), Location of chemical laboratories (red rectangles, right)

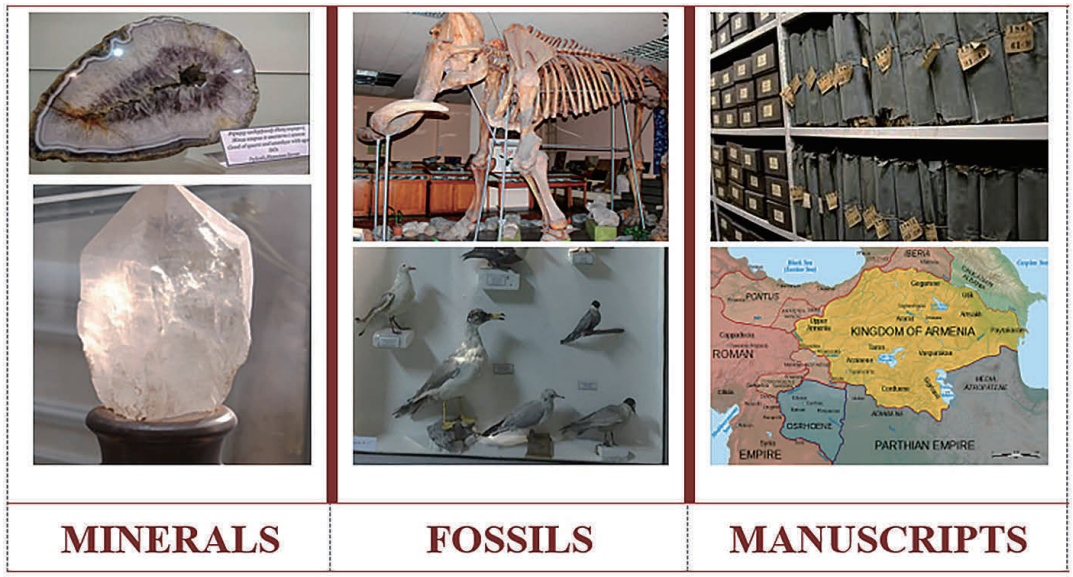
2.2. Identification of values and prioritization of elements at risk

The main value of the museum lies in its mission to serve science and educate younger generations with knowledge about nature. It holds the memory of its founder, Prof. Karapetyan, whose private collection became the source for the very first exhibition. The museum and its collections hold very important aesthetic, historical, and economic values as well. Various minerals, fossils, mineral waters, and ancient and medieval tools as well as many other samples turned the museum into an important depository of the tangible history of Armenia's nature and culture. Along with tangible collection, the museum hosts old scientific works, manuscripts of earlier geological, archaeological studies, and discoveries that provides great understanding on historical scientific developments, scientists, etc. The values and the attributes are summarized in Table 1.

Table 1. Values and attributes of the geological museum

Main values	Values	Attributes	Examples
Educational	**Historical**	Lithology	• Minerals
Associational	**Cultural**	Paleontology	• Elephant
	Aesthetical	Mineralogy	• Birds
	Economic	Mineral Waters	• Old maps
		Ore Deposits	• Reports, Articles
		Volcanology	• Tools

The purpose of this project is to develop a DRM plan to protect these values. It is important to understand, that various elements are affected differently during and after disasters. For instance, this collection of minerals is unique. It consists of a variety of minerals on display in various shapes and forms. Therefore damage to form and shape will reduce the value and importance of these objects to almost nothing. Strong earthquakes pose great risk to the collection of minerals and fossils, while floods would be catastrophic for the manuscript collection and fossils since wet, organic substances could destroy them if there is no timely and properly organized first aid.



Given the limited resources and feasibility of certain actions during disasters, the objects need to be prioritized. That can be achieved through close collaboration with the main beneficiaries of the museum. Expert opinion of the museum staff, IGS researchers, and private collectors helped to prioritize the most unique and important values and attributes held in the museum. Although the fossil of the elephant is the most valuable object in the collection, the collection of minerals also has a significant aesthetic and scientific values that could be easily lost due to an earthquake. Earthquakes can destroy the form and wholeness of the minerals, while a chemical leak would cause total unrecoverable loss. Meanwhile, the collection of manuscripts is more prone to be damaged by floods, fire and chemicals.

2.3. Qualitative analysis of the vulnerabilities

Vulnerability itself is a multidimensional concept. It depends on many parameters related to physical, institutional, social, and economic components and processes. Qualitative analysis of the vulnerabilities revealed that they can be classified in three groups according to their origin as structural, organizational and governance. Structural vulnerabilities are referring to the vulnerability components related to building conditions, planning, and emergency components. Organizational refers to the exhibition and location of the objects. The museum's managerial hierarchy puts additional pressures on developing institutional vulnerability. This is due to poor governance. The findings of the vulnerability analysis are summarized in Table 2.

Table 2. Vulnerabilities and their description

	CAUSE	DESCRIPTION
Structural	Old building	Building was built in 1937, when no building code existed
	Poor maintenance	There is no stable temperature in the museum. Moreover, it is very humid and mold is visible in some parts which can badly affect the fossils, documents' collection
	Not designed for a museum	The collection was moved to its current location in 2012 which is the ground floor of the institute building with a separate entrance.
	Small doors and narrow corridor	The doors are small to evacuate many people in short time. Also the corridor is too narrow and might be blocked by visitors
	No early warning system	Anything happening in the museum may stay unnoticed for long time

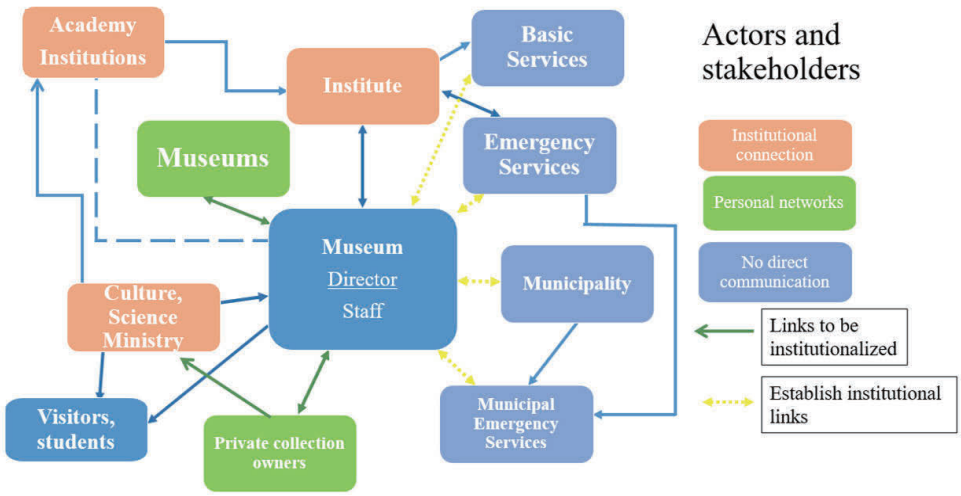
	CAUSE	DESCRIPTION
Organi-zational	Overcrowded exhibition	Exhibited objects are located too close to each other, without any boundaries
	Improper object locations	The second exit is dead locked and completely behind several objects
	Locked doors	The main entrance in half open. It is partially blocked by flower stands
Governance	Institutional management	There is no clear hierarchy in museums funding, reporting, support schemes
	Staff	The staff is not prepared to cope with disaster event
	Weak institutional links	No established links with ministries, emergency services
	No DRM plan	There is no DRM plan

3. Disaster Risk Management Plan

This work considers earthquake as the primary hazard, which triggers water and chemical leaks from the main IGS building and its laboratories. The Disaster Risk Mitigation plan is based on the following risk scenario.

- It is September 27, 11.20 AM. Mw = 7.1 earthquake strikes on Garni fault, 12 km from Yerevan. The intensity of the earthquake at the museum site is 7.
- The museum is hosting 30 school students who are watching a movie in the conference room while the staff is working in the office .

As shaking starts, the students rush out with museum staff. The main and only entrance gets blocked because the flower stands fall down and break the vases. Fortunately, students and staff manage to reach an open space in front of the museum without any injuries. Meanwhile, the earthquake damages the water pipes, an accident happens in the chemical laboratory above and the museum starts getting wet.



3.1. Communicating DRM plan

Any plan needs to be properly communicated with interested and responsible actors that could be involved in the DRM. That requires a very careful identification and mapping of every possible stakeholder, actor, followed by describing the established and/or missing linkages between them. This is crucial not only for preparedness and mitigation, but for the whole cycle of DRM from preparedness to recovery.

The quick mapping shows three big issues:

- Museum and its staff are not directly linked with the services such as basic, emergency despite of their existence on national and municipal levels
- Some of the existing links work on one direction making vertical hierarchy
- There are strong personal links between museum management and other museums, IGS, private collection owners.

This quick exercise revealed that it is urgent to establish direct links and/or strengthen the existing ones between museum and municipal services. The second issue could be addressed by establishing a bilateral collaboration rather than hierarchy. It will ease the communication and establish direct dialog aimed at improving the overall governance. Institutionalization of the personal links will support the sustainable development.

3.2. Preparedness and mitigation plan

Preparedness and mitigation are essential components of the DRM plan. Although they have quite different definitions, it is quite hard taking them separately in practice. Mitigation is defined as "the lessening or minimizing of the adverse impacts of a hazardous event" while preparedness is seen as "developed knowledge and capacities" (UNDRR, 2015). Essentially mitigation mostly refers to the engineering solutions aimed at risk reduction and preparedness is related to knowledge and capacity development for the full DRM cycle. That is why discussing these two together helps aligning technical and social factors of DRR. For the museum, the preparedness and mitigation has been categorized into three main work packages: Improve coordination between actors and stakeholders, develop infrastructure for risk mitigation, and capacity building for staff.

Each of these packages comprises several actions summarized in the following Table 3.

Table 3. Preparedness and mitigation plan: The main objectives and supporting actions

Goal	Actions
Improve coordination between actors and stakeholders	Define actors, responsibilities and roles during a disaster
	Make agreement for storage and technical support for restoration
	Establish direct links with municipal emergency services
	Simplify administrative hierarchy
	Identify possible funding sources
Develop infrastructure for risk mitigation	Install fire/emergency doors
	Install fire detection system
	Install evacuation signs
	Free exits from blocking elements

Capacity building for staff	Create digital inventory, store it on a cloud to access it from outside the building
	Organize trainings and drills on DRM
	Map valuable objects
	Get assistance from Emergency services to design evacuation routes and plans
	Assign tasks, list the details of contact person/department in different agencies

3.3. Recovery plan

The recovery plan should be part of the recovery of the larger IGS. It could be summarized in three tasks: Identification of resources to facilitate quick recovery, prepare agreements with research institutions and museums for technical assistance in advance, and carry out physical recovery of the building (Figure 2).

Funding	**National Funds**	Your Step, Aurora, Gyulbenkyan
	International donors	JICA, USAID, UNESCO, Embassies
	Diaspora	
Technical support (specific for collection type)	**Manuscripts, maps, archives**	Matenadaran, National Library, Archive
	Fossils	Academy Institutes
	Geological	Institute, International partners
Physical	**Specify museum's special needs to be inscribed in institute's reconstruction plans**	
	Emergency Services (Municipal and national)	

Figure 2. Recovery tasks by type and actors

It is suggested to have several resources for the same task as a backup. For instance, Matenadaran was fully reconstructed in 2010 and has up to date infrastructure to withstand earthquakes, fire, flooding etc. But it might not be available if, for example, a more important and larger museum such as National Gallery of Armenia is affected. In that situation the National library or archive could be the partners in saving other museums collections. From all the possible funding sources the power of the diaspora could be the most accessible given the large size of the Armenian diaspora.

The museum can function only if the building is fully restored or retrofitted. The museum cannot do much at this stage because of its tenant status, which could provide an opportunity and benefit from the high status and importance of Academy of Sciences that will most probably be recovered very quickly. The only crucial aspect at this stage is to work closely with Academy administration and put the museum's specific needs into larger reconstruction plans.

4. Conclusion

The museum has a complex management system: as a museum it is under supervision of Ministry of education, science, culture and sport, while being an integral part of IGS at the same time. This complexity brings some complications with assigning roles for the DRM plan's implementation. This work reveals poor governance and provides suggestions on how to improve it. The key outcomes are described in the preparedness and mitigation plan that comprises the basic steps aimed at reducing the risks.

Reference

1. Mason, R.: Assessing Values in Conservation Planning: Methodological Issues and Choices, Research Report, The Getty Conservation Institute, Los Angeles, 2002.
2. Van Balen, K.: The Nara grid: an evaluation scheme based on the Nara document on authenticity. The Association for Preservation Technology International (APT), 39(2/3), 2008.
3. The United Nations Office for Disaster Risk Reduction: Proposed Updated Terminology on Disaster Risk Reduction: A Technical Review, 2015.

3 Activities Undertaken after the International Training Course by Former Participants

3.1 Implementation of Disaster Risk Management on Cultural Heritage for George Town UNESCO World Heritage Site, Malaysia

Ming Chee ANG
General Manager
George Town World Heritage Incorporated

1. Introduction

After the Sendai Framework for Disaster Risk Reduction (2015-2030) was adopted in March 2015, George Town UNESCO World Heritage Site from Penang, Malaysia was selected as one of the three pilot case studies for the "Capacity Building for Disaster Risk Reduction of Heritage Cities in Southeast Asia and Small Island Developing States in the Pacific" by UNESCO. The other two cases selected under this project was the Kota Lama Semarang in Indonesia and Levuka Historical Port Town in Fiji.

George Town World Heritage Incorporated (GTWHI) as the site manager agency responsible for George Town UNESCO World Heritage Site has been given the responsibility to implement the project from April 2017. The aim of the project was to develop the disaster risk reduction strategies and integrate them into the overall heritage management plan of the heritage cities. Using this opportunity, GTWHI was able to identify the major hazards threatening the site, prepare the risk management plan specific for the heritage area, and develop the disaster risk management mechanism and the draft DRR strategy.

This paper records the development and implementation of Disaster Risk Management for Cultural Heritage in George Town UNESCO World Heritage Site, with a specific focus on the strategies and tools developed using a community-based approach that has been proven to be among the major factors of this strategy's success since 2017.

2. Disaster Risk Management Cycle for Cultural Heritage

George Town Historic Cities of the Straits of Malacca was inscribed as a UNESCO World Heritage Site in 2008, and the Special Area Plan—a heritage management document—was gazetted in 2016 under the Town and Country Planning Act 172. The priority in this document during the first decade (2008-2018) was to safeguard and conserve the tangible cultural heritage of the site, and the Outstanding Universal Value of the World Heritage Site.

After ten years as a World Heritage Site, the institutional and agency capacity within George Town has gradually reached a steadier status, providing the ripe moment to enhance the Risk Management Plan for the town when the game changing opportunities reached through the UNESCO project in 2017. Through the introductory teaching by the highly committed resource persons Dr Rohit Jigyasu and Ms Aparna Tandon at the inception workshop in April 2017, important concepts such as hazard, exposure and vulnerability were introduced to the GTWHI team and the local communities who are the main stakeholders of the World Heritage Site.

The gap of disaster management in George Town was identified when I was given the opportunity to be trained under the UNESCO Chair Programme on Cultural Heritage and Risk Management at the International Training Course on Disaster Risk Management of Cultural Heritage in September 2017. The management plan prepared during the training came into practice when George Town suffered from one of the worst floods in the state's history on 4 and 5 November 2017. From April to November 2017, George Town completed the first full cycle of Disaster Risk Management Cycle for Cultural Heritage, including

the preparation of the draft risk management plan, to conduct risk assessment during the disaster and to participate in the recovery and rehabilitation process.

Working under the belief and concept of 'building back better', George Town continues to evolve and improve its heritage resilience to disasters after the November 2017 flood. During the Disaster Risk Reduction Strategy of George Town at the National Workshop on Harmonizing Coordination to Implement Disaster Risk Reduction Strategy in the Heritage City of George Town in March 2018, local leaders, politicians, media, and professionals were invited to participate and empower themselves on disaster risk reduction capacity.

The attendance of important figures from the government, such as the Penang Chief Minister, the Executive Secretary of the Malaysian National Commission for UNESCO, the mayor of the City Council of Penang Island, the General Manager of Penang Hill Corporation, and the Director of Penang State Museum, amongst others, marked the shared commitment of the government and public sectors in enhancing the disaster risk reduction agenda in the public services of George Town, and in Penang. More than thirteen printed and online media, including Buletin Mutiara, The Star, and Sin Chew Jit Poh provided media coverage of the event. The wide coverage in newspapers and online media has built a strong branding and positive message on the Disaster Risk Recovery and Management strategy in George Town and Penang.

Figure 1: Opening Ceremony of the National Workshop attended by the Chief Minister of Penang, the Mayor, and senior representatives of cultural heritage related agencies in Penang in March 2018.

3. Implementing the Action Plans

With the active participation from sixty-four participants representing the central, state, and local level government, community associations and groups, civil defense, first responders, and site managers, the participants from the National Workshop in March 2018 have actively contributed to the development of the action plans. Ten action plans were developed as the direction of implementing disaster risk

management on cultural heritage for George Town. GTWHI was tasked to strategies the priority and implementation of these action plans together with the members of the community. Each action plan is elaborated according to the planning context, implementing strategies, and the output achieved.

Action Plan 1

The National Disaster Management Agency to set up a committee to discuss legislation enhancement, e.g. incorporating heritage related departments and agencies in the National Security Council's Directive No. 20.

Implementation

Suggestions have been made to the National Disaster Management Agency to incorporate cultural heritage elements in the National Security Council's Directive No. 20. This includes the recommendations to add the National Heritage Commissioner, State Heritage Commissioner, local Council Heritage Department and World Heritage Site Managers into the Disaster Management Committee. We also suggested to add the Department of National Heritage (Federal Government Level), Department of Heritage Conservation (Local Government Level) and World Heritage Site Manager Office (Site Manager Level) into the Disaster Management Responding Agency. In addition, a recommendation was also made to establish the Pusat Pengurusan Bahan Warisan (Heritage Materials Management Centre) for the handling, packing and storing of salvaged heritage objects. To improve the legislation within the World Heritage Site, efforts were also taken by GTWHI, together with the Federal Department of Town and Country Planning and the City Council of Penang Island to revise the George Town Special Area Plan, with a new chapter on disaster risk management to be incorporated. On top of this, there is also ongoing lobbying to revise the "Fire Safety Guidelines for Heritage Buildings" with the Malaysian Architect Federation.

Action Plan 2

The Penang State Museum, clan jetties and clan houses will create an inventory list of cultural heritage properties and artefacts, and for the master copy to be safeguarded by GTWHI.

Implementation

The major clan houses in George Town, such as Cheah Kongsi and Khoo Kongsi who already have the lists of their cultural heritage properties have agreed to share the inventory list of cultural heritage properties and artefacts with GTWHI. There are also plans to collect important documents, such as measured drawings, dilapidation reports, inventory lists of cultural objects, and other documentation from heritage buildings owners in the George Town World Heritage Site by 2020. Efforts will also be made to assist the building owners to develop the documents. Among the documentations that GTWHI hopes to store in the databank system are measured drawings.

Action Plan 3

To organise a George Town UNESCO World Heritage Site Disaster Risk Reduction Coordinating Workshop.

Implementation

The contents of the disaster risk management for cultural heritage were developed and adapted from the D-MUCH version for the communities. There are seven pilot cases in the George Town community-

based case studies on cultural heritage. The format also changes into a shorter time, longer intervention, and gradual introductions through four workshops. The First Workshop (4 Sept 2018) introduced basic concepts in layman terms and with examples (Hazard, Vulnerability, Risk, Disaster/Emergencies, Attributes), and conducted the site mapping and imagination game. During the Second Workshop (2 Nov 2018), participants were requested to share the disaster scenario, and mitigation for human life and cultural heritage. The participants also discussed their emergency response strategies. By the Third Workshop (8 Jan 2019), the participants started to detail the risk analysis and identify possible stakeholders and their roles before, during and after disaster. The participating cases were presented during the Fourth Workshop (22 March 2019), which also included the Standard Operation Plan of their cases, before, during and after a disaster.

All participants were provided with technical assistance prior to their presentations to UNESCO and senior representatives from the Fire and Rescue Department of Malaysia during the Experience Sharing Workshop on Disaster Risk Reduction Strategy among Heritage Cities in Southeast Asia, Pacific and Africa (21 June 2019). The cases that were presented are as follows:

a. George Town World Heritage Incorporated by Ms Shereen Loh Phaik See (Administrative Officer, GTWHI).
b. Boon San Tong Khoo Kongsi by Mr Khoo Teng Khoon (Trustee, Boon San Tong Khoo Kongsi).
c. Seh Tek Tong Cheah Kongsi by Mr Peter Cheah Swee Huat (President, Seh Tek Tong Cheah Kongsi).
d. Sia Boey by Ms Virajitha Chimalapati (Conservation Architect, GTWHI).
e. Toh Aka Lane by Mr Teng Wei Yee (Resident from Toh Aka Lane).
f. Lim Jetty by Mr Patrick Lim (Resident from Lim Jetty).

Action Plans 4, 5 and 6

- An early warning and response system will be developed, and UNESCO Jakarta to identify sponsors to provide smoke detectors and fire extinguishers for every building within the George Town World Heritage Site.
- To set up emergency response teams, carry out equipment and tools maintenance, and hold trainings and drills.
- To hold public awareness campaigns, conduct first aid and automated external defibrillator trainings, promote to-go-bags and introduce first aid restoration for artefacts.

Implementation

GTWHI announced the Community-Based Fire Preparedness and Response Strategy in major newspapers and online platforms to invite qualified community members to participate in the programme in 30 January 2019. Premises owners or residents within George Town UNESCO World Heritage Site can submit their applications online. Community members with no Internet access will need to visit the World Heritage Site Manager office during office hours for assistance in submitting their applications. Fifty applicants were selected under the current phase of the project. Selected participants would undergo

firefighting training, jointly organised by GTWHI and the Fire and Rescue Department of Malaysia. A public ceremony was held to inaugurate the first batch of Community-Based Fire Responders with the presence of the media and attended by senior representatives from the State Government of Penang. GTWHI will conduct house-to-house visits to all the participating units to review their basic fire protection measures and provide advice for improvements. After the fifty applicants were selected, two training sessions were arranged for local residents in George Town UNESCO World Heritage Site and participants in April and May 2019.

Figure 2: Fire extinguishers and smoke detectors were distributed to the participating communities from George Town after the training by the Fire and Rescue Department of Malaysia.

The Emergency Response Team Training was conducted on 4 and 5 May 2019, by Mr. Rafizi, the Head of the Fire and Rescue Department of the Beach Street Branch. He provided the safety briefing and explained the role of the Emergency Response Team. The second day of the training focused on practical training such as basic rescue techniques and hydrant drill at Seh Tek Tong Cheah Kongsi. All the participants have undergone the Emergency Response Team training exam during the second day and all of them have received the 1kg dry powder fire extinguisher and certificate for completing the training and passing the exam.

Figure 3: Training by the Fire and Rescue Department of Malaysia to form the George Town Emergency Response Team.

GTWHI also printed the Disaster Risk Management on Cultural Heritage posters in four languages, which received great reception from the local community and government agencies. The design and content were based on the feedback received from the community during the first session of the community workshop. Raising awareness through posters is believed to be the best approach for the local communities as it includes the local context and is easier to be understood.

Figure 4

Figure 5

Figure 6

Figure 7

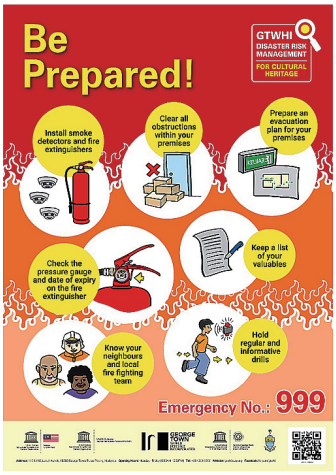


Figure 8

Figure 9

Figure 10

Figure 11

Figure 12

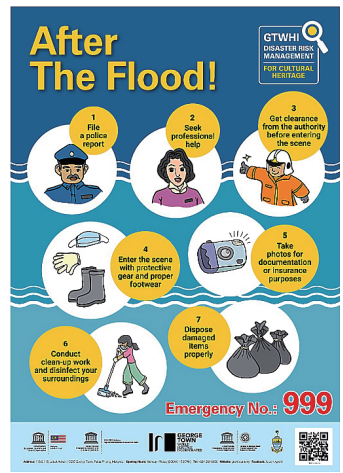


Figure 13

Figure 14

Figure 15

※ Fire extinguishers and smoke detectors were distributed to the participating communities from George Town after the training by the Fire and Rescue Department of Malaysia.

Action Plan 7

To develop a geographic information system (GIS) application in DRR.

Implementation

With fires being identified as one of the major disaster risks that threaten the World Heritage City of George Town, efforts have been made to map and identify the locations of fire hydrants in the World Heritage Site. The time and route of arrival of the first responder have also been studied to ensure that fire brigades can arrive and provide help on time. GTWHI has enhanced the collaboration with the Fire and Rescue Department of Malaysia in updating the location of fire hydrants in George Town, and to ensure that all buildings in the World Heritage Site are in close proximity with a functioning fire hydrant.

Action Plan 8

To set a standard operational procedure for damage assessment.

Implementation

The GTWHI team refers to the "How to Undertake Integrated Post-Event Damage and Risk Assessment" document prepared by Ms. Aparna Tandon and Dr. Rohit Jigyasu from ICCROM in the execution of this investigation and preparation of this report. The Standard Operation Procedure on damage assessment was first developed in December 2017 to access the landslide in Penang Hill, and the second opportunity to use the form was in July 2019 when the GTWHI team was asked to assess the Bukit Mertajam Xuan Tian Temple which was built in 1886 and caught fire at around 8.30pm on 3 July 2019.

Action Plan 9

To plan effective evacuation efforts during a disaster, e.g. creating a contact list of CCTV monitor IDs for the City Council of Penang Island's closed circuit television cameras operation centre and installing 'panic buttons' at strategic locations.

Implementation

The City Council of Penang Island has installed 850 units of closed circuit television cameras equipped with high-resolution technology at hotspots to monitor vehicle traffic, flash floods, and public safety. About thirty flood sensor devices are installed in several flood-prone areas to help the council keep tabs and track the occurrence of flash floods on the island and mobilise the authorities when needed. Water levels are marked in green (normal, with water level below 75% of the height of the drain), yellow (alert), orange (warning, when water level has reached 75% of the height of the drain) and red (danger, when the road surface is flooded with the water level rising up to 250mm). Warning alerts will be channelled to the City Council of Penang Island's 24-hour hotline through SMS, and it will alert the City Council's Squad Pantas for immediate activation of their Standard Operating Procedure for early preparation in disasters.

Action Plan 10

GTWHI to work on heritage assessment and continuous monitoring for Penang Hill rehabilitation.

Implementation

GTWHI has offered peer and professional support to Penang Hill Corporation (PHC) since the November 2017 flood and landslides incidents. Equipment such as helmets, tools, and manuals were provided to

the PHC team to help them in assessing the damages and to rebuild the infrastructures on the hill. After almost two years, PHC has carried out a large-scale Disaster Management Simulation Rescue Drill on 16 July 2019, involving more than 400 personnel from 15 agencies including the police, Fire and Rescue Department, Malaysian Civil Defence Force, Health Department, and Penang Hill Residents Association. It is a learning process from the major landslide in 2017 and they are ready to face the problem. Different agencies learned to coordinate their efforts and make better decisions to be ready for real-life situations. This includes the evacuation of train passengers to safety, the relocation of casualties via helicopter using the emergency landing pad, and evacuation route with the four-wheel jeep.

4. Moving Forward

George Town UNESCO World Heritage Site is a cultural site with about 5,300 buildings, and 70% of these buildings are category I and II heritage buildings. The site also has some 10,000 residents, and more than 100,000 visitors and users daily. Through this Disaster Risk Management for Cultural Heritage in George Town, efforts has been made to empower the local residents and users of the site. More importantly, the capacity building on resiliency is crucial for the state of Penang to ensure that the people of Penang can embrace modernisation and community progression through disaster risk reduction embodied in all levels of society, ranging from government authorities, organisations, private companies to individuals.

Cultural heritage is our shared asset and safeguarding them from disasters is our collective effort. Since the inception workshop in April 2017, GTWHI has learnt that people are the most important resource for a successful disaster risk management programme. The communication between heritage building owners and local rescue departments are important to bridge the gap of information. The commitment from local leaders in mobilising their people has become the factor of social capital that can enhance the trust and effective sharing of information and training opportunities. The willingness of professionals in contributing their knowledge and time in this project will help GTWHI to work with more local residents, building owners, and stakeholders, making George Town a better resilient city.

Figure 16: Representatives from the Fire and Rescue Department of Malaysia attended the site visit and provided suggestions to Mr. Cheah (President of Seh Tek Tong Cheah Kongsi) to improve the disaster risk management plan.

Figure 17: GTWHI representative explaining the operation of fire extinguishers to the residents of Lim Jetty.

Appendix

List of Resource Persons

(As of 2019 September)

Yoshio NAKATANI
Chancellor,
The Ritsumeikan Trust/
President,
Ritsumeikan University

Kenzo TOKI
Special Research Fellow,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

Takeyuki OKUBO
UNESCO Chair Holder/
Professor,
Department of Civil and Environmental Engineering,
College of Science and Engineering,
Ritsumeikan University/
Director,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

Rohit JIGYASU
UNESCO Chair Holder/
Project Manager,
International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM)

Dowon KIM
UNESCO Chair Holder/
Associate Professor,
Department of Civil and Environmental Engineering,
College of Science and Engineering,
Ritsumeikan University

Aparna TANDON
Project Manager,
Collections Unit,
International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM)

Ksenia CHUMUTINA
Senior Lecturer in Sustainable and Resilient Urbanism
The School of Architecture,
Building and Civil Engineering,
Loughborough University

Akira KANBE
Vice-President,
Rit-sei area council,
Rit-sei area management committee/
Ponto-cho town management council

Ryoko NISHIMURA
Manager,
The Nishimura Flower/
Kadohka (a flower arrangement artist),
Sagagoryu-master/
Representative of Takase-river council/
Town Planning Advisor/
Ponto-cho town management council

Ken Okada
Head,
Secretariat Office of the National Task Force for the Cultural Heritage Disaster Risk Mitigation Network,
Independent Administrative Institution
National Institutes for Cultural Heritage

Masamitsu FUJIMOTO
Associate Professor,
Department of Civil and Environmental Engineering,
College of Science and Engineering,
Ritsumeikan University

Nao NAKAYA
Research Fellow,
Department of Conservation science,
Kyoto National Museum

Yuuki IKENO
Chief Examiner,
Asago City Hall,
Board of Education Secretariat Cultural property Division

Kyoutarou NAKAGAWA
Chief,
Asago City Hall,
Board of Education Secretariat Cultural property Division

Tooru FUJIKI
Deputy Manager,
Sayo Board of Education,
Education Division
Planning Administration Office

Yasumichi MURAKAMI
Professor,
Kyoto Tachibana University

Atsushi KOMIYA
Assistant Manager,
Cultural Asset Division,
Board of Education,
Kyoto Prefecture

Hiroki TANIGAWA
Director,
Cultural Property Promotion Office,
Kansai Brunch,
NOHMI BOSAI LTD.

Tetsuyasu SAITO
Manager,
Fire Alarm Equip. Admin. Section,
Technical Department 1,
NOHMI BOSAI LTD.

Kazunori IKEGAME
Deputy Manager,
Engineering Section 2,
Technical Department 2,
NOHMI BOSAI LTD.

Yoichiro KUSAKI
Coordinator,
Fire Alarm Equip. Admin. Section,
Technical Department 1,
NOHMI BOSAI LTD.

Wesley Webb CHEEK
Researcher (JSPS Post Doctoral Fellowship),
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

Yoshihiro HIRAOKA
Professor,
Architecture Design Laboratory,
Department of Design Information,
Miyagi University

Go TANIBATA
Lecturer,
Miyazaki Sangyo-keiei University

Rohit Kumar RANJITKAR
Nepal Director,
Kathmandu Valley Preservation Trust (KVPT)

Dulce Maria GRIMALDI SIERRA
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)

Yuko ISHIDA
Senior Researcher,
Kinugasa Research Organization,
Ritsumeikan University

Ming Chee ANG
General Manager,
George Town World Heritage Incorporated

Shoichi KATSUDA
Cultural Property Chief,
Fire Prevention Division,
Kyoto City Fire Department

Keiji YANO
Professor,
Department of Humanities, Geography Major,
College of Letters, Ritsumeikan University

Yoshifumi SATOFUKA
Professor,
Department of Civil and Environmental Engineering,
College of Science and Engineering,
Ritsumeikan University

Kenji SAWAI
Professor Emeritus,
Setsunan University

Shinta YOSHITOMI
Professor,
Department of Civil and Environmental Engineering,
College of Science and Engineering,
Ritsumeikan University

Rashmin GUNASEKERA
Senior Disaster Risk Management Specialist,
GSURR,
World Bank

Elke SELTER
Doctoral Researcher,
Centre on Conflict, Rights and Justice at SOAS,
University of London

Yoshinori IWASAKI
Principal Director,
Geo-Research Institute

Alessandra BORCHI
Coordinator and Operations Manager,
The UNESCO Heritage Emergency Fund,
UNESCO

Corine WEGENER
Director,
Smithsonian Cultural Rescue Initiative,
Office of the Provost/Under Secretary for Museums and Research,
Smithsonian Institution

Akiko UMEZU
Senior Specialist,
Unit of Risk Preparedness and Conservation in Use
Architecture Division,
Agency for Cultural Affairs

Kohei SAKAI
Senior Researcher,
OIC Research Organization,
Ritsumeikan University

List of Participants

Virginia Fernanda GONZALEZ
Museum Director,
Sarmiento Historic Museum,
Cultural Secretary of National Government

Angela Maria MICELI
Architect
AIAPP, Italian Association of Landscape Architecture

Monia DEL PINTO
PhD Researcher,
Loughborough University

Mahrous Eid Moustafa ELSANADIDY
Chief Curator,
National Museum of Egyptian Civilization,
Nubia Fund,
Ministry of Antiquities

Enrique RODRIGUEZ LEON
Emergency Manager and Security, Response Unit,
Risk Management Department, City of Santa Elena

Clinton Dean JACKSON
Manager,
National Inventory,
South African Heritage Resources Agency

Roy GIAMPORCARO
Junior Professional Officer in Cultural Heritage,
Culture Sector,
UNESCO Amman Office

Alessia STROZZI
Officer,
Ministry of Cultural Heritage,
Marche Region's branch

Samson Lukabya NABBIMBA(OMUTAKA NAKIGOYE)
KABAKA's Trail Coordinator,
KABAKA FOUNDATION

Ameneh KARIMIAN
Independant Cultural Heritage and Disaster Risk Management Researcher and Consultant

Shah Zahidur RAHMAN
Shelter Specialist,
UNDP Bangladesh

Lilit GEVORGYAN
Researcher,
Institute of Geological Sciences of National Academy of Sciences of Armenia

Photos of ITC 2019

A Field Work for Risk Assessment in Ponto-cho, Kyoto

A Site Visit to a Traditional Japanese Townhouse at Ponto-cho, Kyoto

A Group Photo at Meiji Kotokan Hall at Kyoto National Museum, Kyoto

A Lecture of DRM System at Kyoto National Museum, Kyoto

An Exercise of Risk Assessment for collections at Kyoto Museum for World Peace, Kyoto

A Salvage Excercise

A Site Visit to Takeda Castle Ruins, Hyogo

A Site Lecture at Sawanotsuru Museum, Hyogo

A Site Visit to Disaster Reduction and Human Renovation Institute in Kobe, Hyogo

A Site Visit to Kiyomizu-dera World Heritage Site, Kyoto

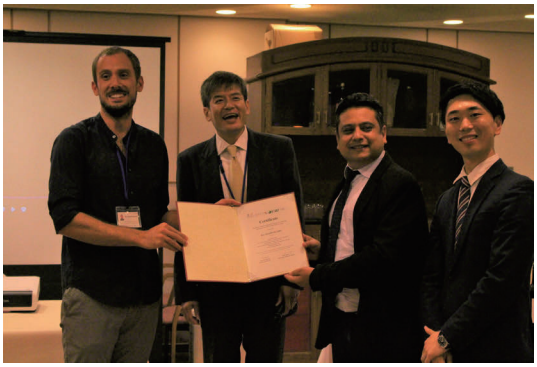
A Lecture of Environmental Water Supply System in Kiyomizu Area, Kyoto

A Site Visit to a Preservation District at Sannenzaka Area, Kyoto

A Site Visit to Kyoto City Disaster Prevention Center, Kyoto

A Site Visit to Higashi Hongan-ji(Temple), Kyoto

Final Presentation of Case Study Projects and Discussion



A Farewell and Certificate Ceremony

Higashihongan-ji : the Buddhist main hall is covering by water shield which is sprayed from drenchers under the eaves

United Nations Educational, Scientific and Cultural Organization
国際連合教育科学文化機関

UNESCO Chair on Cultural Heritage and Risk Management, Ritsumeikan University, Kyoto, Japan
立命館大学 ユネスコ・チェア「文化遺産と危機管理」京都・日本

ICCROM

ICCROM ATHAR

ICOM international council of museums

ICOMOS

INTERNATIONAL SCIENTIFIC COMMITEE ON RISK PREPAREDNESS
ICORP