Proceedings of
UNESCO Chair Programme on
Cultural Heritage and Risk Management

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

2021, 15th year
23rd of August to 7th of October 2021
ONLINE

Organized by Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH), Kyoto, Japan
in collaboration with the International Centre for the Study of Preservation and Restoration of Cultural Property (ICCROM)
and contributed by UNESCO, ICOM, ICOMOS/ ICORP

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

ICCROM

A photo is from Kiyomizu-dera. Taken during the making of site visit video for ITC 2021 online course.

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Date of Publication: February 2022

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

In collaboration with: ICCROM

Authors: Participants of the ITC 2021

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

Edited by: Rohit JIGYASU, ICCROM Project Manager
Dowon KIM, UNESCO Co-Chair Holder, Associate Professor, Ritsumeikan University
Lata SHAKYA, Associate Professor, DMUCH, Ritsumeikan University
Wesley Webb CHEEK, Senior Researcher, DMUCH, Ritsumeikan University
Hiroaki OHASHI, Senior Researcher, DMUCH, Ritsumeikan University

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, ICOM, ICOMOS/ICORP and various national and international organizations. We are very much fortunate to have NICH, (the Independent Administrative Institution National Institutes for Cultural Heritage in Japan) that has supported us to provide the educational resources and lessons which are the integrated protection systems of cultural heritage in Japan. I would like to thank these colleagues for supporting us and participants from all over the world. The purposes of this training course are the education of practical experts in each field of cultural heritage conservation and disaster risk management, and the 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.

Due to COVID-19 pandemic, ITC 2021 was conducted online. In spite of various challenges due to pandemic situation, it was successfully completed by huge contributions from our overseas colleagues and colleagues in Japan. I sincerely appreciate all the colleagues for their support of ITC 2021.

The theme of ITC 2021 was "Disaster Risk Management of Cultural Heritage: Learning from the Japanese Experiences". It was focused on Japanese experiences in each of the phases of DRM cycle: risk assessment, mitigation, preparedness, emergency response, recovery, and policies and frameworks including the international perspectives on policies and frameworks. The related videos of lectures and site visits, interactive live sessions with group works and workshops, and mentoring sessions aimed at developing participants' individual projects were prepared to meet the learning contents of the online course as close to face to face courses that we have organized since 2006.

The outcomes were remarkable although the training was short period and virtual. Some of the participants have already begun to implement their pilot project on their sites.

Thank you all again for supporting this activity, and please keep in touch with us for joining efforts towards transferring our cultural heritage to the next generation.

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

Preface

Since 2006, the Institute of Disaster Mitigation for Urban Cultural Heritage at Ritsumeikan University (R-DMUCH), Kyoto, Japan in close collaboration with the International Centre from the Study of Preservation and Restoration of Cultural Property (ICCROM) has been working towards capacity building in the area of disaster risk management of cultural heritage 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 course is based on lectures by eminent experts, field visits, exercises and discussions. From the inception of the course in 2006 until 2021, nearly 165 professionals from more than more than 68 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 .

Since last year, COVID-19 pandemic that has caused unprecedented health crisis and global disruption, but it has also brought forward immense potential for harnessing web-based platforms for communications and training, in times when travelling and face to face activities have become extremely challenging. While in 2020, R-DMUCH and ICCROM organized webinars and online workshops with former participants and resource persons in place of annual training, this year we decided to take up the challenge of organizing online training course on disaster risk management of cultural heritage for the first time. Following extensive discussions among the organizing team and the resource persons, innovating course structure that included two online interactions of two and a half hours duration each week along with host of teaching resources including lecture and field visit videos, group exercises, interactive workshops and preparation of case study projects by the participants under the mentorship of resource persons. While Zoom was used as virtual platform for the online sessions and discussions, 'Slack' proved to be immensely useful for formal and informal communication among the resource persons and participants. All the teaching resources as well as participants's case studies were posted on google drive for easy access by everyone. At the end of the training course that lasted from 23rd August to 7th October 2021, participants made presentations of their case study projects and were given valuable feedback by the resource persons.

As we move towards post-COVID times, it is time for us to reflect on how we should continue capacity building on the disaster risk management of cultural heritage by tailoring the existing knowledge and skills, identifying and filling gaps in terms of knowledge areas/topics, target audience, and pedagogy based on the lessons learnt from this pandemic. We will continue to build on the rich experience that we have gathered through online training this year and do hope that even when we return to face to face training, we will be able to integrate some of these virtual learning methods. The pandemic period has indeed provided us valuable time to pause, reflect and reconfigure not just the focus areas of disaster risk management that have paid little or no attention to biohazards but also explore innovative ways of teaching and learning using virtual mediums that are now at our disposal. R-DMUCH and ICCROM will continue to strengthen their collaboration to meet these emerging challenges and opportunities and reduce disaster risks and build resilience of our cultural heritage around the world.

Rohit JIGYASU
Project Manager
Urban Heritage, Climate Change and Disaster Risk Management
ICCROM

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1 Introduction

1.1 Background and Objectives of the 15th International Training Course 2021

Disasters and Cultural Heritage

The COVID-19 pandemic and 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.

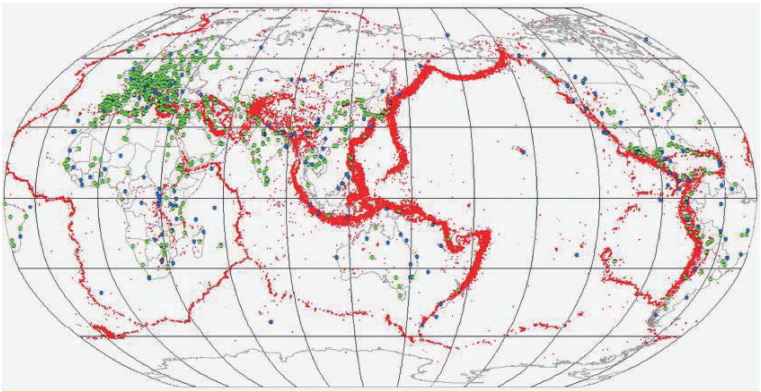

Fig.1 World Heritage Sites Located in the Earthquake Zones 2008

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.

165 participants in total from 68 countries have participated in our training courses till date. These participants are from East Asia (China, Indonesia, Japan, Laos, Malaysia, Myanmar, Philippines, South Korea, Thailand and Vietnam), South Asia and South East Asia (Afganistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka), Oceania (Australia, Fiji, New Zealand and Palau), North America (USA), Central and South America (Argentina, Brazil, Chile, Colombia, Ecuador, Haiti, Honduras, Jamaica, Mexico, Panama and Peru), Europe (Albania, Armenia, Belgium, Bosnia and Herzegovina, Croatia, France, Georgia, Italy, Kosovo, Latvia, Moldova, Netherlands, Portugal, Romania, Serbia, Spain, Switzerland and Turkey), Middle East (Iran, Iraq, Jordan, Palestine and Syria), Africa (Egypt, Ethiopia, Ghana, Kenya, Malawi, Morocco, Nigeria, South Africa, Tanzania, Uganda and Zimbabwe).

Objectives and Methodology of the Training Course

The main objective of the course is to provide 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).
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.

Fig.2 The structure of International Training Course on Disaster Risk Management of Cultural Heritage

Sub Theme of 2021 International Training Programme:

Disaster Risk Management of Cultural Heritage: Learning from the Japanese Experiences

Japan has a rich cultural heritage, but also the country is vulnerable to disasters because of its climate and topography. It has experienced countless earthquakes, typhoons, landslides, and other types of disasters including devastating events like the Hanshin Kobe Earthquake in 1995, and the 2011 Great East Japan Earthquake and Tsunami. Experiencing these numerous disasters, Japan has developed its own disaster risk management (DRM) system. Some of the key lessons learned have been expressed in institutional / legal frameworks/ policies and associated budgets related to cultural heritage and DRM. Japan has also worked to document these lessons and improve its preparedness and emergency response systems through recurring events at the local or regional level, as well as through community-based disaster mitigation activities.

This year's training course is focused on Japanese experiences in each of the phases of DRM cycle: Risk assessment, Mitigation and preparation, Emergency response, Recovery, and Policies and frameworks. To provide a more effective online course, the three sessions: preparatory session (lecture videos, site visit videos), interactive live session (workshops, group work, group discussions) and post-interactive session (mentoring and feedbacks from resource persons for the case study projects) are prepared for each phase. While Zoom was used as virtual platform for the interactive live sessions, 'Slack' proved to be immensely useful for formal and informal communication among the resource persons and participants. All the teaching resources as well as participants' case studies were posted on google drive before the interactive live sessions for easy access by everyone. It was challenging for us to conduct fieldwork given the COVID-19 pandemic. However, with the cooperation of the heritage site owners and the local community in the city of Kyoto, we created alternative video tours of local sites.

Fig.3 An Annual Firefighting Drill at Daigo-ji, World Heritage Temple

Previous International Training Courses (2006-2020)

ITC 2006

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

ITC 2007

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

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

ITC 2008

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

ITC 2009

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

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

The first week of the course was organized in Japan and it focused on familiarizing the participants with the basic methodology for risk assessment and management for cultural heritage properties. The participants were shown various disaster prevention facilities developed for numerous cultural heritage sites in Kyoto. Second week in Kathmandu focused on the earthquake vulnerability and capacity of the World Heritage Monument Zone of Patan and its surrounding historic urban area, both at building and area levels. The UNESCO Chair programme intends to build upon the four years of very rich experience gained through very active participation of lecturers from Japan and abroad, as well as the international participants from various countries from Asia, Europe and the Caribbean and further enrich the contents of the training course in subsequent years.

ITC 2010

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

On the final day of the course, the international symposium titled "How to protect Cultural Heritage from Disaster; Risk Preparedness and Post Disaster Recovery" was organized by Ritsumeikan University and the ICOMOS International Committee on Risk Preparedness (ICORP). In the symposium, the current challenges for protection of cultural heritages taking into account the context of post disaster recovery was discussed in great depth with international experts from UNESCO, ICOMOS, ICORP and a representative of Kyo-o-Gokoku-ji Temple; World Cultural Heritage site in Kyoto.

ITC 2011

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

ITC 2012

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

ITC 2013

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

ITC 2014

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

ITC 2015

Earthquakes and floods cause immense damage to cultural heritage. Recently devastating earthquakes in Nepal in 2015, 2013 earthquake in Philippines, North Italy earthquake of 2012 caused vast damage to cultural heritage. Moreover 2014 floods in Balkan region, 2011 floods in Thailand and 2010 floods in Pakistan also caused damage to historic towns and archaeological sites such as Ayutthaya. While vulnerability of cultural heritage to earthquake and floods is increasing more than ever before, there are many examples of traditional knowledge systems developed by communities for mitigating against earthquakes and floods. Considering these issues and challenges the 10th International Training Course focused on **the protection of cultural heritage from earthquakes and floods, and other associated hazards**.

ITC 2016

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

ITC 2017-2018-2019

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**.

ITC 2020 Alternative Programme

This year, ITC training course was not conducted due to COVID-19 pandemic. However, as an alternative programme, we conducted webinar series "**Capacity Building for Disaster Risk Management of Cultural Heritage: Challenges and Opportunities in Post-COVID Times**" (on 27th June and 4th July 2020) and a workshop "**Good Practices for Disaster Risk Management of Cultural Heritage**" (on 8 to 10 Oct 2020).
The webinar series aimed to discuss the future directions of cultural heritage management through presentations by resource persons of ITC. Webinar was structured with two parts. The first webinar focused on the stages before the disaster that is "**Disaster mitigation and Preparedness**" and the second webinar focused on the stages after the disaster that is "**Disaster response and recovery**".

The workshop aimed to showcase various projects on disaster risk management of cultural heritage undertaken by the former participants of ITC since 2006. It also aimed to review the activities of ITC since 2006 and works towards building a stronger network among the ITC resource persons and the former ITC participants.

Organizers and Participants

The training course is organized in close cooperation with ICCORM and in collaboration with the UNESCO, 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	
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

Observer

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

ITC 2009, the 4th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Rong YU	P. R. CHINA	Lecturer, Wenhua College, Huazhong University of Science and Technology	Dujiangyan, WHS
2	Yuan DING	P.R.CHINA	Researcher, Tongji University, National Historic Cities Research Center	

3	Ramesh THAPALIYA	NEPAL	Architect, World Heritage Conservation Section/Ministry of Culture and State Restructuring, Department of Archaeology	Patan Durbar Square Monument Zone in Kathmandu Valley, WHS
4	Suresh Suras SHRESTHA	NEPAL	Archaeological Officer, Ministry of Culture and state Restructuring, Department of Archaeology	
5	Pauline BROWN	JAMAICA	Senior Director, Office of Disaster Preparedness and Emergency Management	Port Royal City
6	Audene BROOKS	JAMAICA	Senior Archaeologist, Jamaica National Heritage Trust	
7	Sergius CIOCANU	MOLDOVA	Head Scientific Researcher, Institute of Cultural Heritage of the Academy of Science of Moldova	National Museum of Fine Arts (Buildings and Collection)
8	Valeria SURUCEANU	MOLDOVA	Curator, National art Museum of Moldova	

Observers in the Kathmandu Part of the ITC 2009

No	Name	Country	Work Position and Affiliation
1	Keshab P. SHRESTHA	NEPAL	Chief, National History Museum
2	Punya Sagar MARAHATTA	NEPAL	Lecturer, IoE, tribhuvan University
3	Ajay LAL CHANDRA	NEPAL	Assistant Professor, Department of Architecture and Urban Planning, IoE
4	Gyanin RAI	NEPAL	Chief (Administration, Information & Public Relation Section), Lumbini Development Trust
5	Inu PRADHAN SALIKE	NEPAL	Lecturer, Khwopa Engineering College
6	Saubhagya PRADHNANGA	NEPAL	Head of Culture and Archaeology Unit, Lalitpur Sub Metropolitan City Office
7	Chandra Shova SHAKYA	NEPAL	Head of Heritage Section, Lalitpur Sub Metropolitan City Office
8	Prabin SHRESTHA	NEPAL	Head of Urban Development Division, Lalitpur Sub Metropolitan City Office
9	Ashok SHRESTHA	NEPAL	Head of Administration Division, Lalitpur Sub Metropolitan City Office
10	Sainik Raj SINGH	NEPAL	Head of Earthquake Safety Section, Lalitpur Sub Metropolitan City Office

ITC 2010, the 5th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Dechen TSHERING	BHUTAN	Structural Engineer, Division for Conservation of Heritage Sites, Department of Culture, Ministry of Home & Cultural Affairs, Royal Government of Bhutan	Wangduephodrang Dzong
2	Junko MUKAI	BHUTAN	Deputy Chief Conservation Architect, Division for Conservation of Heritage Sites, Department of Culture, Ministry of Home and Cultural Affairs, Royal Government of Bhutan	
3	Alexander G DWIGHT	PALAU	Director, Historical Preservation Officer, Bureau of Arts & Culture, Ministry of Community & Cultural Affairs	Bai: Traditional Meeting House
4	Sunny NGIRMANG	PALAU	Palau National Registrar, Bureau of Arts & Culture, Palau Historic Preservation Office	
5	Teresa VILCAPOMA HUAPAYA	PERU	Professor, Sagrado Corazon University	City of Cuzco, WHS
6	Olga Keiko MENDOZA SHIMADA	PERU	JSPS Research Fellow, Graduate School of Science & Engineering, Ritsumeikan University	
7	Marilene TERRONES DIAZ	PERU	Professor, Sagrado Corazon University	
8	Milica GROZDANIC	SERBIA	Director, Cultural Heritage Preservation Institute of Belgrade	Kosancicev Venac, Belgrade
9	Svetlana Dimitrijevic MARKOVIC	SERBIA	Architect - Conservator - Senior Associate, Cultural Heritage Preservation Institute of Belgrade	
10	Zeynep GUL UNAL	TURKEY	Assistant Professor, Dr. Yildiz Technical University, Faculty of Architecture, Restoration Department	Eskigediz Heritage Site
11	Meltem VATAN KAPTAN	TURKEY	Research Assistant, PhD Student, Yildiz Technical University, Faculty of Architecture, Structural Systems Division	

ITC 2011, the 6th year

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

ITC 2012, the 7th year

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

Observers

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

ITC 2013, the 8th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Saleh Mohammad SAMIT	AFGHANISTAN	National Manager, Community Development Programme, Aga Khan Foundation- Afghanistan	Cultural Landscape and Archaeological Remains of the Bamiyan Valley, WHS
2	Dian LAKSHMI PRATIWI	INDONESIA	Head of Archaeological Section, Division of History, Archaeological and Museum, Cultural Service Office, Government of Yogyakarta Special Territory	Kotagede Heritage Area, Yogyakarta Historic City
3	Kambod AMINI HOSSEINI	IRAN	Director, Risk Management Research Center (Associate Professor) Risk Management Research Center, International Institute of Earthquake Engineering and Seismology	Golestan Palace, Tehran Bazaar and their surrounding old urban fabrics, Tehran
4	Barbara CARANZA	ITALY	MEC srl Italian Army "LIGURIA" ARMY MILITARY COMMAND	Monumental Cemetery of Staglieno, Genoa
5	Paola MUSSINI	ITALY	Researcher, SiTI-Instituto Superiore sui Sistemi Territoriali per l'Innovazione	Portovenere, Cinque Terre, and the Islands (Palmaria,Tino and Tinetto), WHS
6	Zaha AHMED	MALDIVES	Assistant Architect, Heritage Department, Male' Republic of Maldives	Laamu atoll Isdhoo Old Friday mosque in Maldives
7	Arjun KOIRALA	NEPAL	Advisor, Urban Planning and Infrastructure Development, GFA Consulting Group (Nepal Office), on behalf of GIZ/Nepal Municipal Support Team, Ministry of Urban Development, Department of Urban Development and Building Construction	The city core area of Tansen Municipality
8	Kenechukwu Chudi ONUKWUBE	NIGERIA	Director of Programs, Development Education and Advocacy Resources Initiative for Africa (DEAR Africa)	Sukur Cultural Landscape, WHS

9	Muhammad Juma MUHAMMAD	TANZANIA	Director, Urban and Rural Planning Department of Urban and Rural Planning	Stone Town of Zanzibar, WHS
10	Hatthaya SIRIPHATTHANAKUN	THAILAND	Landscape Architect Ministry of Culture, Fine Arts Department, Office of Architecture	Historic City of Ayutthaya, WHS

ITC 2014, the 9th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Elena MAMANI	ALBANIA	Project Manager, Deputy Head of Office, Cultural Heritage without Borders (CHwB)	Gjirokastra, WHS
2	Catherine FORBES	AUSTRALIA	Built Heritage Advisor, GML Heritage; Australia Institute of Architects, Australia ICOMOS	The Rocks Historic Urban Precinct
3	Sasa TKALEC	CROATIA	Head of Office of Director, Croatian Conservation Institute	Castle Batthany in Ludbreg
4	Juan Diego BADILLO REYES	ECUADOR	Architect Conservator free-lance, 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

Observer

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)

Observer

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	Sayma 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
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

ITC 2019, the 14th year

No	Name	Country	Work Position and Affiliation	Selected Site
1	Virginia Fernanda GONZÁLEZ	Argentina	Museum Director, Museum Director Cultural Secretary of National Government	Historical Museo of Sarmiento
2	Angela Maria MICELI	Italy	Individual Professional, AIAPP Professional Association of Lanscape Architects	LUNGOTEVERE TOR DI QUINTO (QUINTO'S TOWER/TIBER_ RIVERFRONT PARK)
3	Monia DEL PINTO	Italy	PhD researcher, Loughborough University	MuNDA -Museo Nazionale D'Abruzzo (National Museum of Abruzzo)
4	Mahrous Eid Moustafa ELSANADIDY	Egypt	Chief Curator, National Museum of Egyptian Civilization, Nubia Fund, Ministry of Antiquities	National Museum of Egyptian Civilization, Nubia Fund, Ministry of Antiquities
5	Enrique RODRIGUEZ LEON	Costa Rica	Preparedness and Response chief / Risk and Emergency Management Unit, GAD - decentralized autonomous municipal government of Canton Duran (city of Duran)	Museum and archeological site of The Lovers of Sumpa and Museum and archeological site of the Venus of Valdivia
6	Clinton Dean JACKSON	South Africa	Manager: National Inventory, South African Heritage Resources Agency	Dal Josafat Cultural Landscape
7	Roy GIAMPORCARO	Italy	Junior Professional Officer in Cultural Heritage, Culture Sector, UNESCO Amman Office	The Historic Centre of Naples, ITALY
8	Alessia STROZZI	Italy	Officer, Ministry of Cultural Heritage, Marche Region's branch	The Lazzaretto of Ancona, (Mole Vanvitelliana)
9	Samson Lukabya NABBIMBA	Uganda	CLAN LEADER- RED ANT (KINYOMO), KABAKA'S TRAIL COORDINATOR, KABAKA FOUNDATION	WAMALA TOMBS

10	Ameneh KARIMIAN	Iran	DRR Advisor & Project Coordinator at Iranian Relief Association (IRA) NGO Researcher & Scientific Coordinator at Tamadon Karizi Consulting Eng. (TKCE)	Qasem-Abad Qanat and Akbar-Abad Qanat (twin qanats) part of the Persian Qanats (WH serial property)
11	Shah Zahidur Rahman Zahidur ZAHID	Bangladesh	Shelter Specialist, Early Recovery Facility, Resilience & Inclusive, Grouth Cluster, UNDP Bangladesh	Somapura Mahavihara in Paharpur, Badalgachhi Upazila, Naogaon District, Bangladesh
12	Lilit GEVORGYAN	Armenia	Researcher, Institute of Geological Sciences of National Academy of Sciences of Armenia	Geology Museum after H. Karapetyan of Institute of Geological Sciences of National Academy of Sciences

< ITC 2020 Alternative programme 1 >
Presenters for Webinar Series
"Capacity Building for Disaster Risk Management of Cultural Heritage: Challenges and Opportunities in Post-COVID Times"

	Name	Work Position and Affiliation	Topic
Webinar1	Ksenia CHMUTINA	Senior Lecturer in Sustainable and Resilient Urbanism, Loughborough University	Considering multiple risks and inequalities in COVID-19 times and beyond
Webinar1	Lee BOSHER	Professor of Disaster Risk Management, Loughborough University	Considering multiple risks and inequalities in COVID-19 times and beyond
Webinar1	Takeyuki OKUBO	Professor, College of Science and Engineering, Ritsumeikan University	Community based DRM workshops with digital network for post-COVID times
Webinar1	Yoshifumi SATOFUKA	Professor, College of Science and Engineering, Ritsumeikan University	Consideration of Climate Change for DRM
Webinar1	Joseph KING	Director of Partnership and Communication, Partnership and Communication Unit, ICCROM	How should international organizations working in the field of cultural heritage sector rethink on their activities in the light of COVID-19?
Webinar2	Aparna TANDON	Senior Programme Leader, First Aid and Resilience for Cultural Heritage | Sustaining Digital Heritage, Programme Unit, ICCROM	What can we learn from COVID-19 response cultural heritage?
Webinar2	Wesley CHEEK	JSPS Fellow, Visiting Researcher, Ritsumeikan University	How can we address sustainable and resilient recovery by mainstreaming cultural heritage
Webinar2	Elke SELTER	Doctoral Researcher, SOAS, University of London	Reflecting on PDNA methodology based on COVID-19 experience

Webinar2	Ming Chee ANG	General Manager, George Town World Heritage Incorporated	The Disaster Risk Management Implementation during COVID-19 in George Town, Malaysia

< ITC 2020 Alternative programme 2 >
Participants for Workshop
"Good Practices for Disaster Risk Management of Cultural Heritage"

No	Name	Country (ITC participated year)	Topic
1	Elena MAMANI (The Best Practice winner)	Albania/Greek (ITC 2014)	"Utilisation of traditional water cisterns as water source in case of fire in Gijokastra, Albania"
2	Dulce María GRIMALDI (The Best Practice winner)	Mexico (ITC 2016)	"Mapping risks for cultural heritage in Mexico"
3	Ming Chee ANG (Exemplary Practice Award winner)	Malaysia (ITC 2017)	"George Town world heritage city, Malaysia"
4	Abdelhamid Salah Abdelhamid SAYED	Egypt (ITC 2014)	"Fire risk mitigation strategies for urban heritage site in Cairo, Egypt"
5	Junko MUKAI and Dechen TSHERING	Japan/Bhutan (ITC 2010)	"Disaster risk management plan for Punakha Dzong, Bhutan"
6	Marcela HURTADO	Chile (ITC 2015)	"Disaster risk management plan for Humberstone and Santa Laura altpeter works, Pozo Almonte, Chile"
7	Vanessa Anne TANNER	New Zealand (ITC 2016)	"Heritage New Zealand Pouhere Taonga (HNZPT) draft guidance for preparing heritage risk management plans"

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

	8/23 Mon	8/26 Thu	8/27 Fri	8/30 Mon	9/2 Thu	9/3 Fri	9/6 Mon	9/9 Thu	9/11 Sat	9/13 Mon
	1st Week			2nd Week			3rd Week			
THEME	Introduction		Case Study Project Preparation	Risk Assessment		Case Study Project Preparation	Mitigation and Preparation		Case Study Project Preparation	Emergency
	Introduction and core Principles of DRM	Participants Introduction Presentation		Value Assessment, Integrated Risk Management and Key Terminology	WS- Disaster Imagination Game		Technology for Prevention and Mitigation	WS- Designing Mitigation		DRM System and Education of Emergency Drills
Venue	Online	Online	Online	Online	Online	Online	Online	Online	Online	Online
15:30	Opening Remark 1 (President of ritsumeikan Univ)	Recap (Group Presentation)	Individual case study project preparation time	Recap (Group Presentation)	Recap (Group Presentation)	Individual case study project preparation time	Recap (Group Presentation)	Recap (Group Presentation)	Mid-Term Presentation	Recap (Group Presentation)
15:35										
15:40	Opening Remark 2 (Director General of ICCROM)									
15:45		Intro-presentations of 7 participants (5min.)								
15:50	Orientation of the Course (R. JIGYASU & D. KIM)			SM and Q&A (Lec 3) DRR and Integrated Risk Management (R. JIGYASU)	SM and Q&A (Lec 5) Introduction of DIG (T. OKUBO)		SM and Q&A (Lec 6) GIS for Disaster Management of Historical Cities and Cultural Heritage (K. YANO)	SM and Q&A (Lec 10) Environmntal Water Supply System in Kiyomizu Area (T. OKUBO)		SM and Q&A (Lec 11) DRM System in Kyoto National Museum (J. FURIHATA)
15:55										
16:00								Site Visit 2 (video) Introduction to the Maintenance System in Kiyomizu-Dera World Heritage Site		
16:05										SM and Q&A (Lec 12) Disaster Mitigation for Cultural Heritage by Kyoto City Fire Department (D. YAMANOUCHI)
16:10	SM and Q&A (Lec 1) Development of Disaster Risk Management for Cultural Heritage in Historic City: Kyoto (K. TOKI)				BREAK					
16:15				Site Visit 1 (video) Ponto-cho Townscape Improvement Area	Workshop 2 Disaste Imagination Game (T. OKUBO & D. Kim)		SM and Q&A (Lec 7) Seismic Performance of Japanese Historical Structures (S. YOSHITOMI)			
16:20		Comments Q&A 15min						Video of the Roof Repair of Kiyomizu-dera		BREAK
16:25	BREAK							BREAK		
16:30	Brief lec. Introdoction of Kyoto (D. KIM)							Workshop 3 Designing mitigation (R. JIGYASU)		Site Visit 3 (video) Fire Prevention Facilities at Higashihongan-ji
16:35		BREAK		BREAK			SM and Q&A (Lec 8) Landslide Assessment (M. FUJIMOTO)			
16:40										
16:45	SM and Q&A (Lec 2) Key Principles for DRM of CH (R. JIGYASU)						SM and Q&A (Lec 9) Climate Change and Risk Prevention (M. FUJIMOTO & Y. SATOFUKA)			
16:50										
16:55		Intro-presentations of 7 participants (5min.)		Group-Work (Lec 4) Disaster risk reduction or disaster risk production: Considering urban challenges in historic urban areas (K. CHMUTINA and L. BOSHER)			BREAK			Group Discussion
17:00										
17:05										
17:10										
17:15	Workshop 1 Terminology of DRM						Group-Discussion			
17:20		Comments Q&A 15min								
17:25										
17:30										
18:00										
18:30										

# of Cultural Heritage 2021, 15th year, Ritsumeikan University

9/16 Thu	9/17 Fri	9/20 Mon	9/23 Thu	9/24 Fri	9/27 Mon	9/30 Thu	10/1 Fri	10/4 Mon	10/7 Thu	
4th Week		5th Week			6th Week			7th Week		
y Response		Recovery			Policies and Frame Works			Conclusion		
WS- Roll Play	Case Study Project Preparation	From Response to Recovery (lessons from Great Hanshin EQ & Great East Japan EQ	WS- Designing Recovery Process	Case Study Project Preparation	Government Policies and DRM Frameworks	Good Practices of DRM	Case Study Project Preparation	Final presentations	Final presentations and Virtual Farewell Party	THEME
Online	Online	Online	Online	Online	Online	Online	Online	Online	Online	Venue
Recap (Group Presentation)	Individual case study project preparation time	Recap (Group Presentation)	Recap (Group Presentation)	Individual case study project preparation time	Recap (Group Presentation)	Recap (Group Presentation)	Individual case study project preparation time	Final presentations of 4 participants (10min. + 10min. Q&A)	Final presentations of 3 participants (10min. + 10min.Q&A)	15:30 15:35 15:40 15:45
SM and Q&A (Lec 13) Formulation of Scenarios (A. TANDON)		SM and Q&A (Lec 14) Lessons Learned from Experience of Kobe Earthquake (Y. MURAKAMI)	Additional Lecture Utilization of 3D Documentation (H. IKAWA)		SM and Q&A (Lec 17) Governmental policies of Disaster Risk Management for Cultural Properties (T. INAGAKI)	SM and Q&A (Lec 21) Good Practices of DRM by former Participants (videos of Workshop) (Ang: 10mins+10mins) Elena: 10mins Dulce: 10mins)				15:50 15:55
		SM and Q&A (Lec 15) Post Disaster and Recovery Process in Tohoku (Y. HIRAOKA)	SM and Q&A (Lec 16) Thinking about Disaster Recovery Through a Social Science Lens (W. CHEEK)		SM and Q&A (Lec 18) Management System and Management Planning for Heritage Sites (E. JO)					16:00 16:05 16:10 16:15
BREAK		Site Visit 4 (video) Recovery Process after Tohoku Earquake in Minami- Sanriku	BREAK		BREAK	BREAK		BREAK	BREAK	16:20 16:25
Workshop 4 Role Play (A. TANDON)		BREAK Group Discussion	Workshop 5 Designing recovery process (W. CHEEK)		SM and Q&A (Lec 19) Recent Development and Emergency Response to Cultural Heritage in Crisis Situations (G. BOCCARDI)	Workshop 5 Discussion with Former Participants Challenges for Making DRM Plans (K. CHMUTINA)		BREAK	BREAK	16:30 16:35 16:40
					SM and Q&A (Lec 20) PDNA and Post Disaster Recovery Frameworks (E. SELTER)					16:45 16:50 16:55
					Group Discussion			Final presentations of 3 participants (10min. + 10min. Q&A)	Final presentations of 3 participants (10min. + 10min.Q&A)	17:00 17:05 17:10 17:15 17:20 17:25
									Closing Remarks (T.Okubo, DMUCH Director) & Farewell Party	17:30 18:00 18:30

2 Outline of Disaster Risk Management Plans for Case Study Projects by ITC 2021 Participants

2.1 National Palace of Sintra, Portugal: a comprehensive approach for the development of a disaster risk management plan

Alexandre A. Costa *Co-Founder and Partner, NCREP – Consultancy on Rehabilitation of Built Heritage, Ltd.*
Invited professor, Polytechnic Institute of Porto, School of Engineering

1. Introduction

(1) Presentation of the case study

The National Palace of Sintra (Fig. 1) is in the center of Portugal, at the middle part of Sintra mountain and 8km far away from the Atlantic Ocean, inside the UNESCO World Heritage Cultural Landscape of Sintra. Indeed, it "(…) is undoubtedly the dominant architectural feature of Sintra, situated in the town centre. Probably constructed on the site of the Moorish Alcazar of Sintra, the palace's buildings date from the early 15th and early 16th centuries. One of the most important features of the Palace is the facing with tiles (azulejos), the finest example of this Mudéjar technique on the Iberian Peninsula. The interior contains painted and tiled decoration and other features characteristic of the Mudéjar and late Gothic Manueline styles", (Outstanding Universal Value, extracted from[1)].

a) b)

Fig. 1 National Palace of Sintra: a) general view of the Palace (source: PSML); b) Brazões room, with the ceiling and tiled decorations (source: by author)

The management of the National Palace of Sintra, among other properties and lands, is made by Parques de Sintra – Monte da Lua, S.A. (PSML), a public company created in 2000 after the UNESCO World Heritage classification in 1995. This company is responsible for the management and the shareholders are those main institutions responsible for the protection and valorization of the World Heritage area (General-Directorate of Treasure and Finances, 35%; Institute of Nature and Forestry Conservation, 35%; Portuguese Tourism Board, 15%; Sintra Municipal Council, 15%). It should be referred that Parques de Sintra – Monte da Lua, S.A., do not make use of the State Budget and therefore all restoration, maintenance, and upgrade activities are covered from different sources, like ticket sales, shops, cafeterias, and rental of event spaces (2).

(2) National Palace of Sintra: historical background and values

The National Palace of Sintra is considered the oldest Palace in Portugal with an estimated construction date of the first structures on the X or XI century, being adapted and reformulated along the times, but 3 main construction periods are defined: XIV century by King D. Dinis; XV century by King D. João I; XV and XVI centuries by King D. Manuel I. Almost all kings and queens of Portugal inhabited the palace during different periods and therefore the Palace possess movable and immovable heritage components from this presence, as the oldest ceramic floors of the Palace (1430-1440), the Swan room ceiling (ceiling with a

probable date of construction on XIV century), containing also the finest examples of the Mudéjar technique of paintings, ceilings and tile decoration on the Iberian Peninsula as the Palatine Chapel, among others.

From the research performed, several important values can be attributed to the National Palace of Sintra and mostly related to built heritage: landscape, architectural, historical, artistic, social, economic. On the other hand, the National Palace contains also valuable collections but without the significance of the built heritage values and without important impacts on the local community livelihood.

2. Risk analysis and local assessment

For the initial identification of possible hazards, several documents were consulted, being the most important ones: national civil protection plan; national risk assessment document; national platform for reduction of disaster risks, Sintra municipality civil protection plan; Parques de Sintra – Monte da Lua management plan. For the case study, the collected data was filtered considering agents that could affect built and movable heritage, as well as other agents that could impact surroundings and local livelihood.

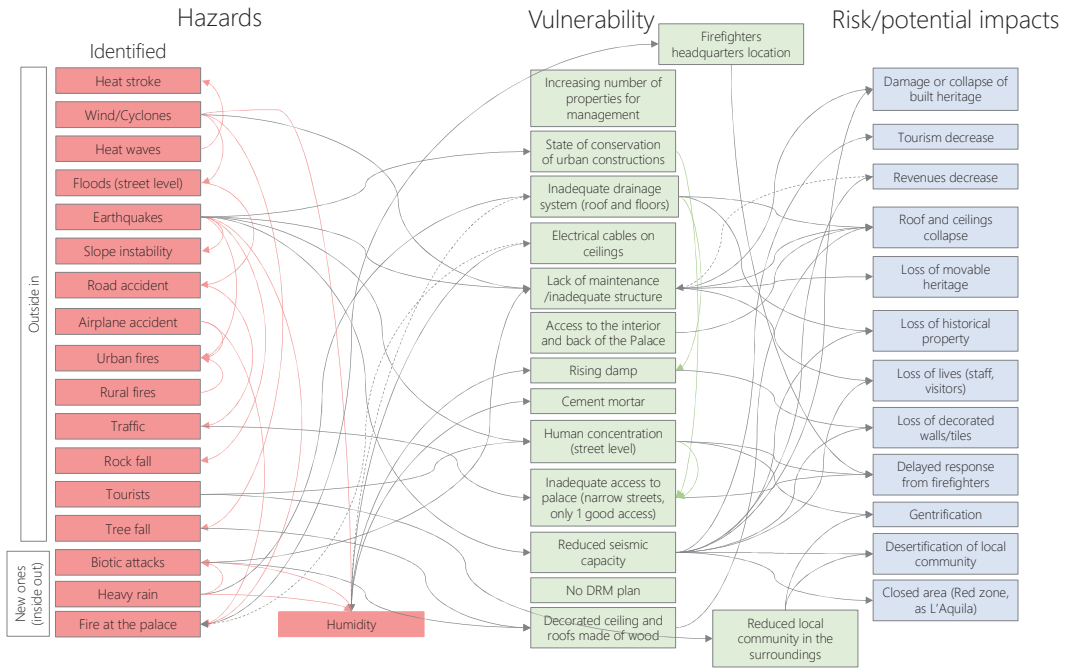

Fig. 2 Example of initial risk analysis for the National Palace of Sintra, interconnecting hazards with vulnerabilities and impacts: grey arrows (direct relation between hazard-vulnerability or vulnerability-impacts), colored arrows (interconnected relation between hazard-hazard or vulnerability-vulnerability), dashed arrows (backward interaction) (source: by author)

The assessment of the local conditions of the National Palace, to infer possible vulnerabilities and assess their potential impacts was made locally with site visits including visual inspections, extensive photographic survey, meetings with local staff (museology, built heritage, security, touristic guides), and interviews to local persons. For the built heritage, a strong push was given by the structural and diagnosis reports already performed by NCREP in 2020-21 (3-5). Moreover, some connections were made to possible important stakeholders, as the Municipality Civil Protection, ICOMOS-Portugal, and General Directorate of Cultural Heritage (DGPC). Despite being an evolutive, forward-backward, and continuous process along the 7 weeks of the ITC course, Fig. 2 presents the initial risk analysis made, identifying hazards (primary and secondary), vulnerabilities, and potential impacts.

3. Worst case scenario

An earthquake occurs in August (from 5 years data, 2), the maximum number of tourists in Sintra) during the morning, followed by a fire at the palace. Some local collapses occur at the Palace, including partially the main façade (based on historical information and recent seismic assessment results), including some ceilings and roof structures (due to bad state of conservation). Loss of built and movable heritage and possibly human lives losses (staff and visitors). The main entrance is blocked due to debris and access to the back of the Palace is blocked due to the collapse of non-structural elements (parapets). Locals and staff are afraid to go inside the Palace. The Earthquake triggered slope instability on the surroundings of the palace, blocking access from the Vila (Volta do Duche) to the fire brigades, as well as rockfalls from Castelo dos Mouros Mountain (based on 6) research data), damaging some buildings and blocking other alternative accesses to the palace. Some buildings in the Old Villa partially collapsed to the street (out-of-plane failures) and main streets are also blocked by tourists and locals under panic, most of them concentrated in the main square at the front of the Palace working as a temporary shelter, blocking any access to the Palace. Important loss of landscape, architectural artistics, and historical values.

30 minutes to 1 hour later, fire is spreading at the palace and no direct intervention is made due to the lack of first intervention measures possible to be used by staff. First firefighters arrive at the Palace and can extinguish the fires located around the Palace central yard, including Swan's room, and at the West part of the Palace through the gardens (including Brasões room). Hydrants are provided by existing natural water cisterns and fountains and not from water trucks or external water supplies. No direct access is available to the back part of the Palace due to local collapses, increasing the severity of the fire at the Palatine Chapel.
In December/January (4-5 months later after the main event), landslides occur due to slope instability with mud and debris floods due to earthquake (as the case of Beichuan, China, after the 2008 Sichuan earthquake). No direct effect to the Palace but affects local recovery with strong social impact.

Considering the conditions of the Palace and concerning long-term effects (2-5 years), the social and economic impact is high with the collapse of the local economy, resettlement of local people, and severe decrease of touristic flow. Local identity is lost. Lower revenues induce a lack of maintenance activities, including repairing and reconstruction activities required to the Palace. Moreover, the water used in fire increased humidity around the walls, flooring, roof, and ceiling, and termite attacks are extended to all wooden elements, inducing the collapse of the remaining wooden elements that did not collapse during the earthquake or were not burned during the fire. Textiles are deteriorated and existing collections are strongly affected (those not recovered after the main event). Finally, the increase of humidity with existing rising damp induces the loss of azulejos due to mortar failure (around all the Palace) and frescos (at the Palatine Chapel). There is a permanent loss of historical, artistic, and educational values.

4. Development of a disaster risk management plan

(1) On the way to a comprehensive and fluid recovery, through mitigation/preparedness and emergency response measures

Considering the vulnerabilities identified (some presented in Fig. 2 in section 2), the worst-case scenario (section 3) as well as other two alternative scenarios with different triggering hazards (strong cyclone; heavy rain), several measures were identified to tackle different weaknesses considering both mitigation/preparedness, emergency response or recovery phase of a disaster risk management plan. Fig. 3 presents two examples of measures to be implemented considering the emergency response to movable items: on the left, a 3-stage approach for evacuation of objects concerning increasing severity of earthquakes (1st stage: no significant damage on the palace and the 1st refugee area is made on the safest part of the Palace, as identified recently on a seismic vulnerability assessment report; 2nd stage: some damages occur in the Palace and the 2nd refugee area made in a hotel right next to the Palace; 3rd stage: significant dam-

age at the Palace with some local collapses, and the 3rd refugee area is made at the Palace's garden to provide 1st aid to objects). On the right figure, a colored inventory for evacuation of objects is presented,

Fig. 3 Example of measures at the emergency phase regarding movable heritage: a) evacuation areas (area of the National Palace in red); b) example of inventory for evacuation priority with colored sign next to an object (source: by author)

Fig. 4 Measures defined for the disaster risk management plan divided by departments, highlighting in color and by legend the main impacts of the measure in a disaster (M, mitigation; P, preparedness; E, emergency; R, recovery) (source: by author)

where the color of the item (green, yellow, red, or black) indicates the priority on evacuation considering its importance, weight, dimensions, and location.
The implementation of these example measures could minimize the permanent loss of movable items, reducing the loss of artistic and historical values, despite not being the major values identified in the Palace (mainly related to built heritage). On the other hand, these example measures are simple, have no cost and can be implemented within a very reduced time frame by the local staff of the Palace, on the opposition to main interventions on built heritage (e.g. seismic strengthening). This type of analysis was made for all the proposed measures to access their impact and efficiency for the reduction of risk.
As the final output, a global disaster risk management plan (Fig. 4) was defined considering different internal departments of the National Palace as well as the management team, clarifying also the responsibility for the implementation of each measure and the coordination between departments.

(2) Preparation and implementation of a pilot project
The definition of the pilot project to implement in the 1st year after the ITC 2021 course was made considering important key points for the success of the DRM plan:

- implementation of measures for all stages of a DRM (mitigation/preparedness, emergency response, recovery);
- small but effective and visible improvements on mitigation and preparedness with the implementation of simple measures in a short time;
- involvement of different Palace's departments and key staff to be used as a trigger to include other persons from the Palace within DRM plan in a more demanding objective for future tasks;
- effective solutions and independent of external companies, increasing awareness on DRM within the Palace's staff and management as well as on local community;
- evaluation of interconnection between different stakeholders to be tackled and improved in the following years, possible to assess with a disaster simulation drill.

Fig. 5 presents the definition of the pilot project, where each measure can be identified by a color along the different stages of the DRM plan (green: mitigation/preparedness; red: emergency response; blue: recovery). Moreover, the department defined to implement the measures are also identified. If more than

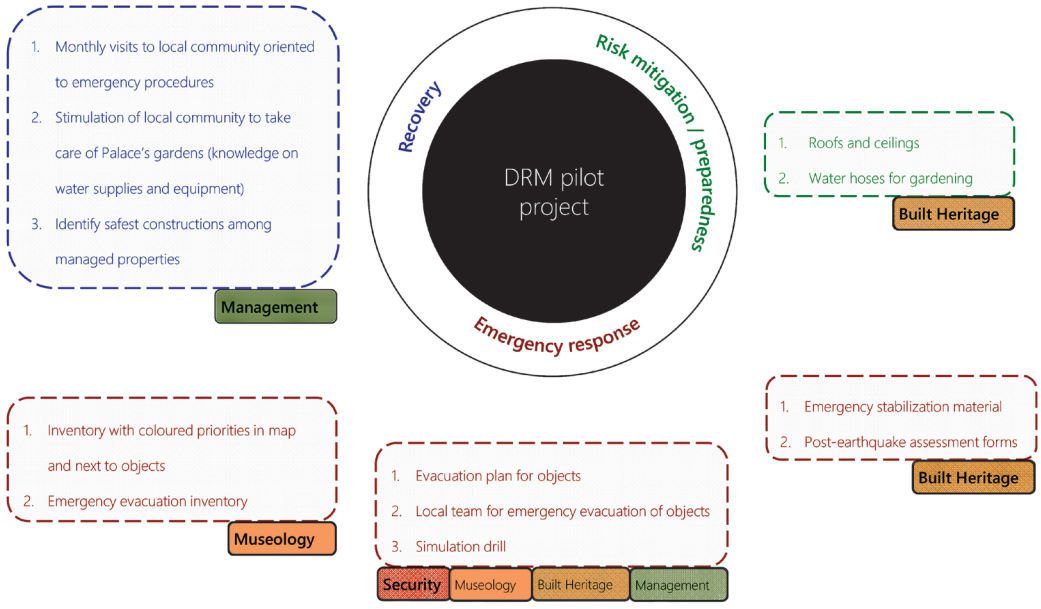

Fig. 5 Disaster risk management pilot project proposal (source: by author)

one department is involved in a specific measure(s), the department responsible for the implementation is identified by a bold text. This code map can be followed in the subsequent DRM plans to be established in the future.

5. Final remarks

The National Palace of Sintra is a unique and important piece for the landscape, architectural and historical values of Sintra, among others. The main values identified are related to built heritage but the National Palace of Sintra contains an intangible value and impact for the local community. The disaster risk assessment highlighted the impacts in the short, medium, and long term for the loss of values concerning the National Palace and local community. Despite the importance of built heritage, the preparation of the disaster risk management plan highlighted several different measures not related to this specific vulnerability (e.g., seismic strengthening of the Palace) but to mitigate the impacts of a disaster in a more comprehensive approach.

Acknowledgment

The author thanks Parques de Sintra – Monte da Lua, S.A. for the collaboration and interest on this work, including a special thanks to the Department of Built Heritage for all their effort.

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2.2 Disaster Risk Management for the Rafael Núñez House Museum

Ana Paula Gómez Uribe *Restorer and cultural heritage conservator, Strengthening Museums Program*

1. Introduction

The Rafael Núñez House Museum (CMRN) is part of the fourteen museums of the Ministry of Culture, and its stated mission is to preserve and disseminate the historical legacy of former President of the Republic of Colombia Rafael Núñez. In the eight permanent exhibition rooms, objects from the daily life of Soledad and her husband Rafael Núñez are exhibited.

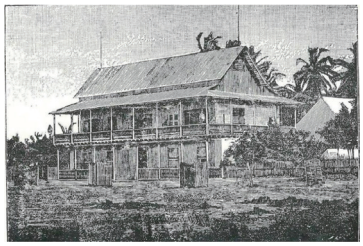

Fig.1 Original look of the House in 1877
Source: Carina Mendoza (https://n9.cl/j9t5c)

Fig.2 Current appearance of the Museum
Source: Julio Castaño, El Universal (https://n9.cl/p0u2v)

It is important to mention that a large part of the collection as well as the same property built in the mid-nineteenth century (1848 approximately), are considered Assets of Cultural Interest of National Character. The House Museum has a declaration as an Assets of Cultural Interest according to Decree 1911 of November 2, 1995. This is one of the most significant examples of Caribbean wood architecture from the 19th and it was declared a World Heritage Site by UNESCO in November 1984 (code C-285).

Currently, the collections in this museum are at risk due to several causes. Among the major risks are floods, ocean level rise, heavy rains, pests, and airborne salinity. The following sections introduce the proposal for a disaster risk management plan for the Rafael Núñez House Museum, in order to provide targeted mitigation measures and prevent future loss of the collection and the building.

2. Location and context

Rafael Núñez Museum is in the city of Cartagena de Indias-Colombia, in the old fishing district of El Cabrero. Cartagena city is in the north of Bolívar district, at the shores of the Caribbean Sea. This property was acquired in 1848 by Manuel Picón, father of Soledad Román, whom he favored when drawing up his will (July 1873). This property was occupied in 1874 by Soledad Román. In 1877 she married Rafael Núñez. They moved to live in the House; at this time, Soledad decided to build the second floor in wood. Rafael Núñez lived in this house until his death, on September 18, 1894, and Soledad Román until 1924.

In 1950 the Nation acquired the house, and in 1958 it was adapted as a museum. The National Tourism Corporation rebuilt the house in 1978 and a year later it was conditioned and reopened to the public. In 1985, the El Cabrero House Museum Foundation was established to guard and safeguard the House Museum. In 1988 it was restored by the National Tourism Office of Colombia. The property has been declared an Asset of Cultural Interest of national scope since 1995 by decree 1911 of November 2 of the Ministry of Culture and is part of the group of museums under its charge. In 2011 the house was restored through the management of the Strengthening Museums Program. The Museum lacks data on the provenance of most of the pieces in the collection, some of them are original, others were replaced by those of

Fig.3 and Fig 4 Aerial views of the House Museum
Source: Rafael Núñez House Museum

Fig.5 Inside view of the House Museum
Source: by author

Fig.6 Soledad Roman's room
Source: by author

Fig.7 Master living room
Source: by author

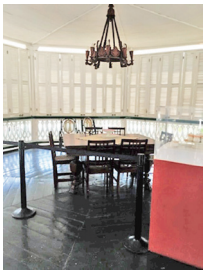

Fig.8 Dining room
Source: by author

the time and today they fulfill their function by being recognized by the collective as assets that represent them. Other objects were scattered, some in the National Museum of Colombia and others of value were deposited in the Historical Museum of Cartagena (today MUHCA), among them several personal objects of the president and his wife that were later delivered to the Museum.

It should be noted that in terms of financial resources, the House Museum does not handle private resources, since admission is free and seldom is an open space near the House rented within the perimeter of the Museum, for private events. Currently the House Museum manages a four-year agreement with the Association of Friends of the National Museum, to manage the resources received by the Ministry of Culture.

3. Attributes and values

According to the stated mission of the House Museum, the objects in the collection were classified based on their significance as indicated in the table below:

Tab. 1 Values identified for the Rafael Núñez House Museum Collection

Value level	Description	Values identified	Examples	
HIGH	Objects that belonged to Rafael Núñez or his wife Soledad Román, and have a close connection with the Museum's stated mission	Historical, Aesthetical, Political and Testimony values		
MEDIUM	Objects manufactured in the 19th or early 20th century, which manage to recreate the original atmosphere of the House inhabited by the Núñez family	Historical, Aesthetical, Artistic and social values		
LOW	Exhibit Props (non-collection props)	Artistic value		

Source: by author.

4. Key hazards and vulnerabilities

According to the probability of happening (high, medium, and low level), it was possible to identify the following hazards and vulnerabilities for the Rafael Núñez House Museum:

Tab. 2 Hazards, vulnerabilities and risks identified for the Rafael Núñez House Museum

Hazards	Vulnerabilities	Secondary hazards	Risks
Probability: High Medium Low **Geological hazards** • Floods • Earthquakes • Tsunami **Atmospheric hazards** • Hurricanes and gales • Tropical cyclones • Heavy rain • Airborne salinity • Severe thunderstorms **Anthropogenic hazards** • Potential global warming (ocean level rise) • Pandemic • Fire **Slow and progressive agents of damage** • Light / UV • Pests • Robberies • Custodial neglect	• Non-existence of early-warning systems and lines of communication • Availability and readiness of emergency infrastructure • Construction style • Age of the building • Construction materials • Cultural factors that influence public response to warnings • Lack of maintenance / poorly maintained • Inherent deterioration phenomena • Geographical location (located below sea level and at the same street level without having a good sewage system in this area of the city) • Lack of financial resources • Lack of planning guidelines and frameworks • Temperature and precipitation levels • Advanced deterioration of wooden elements supports of the House Museum. • Lack of a system of surveillance. • Lack of maintenance and the deposit of garbage in sewage system. • Organization level (organized community or not) • Participation (level of community participation), • Community knowledge of risk • Tidal elevation in low points of the external and internal bay and in the Caribbean Sea • Accumulation of rubbish and rubble into stream beds and canals in a problem affecting the city's storm drainage system.	• High waves and tide • Strong winds • Torrential rains • Obstruction of roads due to falling trees. • Collapse of the aqueduct and sewerage systems. • Mould, deformation. corrosion and other deterioration indicators on organic composition collection objects. • Looting • Fire • Floods • Increase of pests. • High waves and tide • Strong winds • Torrential rains • Obstruction of roads due to falling trees. • Collapse of the aqueduct and sewerage systems. • Mould, deformation. corrosion and other deterioration indicators on organic composition collection objects. • Looting • Fire • Floods • Increase of pests.	• Damage to cultural heritage • Damage to the physical infrastructure. • Irreversible damage • Reduction of trust in government / institutions • Loss of tangible records • Irreversible Damage • Physical damage to heritage object/structure • Risk of structural failure or even collapse of the roof. • Total decomposition of the entire structure of the House • Obstruction of the existing drainage due to the carrying of fine and coarse sediments.

Source: by author.

In general, the Museum has a previous history of flooding due to the high level of the frontal street regarding the museum itself, which is lower and eases the entrance of rainwater, accumulation of rubbish and rubble on the city stormwater system. As a secondary hazard, there is disruption of electrical power and water service, obstructing the correct function of the hydraulic pumps to evacuate the water. There is also airborne salinity, pests by the presence of termites and the lack of maintenance and financial resources.

(4.1) Impact of hazards on values

The impact of primary and secondary hazards and vulnerabilities on various heritage components/elements and the analysis of the resulting severity of loss of associated values (as low, medium and high), are described next:

Tab. 3 Hazards, vulnerabilities on various heritage components of the Rafael Núñez House Museum

Hazard	Likelihood	Impact	Disaster Risk	Severity of loss of associated values		
				HIGH: Objects that belonged to Rafael Núñez or Soledad Román.	MEDIUM: Objects manufactured in the 19th or early 20th century	LOW: Exhibit Props (non-collection props)
Floods when ocean levels rise	1	4	Medium	High	High	Medium
Floods from torrential rains	5	2	Medium	High	High	Medium
Earthquakes	2	5	Extreme	High	High	High
Tsunami	1	5	High	High	High	High
Fire	4	2	Extreme	High	High	High
Hurricanes	1	3	Medium	Medium	Medium	Low
Tropical cyclones	1	3	Medium	Medium	Medium	Low
Heavy rain	5	2	Medium	Medium	Medium	Medium
Airborne salinity	4	2	Medium	Medium	Medium	Low
Pandemic	2	1	Low	Low	Low	Low
Thunderstorms	4	3	Medium	Low	Low	Low
Light / UV	5	2	Medium	Medium	Medium	Low
Pests	5	2	Medium	High	High	Low
Robberies	5	2	Medium	Medium	Medium	Low
Custodial neglect	5	2	Medium	High	High	Low

Source: by author.

5. Mitigation measures

Following the analysis above, the following mitigation measures are suggested. In the formulation of these measures, it's important to mention that currently, two projects (IBERMUSEOS grant 2020 and a Ministry of Culture and the Arts & Crafts Cartagena School partnership) are going on to optimize the physical aspects of the building: maintenance works to fix all the wooden structures, construction of a drainage system in front of the building to avoid the accumulation of rainwater, repair of the hydraulic pumps, reparation of damaged wood due to termites, conservation treatments on the collection, among other works.

- Maintenance of sewage system
- Construction of a drainage system in front of the building to avoid accumulation of rainwater
- Maintenance of water pumps and acquisition of a power plant
- Change of the exterior pipe by a larger diameter to drain rainwater smoothly

- Maintenance of the electric system
- Improvement of fire detection and prevention system
- Collection emergency plan
- Structure improvements at the stairs
- Backup of the collection inventory information
- Community workshops to awareness of the risk

6. Proposals for emergency preparedness, response, and recovery

In the event of any emergency originating in relation to the risks previously identified, the following measures are proposed, which are consistent with the Museum's capabilities:

Before event occurs	• Install fire alarm system • Establish a telephone tree • Regular drills (including collection evacuation and moving to a safety place) • Establish communication with first aid responders • Workshops with visitors and community living by, to awareness of the risks • Modular display (wood bases) with little wheels to move most heavy objects in case of emergency
During event	• Analyze risk assessment to decide where to evacuate the collection (in case of fire, outside the current building, in case of floods, to the 2nd floor) • Activate the water pumps or extinguishers • Contact emergency responders • Staff guide visitors to a secure point (across the street or near to the closest fort)
Post event	• Repairing building damage (Municipality, Ministry of Culture) • Undertaking minor conservation treatments for objects • Emergency contact to NGOs (IBERMUSEOS, Prince Claus Fund) • Stakeholders' collaboration • Seek ITC 2021 private funds (director chief) • Strategy to planning activities with communities in terms of keeping the core of the mission on people's minds (take out the museum from its physical place)

7. References

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2.3 Disaster Risk Management Plan for the Historic Center of Prizren

Artnet Haskuka *Chairperson – Council of Historic center of Prizren*

1. Introduction

Prizren is the cultural and spiritual capital of Kosovo thanks to its cultural diversity. The city of Prizren is located in the south of Kosovo and includes an area of 3194 ha at an altitude of 412-500 m with a Continental and Mediterranean climate. During the XV-XX centuries, trade in Prizren reached a high level of development and the city became a commercial and administrative center, which influenced construction of cultural heritage buildings classified among monuments with high historic, architectural, social, and economic values. Wars and migrations in the city have influenced the formation of the character of the city, but economic development played a key role in shaping its image. During this time, neighborhoods have been created and are characterized by their special physiognomy, network of roads in organic form, their proximity to water sources, the presence of water in yards in the form of JAZE (stream), squares and public spaces, important cultural and historical complexes and many religious buildings mainly located in the center of Prizren. However, because of historic, architectural, social, environmental and economic values the Urban Development Plan of Prizren in 2003 defined the boundaries of the Historic Center of Prizren (62.88 ha) located right in the heart of the city and divided along the east-west axis by the river LUMBARDH, with the Prizren Castle in the eastern part and the residential areas around the transversal that have undoubtedly influenced its development.

Moreover, a Conservation and Development Plan for the Historic Zone of Prizren was drafted in 2008 taking into account the importance of Historic Center and meanwhile the Historic Center of Prizren is protected by law - the Law on the Historic Center of Prizren (No. 04 / L-066). It is important to stress that Center includes 38 residential buildings (with historic, architectural, artistic, social values), one natural rarity (with environmental and historic value), 27 worship buildings (with historic, architectural, artistic, social values), 29 public buildings (with historic, architectural, artistic, scientific, social and economic values) and five architectural complexes (with high historic, architectural, social, environmental and economic values). The Management Plan was drafted with the purpose to define strategic policies for the protection, administration and development of Historic Center of Prizren. However, all plans are drafted without consideration of the potential risks in the Historic Center which can lead to serios losses of cultural heritage values. Therefore, drafting the Disaster Risk Management (hereafter DRM) plan and its integration with cultural heritage will complete the circle of planning. DRM plan aims to promote the integrated approach in cultural heritage which has been missed so far. Moreover, this plan will identify hazards, vulnerabilities, potential negative impacts and through mitigation measures will eliminate and reduce the risks in the Historic Center of Prizren.

2. Values of Historic Center of Prizren

"The Historic Center of Prizren is the core of the city, located in a cross-section of ancient routes, and boasts evidence of pre-historic civilizations and cultures, dating from Prehistoric, Dardani to the Pre-Roman, Roman, Byzantine, Arbëror, Serbian, Ottoman and Albanian periods. Its values include historic evidence of societal life in the past, traditional concepts and transformations of family and society, urban morphology and achievements in construction technology. It also testifies to the livelihood of a multi-ethnic community throughout a time period spanning thousands of years, during which the city has developed constantly, under the influence of various cultures that further enrich today's cultural diversity" [1]

1 Management Plan for the Historic Center of Prizren, *Prizren statement of Significance*

Fig.1. Historic Center of Prizren (HCPZ)
Source: by author and castle by A.Llapashtica

The Prizren Historic Centre presents a complex site where history, architecture and urban developments are integrated with traditions, customs, and everyday changing lives. Therefore, in order to develop an in-depth, comprehensive understanding the Values Assessment is structured in three levels:

Building level – LUMBARDHI Cinema with following values: High Social/Cultural values – first cinema where the modern cultural identity of the Prizren is formed and the place of gathering regardless ethnicity; Historic/age value - year of building 1951; Technical value — presents basic construction techniques of a period; Landscape value — with location in the center and simple facade it is interlaced with other monuments; Scientific value - the two projection machines and sound equipment are from the period 1950-1980, and are the only examples that have survived to this time, and the Economic value.

It is important to emphasize that all protected monuments within Historic Center have high historic, architectural, artistic, social, environmental and economic values.

Zone level - high historic, architectural, social, and economic values.

City Level - following a grid[2], modified for Prizren, summarizes the values of the city in a concise format. The Nara grid was used to identify the different dimensions and aspects that cover the values attributed to the architectural heritage.

Tab. 1. Nara Grid modified for Prizren

Dimensions of Heritage	**Aspects of Sources**
	Form and design; Materials and substance
Aesthetic	The mixture of styles, which could result in a chaotic expression of the urban landscape, are a cohesive whole as the urban fabric was developed harmoniously over hundreds of years. The small scale of the vernacular and commercial architecture is in keeping with the scale of the monumental architecture.
Historic	Built cultural heritage combined with civic, religious buildings and urban fabric with narrow streets; represent buildings typology of different periods, characteristic for this part of Kosovo yet unique in that Prizren was a cultural, commercial, and administrative center.
Social/ Religious	Urban composition inherited mainly from the 19th and 20th centuries with numerous small squares that highlight religious building in the center, a public fountain and a market area where specific crafts were practiced, are indicators of how social life influenced the development of the city. The various religious and social functions have resulted in numerous architectural forms including mosques and their minarets as well as church towers and complexes.
Economic	Prizren presents one of the main venues for visitors coming from different parts of the region and world. It is target for Albanian visitors worldwide, visiting the Albanian League of Prizren; also target for visitors from Turkey visiting the Balkan Peninsula for its Ottoman period-built heritage, as well as one of the main places for international Orthodox community, especially Serbian community who visit the Orthodox churches. The flux of visitors has a direct economic impact on the city supporting numerous businesses.

2 Management Plan for the Historic Center of Prizren, *Values*

Natural	Despite the built urban structure, the city centre is interconnected with nature. The Lumbardhi River that flows through the city center presents a natural break as well as the planned open public space. The Hill where the Castle is placed together with Marash compound to the east, offer a recreational and natural resort, integrated and at the same time divided from the busy urban part. This is combined with the nearby Sharr Mountains viewable from every corner of Prizren.
Dimensions of Heritage	Aspects of Sources
	Use and function, location and setting
Aesthetic	The historic city is used as a residential area and a meeting point for family and social life, as well as one of the main zones where business activities are conducted. It still functions as a center due to the aesthetic character, form, compactness, and the scale.
Historic	Historic functions in the center were maintained at an optimal personal scale. The ground floors of the residential areas were adapted to respond to economy trends, where farming functions were transformed to trade and service. The religious sites have kept their original function. While old bazaars were transformed into shopping areas where trade function replaced traditional craftsmanship.
Social/ Religious	The majority of religious buildings and places are still functional. Open public spaces are transformed into main venues for development of social everyday life. Many historic buildings and squares host cultural activities and festivals that offer a new dimension to the city.
Economic	The built heritage concentrated in the historic center attracts a high number of national and international visitors to Prizren. They are used as a backdrop to the continuous use of the city center. Few of the historic buildings such as the Lumbardhi Cinema function as artistic community gathering places. There is a potential for developing strategies for sustainable development through adaptation and revitalization of historic buildings and sites.
Natural	The River Lumbardhi is used fragmentally as venue for various cultural and social activities, including 40 Bunar Fest activities, and as a temporary outdoor cinema during Dokufest. Prizren is located adjacent to the mountains with hills and canyons penetrating the city. Those areas have potential for developing different sports and eco-tourism activities.

Source: Management Plan for Historic Center of Prizren

3. Hazards and Vulnerability

Based on the history there are few potential hazards that have caused disasters in Prizren especially in the Historic Center. The identified hazards are as follows:

Flood – first in 1903 and then on 18 -19 of November 1979 with high negative impact when Prizren lost one of its most important monuments – the Stone Bridge (c. fifteenth century) disappearance of Tabakhane followed with thousands of meters of damage to technical infrastructure. Considering the arguments like rainfalls, history of LUMBARDHI that floods every second year and the classification of Prizren among risk areas make us understand that the possibility of another flood happening is most *Likely with High Impact.*

The second hazard is **Fire**. Fire has happened several times: 1853, 1913, 1999 and March 2004. From the fire of 1913 Prizren lost one of the oldest bazars – ARASTA which besides architectural, social values had high economic value. It is important to stress that this important part of Historic Center was never reconstructed. The possibility of happening is *Likely with Medium/High impact*.

Another hazard that is putting the cultural heritage of Prizren at risk is the pressure of tourism, where owners are demolishing the old buildings/houses for the construction of hotels/parking places. The impact of this phenomenon is loss of large number of old buildings with significant values. Possibility of happing is *Possible with Medium Impact.*

By analyzing the above mentioned hazards and through a consideration of arguments like: amount of rainfalls, global warming etc. it can be concluded that the main hazard in the Historic Center is a flood followed with secondary hazards. Moreover, the vulnerabilities like: lack of DRM components in Law of cultural heritage and expertise, lack of DRM plan/mitigation measure in cultural heritage buildings, old technical infrastructure in the Historic Center, low awareness for the importance of DRM (community, politicians, professionals etc.), lack of drainage system maintenance in the Center, position of Historic Center in the lower level of Prizren, lack of river bed maintenance especially in Zhupa valley villages will lead to the loss of aesthetic values, low attractiveness, loss of traditions techniques workmanship, disappearance of old materials which are not used today, loss of various religious and social functions (i.e. activities in mosques, church towers and complexes will be suspended, less flux of visitors etc.).

Tab. 2. Main Hazard and Secondary hazards

Main Hazard	Secondary Hazards	Vulnerabilities	Potential Negative Impacts
FLOOD	- Landslide in Nenkalaja - High Humidity - Mold - Contaminated drinking water - Pollution from waste water/Pandemics situations - Explosions from the old electricity network - Vandalism	- Lack of DRM component in Law of CH and expertise, - Lack of DRM plan/mitigation measure in CH buildings, - Old technical infrastructure in Historic Center, - Low awareness for importance of DRM (community, politicians, professionals etc) and CH, - Lack of drainage system maintenance in Center, Position of Historic Center in lower level of Prizren, - Lack of river bed maintenance especially in Zhupa valley	- Loss of aesthetic values, the low attractiveness, - Loss of Traditions techniques workmanship, - Disappearance of old materials which are not used today, - Loss of various religious and social functions: activities in mosques, church towers and complexes will be suspended, - Less flux of visitors

Source: by author

4. Selected Scenario

Main Hazard: Flood

Duration: 12-14 March 2030 – PRIZREN

Scenario: On 12th of March 2030 due to heavy rain in Prizren and rapid snow melting from mountains, levels of LUMBARDHI rapidly increase. In the evening when people are still in restaurants, some in a concert in the Cinema and some working, the river floods from both sides. Due to the slope of terrain, the flash flood waters flow in the direction of the river.

The 21 buildings mainly located close to the river will be impacted from the flood, 12 buildings with high impact, 6 with medium impact and 3 with low impact.

However, from all high impacted buildings the **LUMBARDHI Cinema** is a building that may have a large value loss from the flood. Considering the fact that this building is important for all communities living in Prizren because it is a place of gathering and socializing regardless ethnicity/religion, the protection is more than necessary. Unfortunately, in this building there are several encountered vulnerabilities such as: proximate location close to the river, old technical infrastructure, old drainage system, lack of DRM plan, low awareness of cinema staff/management and community with regard to potential risks, poor quality of building construction that can endanger the historic, technical, landscape, social/cultural, scientific and economic values of the cinema. The flood as a main hazard, looting, and fire (explosions from old electrici-

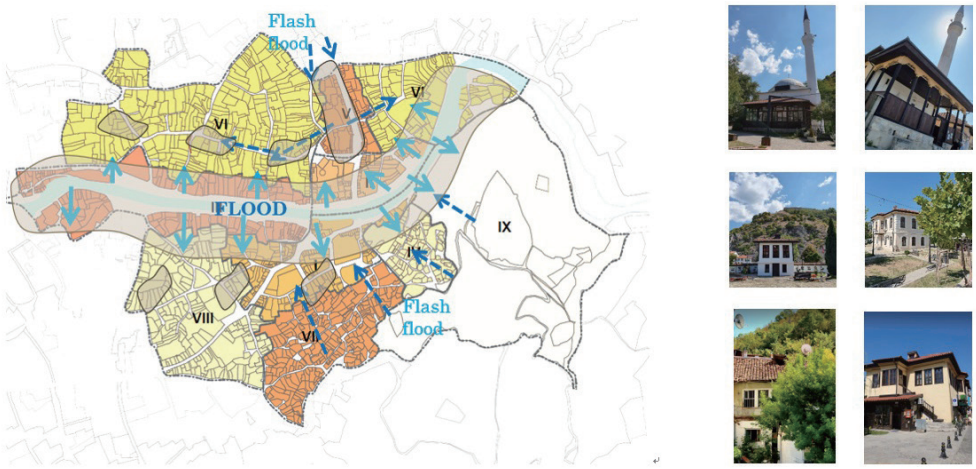

Fig.2. Flood Scenario Map and some of high impacted buildings
Source: Map - Conservation Plan and adapted by author, photos by the author

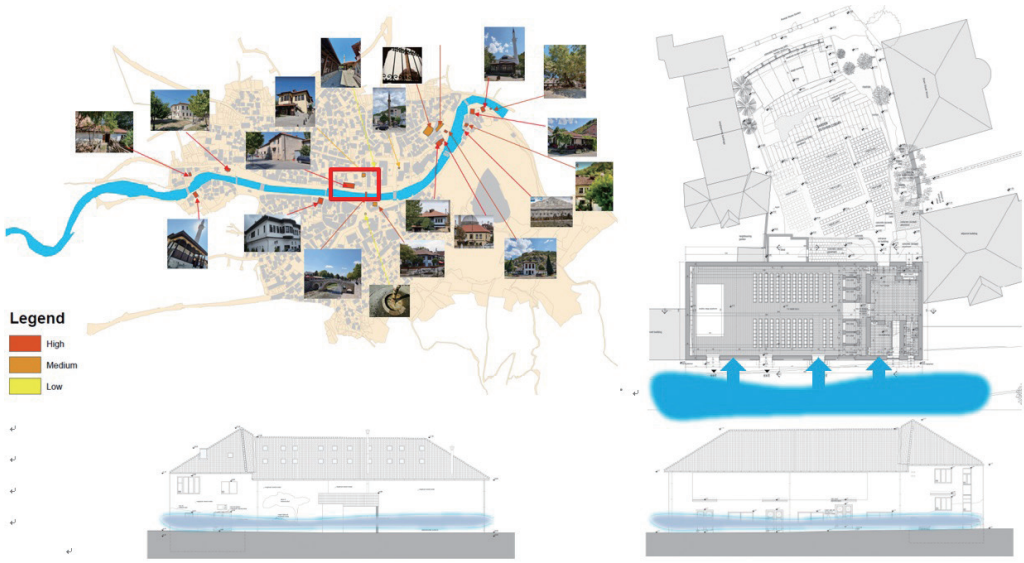

Fig.3. Position of Cinema within Historic Center and negative impacts from flood
Source: map by the author, drawings KHORA office/CCH Prizren

ty network) as a secondary hazard can lead to loss of life, loss of old building techniques, low revenues, less cultural activities/less promotion, and loss of visitors.
Moreover, floods in the cinema building may cause: mold in wooden pillars, damages in construction, humidity in walls and inside the building, mortar damages and the possibility of collapse.
Therefore, in order to protect values of the Historic Center and LUMBARDHI cinema as well it is important firstly to understand, then deal with possible negative impacts and afterwards develop risk treatment.

5. Mitigation measures

In order to identify actions which will minimalize the negative impacts in the Historic Center at zone level and in LUMABRDHI cinema at building level it was crucial to see the links between hazards and vulnerabilities and then vulnerabilities and potential impact. Moreover, these links helped to identify the effective

Tab. 3. Mitigation measures

No	**Mitigation Measure** for the Historic Center	Who	Duration	Cost
Non-structural measures				
1	Sensitizing of the Community	Civil society organizations	Short/Medium term	Low
2	Awareness raising of government	Civil society organization, Council of CH of HCPz	Short term	Low
3	Drafting of policies, regulations	Local/central government	Medium term	Low
4	Integration of DRM into the planning	Local/central government	Medium term	Medium
Structural measures				
1	Construction of dams in Zhupa Valley	Central level	Long term	High
2	Slowing the river water flow	Local/central government	Medium term	Medium
3	Renewal of sewage system in Center	Local government	Medium term	High
4	Renewal of drainage system	Local government	Medium term	High/ Medium
5	Hydro insulation of CH buildings	Local/central government	Short term	Medium
6	Hydrants, flood barrier, alarm installation	Local government/donators	Medium term	Medium
7	Reforestation in Nenkalaja subzone (landslides)	Local government/donators	Short term	Low

No	**Mitigation Measure** for the LUMBARDHI Cinema	Who	Duration	Cost
Non-structural measures				
1	Training of staff and community	Civil society organizations	Short/Medium term	Low
2	Drafting of detailed emergency plan	Local government	Short term	Low
3	Collaboration with Police (vandalism)	Local/central government	Continually	Low
4	Organizing joint cultural activities with all ethnic groups	Civil society organizations	Medium term	Medium
5	Digitalization of movies and documentation	Civil society organizations	Short term	Low
Structural measures				
1	Alarm installation	Local/central government/ donors	Short term	Medium
2	Hydrant installation	Local/central government/ donors	Short term	Medium
3	Camera installation	Local/central government/ donors	Short term	Medium
4	Fire sprinkler installation	Local/central government/ donors	Short term	Medium
5	Flood barrier installation	Local/central government/ donors	Short term	Medium
6	Renewal of drainage system	Local government	Medium term	Medium
7	Protection of the wood construction from moisture	Local/central government/ donors	Short term	Medium

Source: by author

measures which can eliminate/reduce the risks. Preventive and reactive measures in order to reduce risks in the Historic Center and in the LUMABRDHI Cinema are listed in the following tables.

6. Conclusion

The importance of drafting the DRM plan for the Historic Center of Prizren primarily lies in raising the awareness of policy makers about the fact that integrated approach to cultural heritage is a necessity that has been missed. It is important to emphasize that implementation of mitigation measures will encourage the cooperation between different disciplines and sectors dealing with risks, increase the awareness of communities about disasters that can cause damages to heritage sites and micro-economy, strengthen effective communication between decision makers with regard to risks and risk-related issues in cultural heritages.

Another important issue is sustainability of the project. Since the human factor is one of the components influencing sustainability, giving "ownership" to the respective institutions and the community is essential. Therefore, involvement of officials from the central as well as local level, and the community at different stages is a way that will build "ownership" for the project.

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2.4 Community-based Disaster Risk Management Plan in Monserrate District, Historic Center of Lima

Aya Miyazaki *PhD Candidate, University of Tokyo/ International Consultant*

1. Introduction

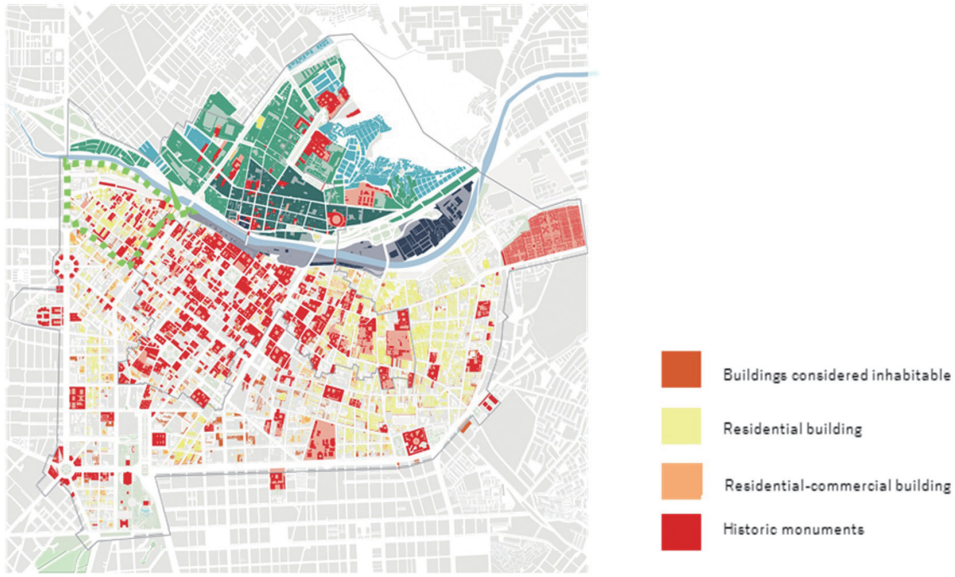

Fig. 1 Map of the Historic Center of Lima, with Monserrate District in green dotted line
Source: PROLIMA (2019)[1)]

(1) Context of Monserrate District, Historic Center of Lima

The Historic Center of Lima is a Spanish colonial town that was founded in 1535 and developed as the political, administrative, economic, and religious center of the Viceroyalty of Peru[2)]. Inscribed in 1991, the World Heritage city has been protecting the many layers of history of Lima: from the pre-Hispanic paths heading North and East, Spanish checkerboard urban plan, to the European-style buildings that reflected the architectural evolution from the XVI to the XX centuries. In addition, the intangible cultural heritage of the city, in relation to religious practices and ceremonies, as well as the communities are significant attributes of the city that makes it unique. The city's uniqueness lies in the adaptation of the buildings to regional environment such as the available materials, climate, and earthquakes. In fact, this is a historic city that had to live, hand in hand, with the impacts of El Niño, earthquakes, tsunamis and half-a-year winter of thick fogs.

The target of the scope for this project is limited to the Monserrate District in the Buffer Zone of the Historic Center of Lima, developed between 1535 and 1868 (in the green dotted line of Figure 1). Adjacent to the Core Zone, the Monserrate District has a high number of historic buildings made of original materials and bricks that are considered to be in a medium to very high level of physical vulnerability. There is a tendency of inhabitable buildings still being used for residential purposes, which are considered very high or high risk in the official risk scenario. On the other hand, there are historic monuments that are in a good, habitable state, which are used as public buildings (police station, for example) or religious structures.

(2) Actors & Stakeholders

The Monserrate District is a residential district, with a high number of minors, elderly, and disabled population. There are many medium to high poverty households that are earning between 575 PEN to 1,330.09 PEN per capita, who mostly live and work in the district for generations. People have secondary education and higher, and in general they understand the values of the Historic Center of Lima and the monuments. In addition to the vulnerable state of the buildings from poor maintenance, there is also data that people feel constantly vulnerable on the street throughout the day; it is reflected in the low movement on foot the whole day, while streets have medium amount of car mobility during the daytime. The District has a strong presence of communities that know very well of their neighborhood, which is a strong asset when implementing a project.

In order to protect the architectural, historical, artistic, and social fabrics of the Historic Center of Lima, El Programa para la Recuperación del Centro Histórico de Lima (PROLIMA) was created as a decentralized institution within the Municipality of Lima in charge of recovering the monuments, sculptures and public spaces of the Historic Center. Based on a holistic Master Plan of the Historic Center of Lima 2019-2029 with a vision until 2035, PROLIMA has closely worked with different partners to revitalize the Historic Center by promoting its sustainable and humane recovery. It is based on three strategies of (1) protecting the OUV of the Historic Urban Landscape (HUL), (2) keeping the lively and attractive city center for residence and investment, and (3) reviving the city as a traditional cultural and touristic center of Lima[3)].

2. Analysis of Attributes and Values

The Historic Center of Lima, including the Monserrate District, is rich in tangible and living cultural heritage and their cultural and historic values. An urban foundation design in the checkerboard style and historic buildings adapted to the climate, earthquakes and available materials are significant attributes that are currently protected by PROLIMA. In addition, values identified by PROLIMA reflects both the tangible and intangible heritage, which could be grouped as in the following table.

Tab. 1 Table of cultural and historic values for tangible and living cultural heritage

Values of Tangible Heritage	Values of Living Heritage
• Traditional value of immaterial cultural elements • Symbolic social value • Natural value, remaining from prior to the construction of Lima	• Festive value • Traditional use value • Foundational value • Values related to historic events

Source: arranged by author, based on PROLIMA (2019) Plan Maestro del Centro Histórico al 2029 con Visión al 2035

3. Disaster Risk Assessment

Disaster risks of the Historic Center of Lima by PROLIMA could also be applied to the Monserrate District. In addition to the already existing risks at the time of the construction, there additional risks caused by changes in usage of the buildings and public spaces, the climate, and the maintenance. The hazards could easily turn into disasters, as the Monserrate District has a very limited public open space and many narrow streets could be blocked with either fire or destroyed buildings; with a limited number of hydrants to cover the areas, hampered evacuation routes will prevent the people, cultural properties or the fire trucks and ambulances from passing through to the evacuation center in case of emergency.

(1) Primary Hazards

Nature-induced hazards of earthquakes, a long period constant weak rain, and El Niño climate are constant threats to the historic buildings in Lima. Human-induced hazards can be seen in the illegal or uncon-

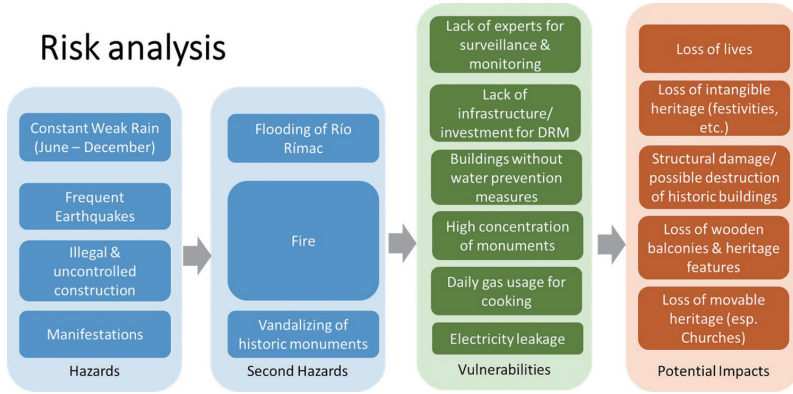

Fig. 2 Analysis of hazards, vulnerabilities and potential impacts
Source: author, based on data analysis

trolled construction built in unoccupied public spaces or abandoned buildings. There are also manifestations where people intentionally vandalize the historic buildings and statues in public spaces.

(2) Second hazards

First hazards are consequently followed by flooding or fire[4], on top of the damages to the buildings. Fire is the most common incidents that have been observed in the historic center, which either derives from the gas being used for cooking, illegal usage of the building without proper maintenance, or poor cabling of electricity that frequent leads to the leakage of electricity.

(3) Vulnerabilities & Impacts

Unfortunately, inadequate investment to mitigate the impact of hazards has led to negative impacts to the cultural heritage and the livelihoods of the communities. Hydrants are sparse to cover the District, communities in general are not aware of the actions they can take as a neighbor in case of fire or earthquake, and residential buildings lack infrastructure to detect fire, to prevent water from entering, or to utilize safe electricity. By improving some of the infrastructure could the community members live without the need of being concerned about the earthquakes, flooding, or fire, but no specific actions have been taken at the moment in a wider scale.

4. Disaster Scenario

It is the dry season in Lima, and at 9 p.m. a magnitude 7 earthquake hits Lima. Historic buildings without intervention by PROLIMA is greatly affected in Monserrate District, with the many of the buildings with high to very high risks damaged, of which some are razed. Narrow roads are blocked by some of the buildings and you can hear that there are residents trapped in some of the buildings. Several fires start in multiple areas, from the gas that was used for cooking dinner as well as from the electric wires. You can hear ambulance and fire trucks at a distance but they cannot pass through the wider roads because of the cars being parked on one side of the two-lane streets. Helping out those who walk, people are heading towards the only open space nearby, the Plaza Monserrate in front of the train station. Some managed to reach there but others are looking for alternative routes to get to an open space, away from the building, because the streets are blocked by collapsed buildings and parked cars.

5. Mitigation Measures

Following the risk assessment and applying it to the disaster scenario, the following mitigation measures could be considered in the District.

- PROLIMA:
  - Identify public buildings that are in a good state of conservation for storage and possible evacuation spaces in case of disasters
  - Identify unoccupied inhabitable historic buildings that could be used as a possible storage
  - Prioritize the rehabilitation of "very high risk" historic buildings that could block the paths or damage human lives
  - Install more hydrants to cover enough areas to extinguish fire and introduce an easy system to utilize them; Figure out procedures to draw water from the Río Rimac (and assess the water quality in advance)
  - Map out evacuation space with access to water and sanitary environment for a huge number of people
- PROLIMA + churches + fire department:
  - Back up the inventory of movable cultural heritage and share the detailed data with the fire department
  - Create a communication pipeline among the three authorities for a smooth collaboration in case of emergency
- PROLIMA + community + police station:
  - Prepare an evacuation plan & review the plan with the community of the district
  - Check the high-risk electric wire areas and PROLIMA to create a scheme to support the infrastructural investment
  - Strengthen the role of police in emergency situation to lead the emergency response actions

6. Proposals for Emergency Preparedness, Response & Recovery

While there are multiple difficulties, the closeness of the community is an asset that could be applied to mitigate the impact of the earthquakes and secondary hazards of fire in Monserrate, as everybody knows each other[5]. Residents and vendors could be first responders, based on the existing community relationships and knowledge of the place. In addition, the PROLIMA has already identified all the possible risks and hazards for the whole of the Historic City of Lima. What is needed as a next step is to tailor-make a scenario-based evacuation plan for each district. In case of Monserrate, there is a police station next to a well-protected historic church and in front of the Plaza. With PROLIMA, police, and the identified first responders, the following action could be taken to increase emergency preparedness:

- Evacuation Plan: implement fire/earthquake drills based on the plan, with the roles of the actors clearly explained
- Capacity building: enable community members to utilize essential knowledge and possible actions to

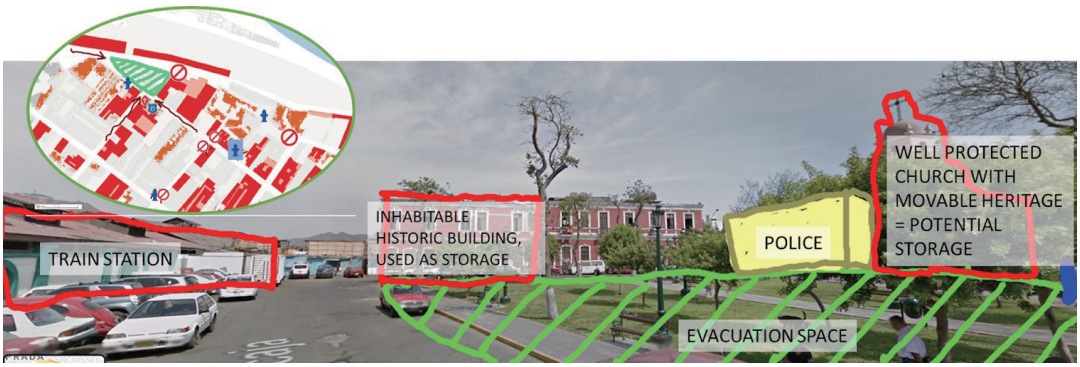

Fig. 3 Map of the Plaza Monserrate, the only open space in the neighborhood that could be used as a temporary evacuation space

Source: author, using a google map

decrease the level of hazards turning into disasters

- ➢ Car parking in areas that will not affect the escape route
- ➢ Dangerous usage of gas
- ➢ Accidents of illegal electric wire

● Emergency supplies:

- ➢ Prepare emergency supplies needed to evacuate the neighboring population, based on appropriate assessment of the status quo
- ➢ Create and monitor the storage spaces near the Plaza, with capacitation of the chosen members out of the first responders
- ➢ Do drills once a year to familiarize the residents and vendors of what will happen in case of emergency situation

The Plaza itself is surrounded by public buildings and unused buildings that could be converted for storage to augment the emergency preparedness. It will require PROLIMA to combine these district-based scenarios and evacuation plans to come up with the mid- and long-term emergency recovery plans that incorporates all of the Historic City of Lima.

7. Conclusion

In summary, this proposal is to focus on the two areas that are not clarified in the Disaster Risk Management Plan by PROLIMA, based on the worst-case scenario applied specifically to the Monserrate District.

- Exemplary attempt in a district of Buffer Zone = specific plan for prevention & evacuation needed for each district, based on the existing analysis
- People-based approach by considering residents and vendors as first responders, in cooperation with the police

A Mitigation plan is already in place, with the fortification of buildings in progress by PROLIMA in strategic locations. Hence, the focus was on the following points of:

- Preparing residents and vendors to create less vulnerable living situations, through training & information-sharing
- Including police stations as the core actor in charge of disaster response & implementation of evacuation plan
- Frequent checks of the usability & accessibility of hydrants

It will be essential to create an emergency response plan, with evacuation routes and a risk map, reflecting

Fig. 4 Diagram of the proposal of the Project, based on the already implemented actions by PROLIMA
Source: by author

the voices of stakeholders and communities. Capacitation of the first responders in the necessity of storing materials and equipment in secure locations, to set up the tents and guide their communities will be essential, which will require the leadership of the local authorities of PROLIMA, police, and fire stations.

Acknowledgements

I would like to express my sincere appreciation to PROLIMA, especially Mr. Ricardo Rivera and Sarita Rodríguez, for their kindness in sharing with me valuable information, data, and insights. In addition, I would like to thank the organizers and lecturers of the ICCROM and the UNESCO Chair Programme on Cultural Heritage and Risk Management ITC R-DMUCH team, especially to Wes for guiding me with the concise advise during our online mentoring sessions. It was such a wonderful fresh of air, in a very difficult COVID-19 pandemic year, to have had the chance to meet the teams and participants. 有難うございました！

Footsnotes and Reference

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2.5 Basel, a city of museums and underestimated risks for cultural heritage

Flavio Häner *PhD, Cultural Property Proetection Responsible, Abteilung Kultur, Präsidialdepartement Basel-Stadt*

1. Introduction

The urban area of Basel (Basel-Stadt, Switzerland) is home to a large quantity and variety of cultural heritage sites and institutions, especially museums and collections of movable and tangible cultural heritage. The municipal area of the canton Basel-Stadt and the surrounding areas are home to more than 30 museums and several libraries and archives of regional, national or international significance. Apart from the collections of mobile tangible heritage, the largely intact historic city centre, outstanding architecture and archaeological sites add further cultural heritage objects to the area. In total, there are 102 objects of national significance and around 300 objects of regional significance located in Basel-Stadt listed in the Swiss inventory of cultural property[1]. The high density of museums is represented in the label "city of museums", which also indicates the cultural, social, economic and touristic significance of the museum sector[2].

The wealth of tangible cultural heritage is a privilege but also a challenge. Although the city has been spared from disasters or larger damage since the large Basel Earthquake of 1356[3], the risks of damage to objects of institutions are prevalent. Many museums are located in historic buildings, making them vulnerable to vibration, fire or climate induced damages. Above all, it is a question of time, until another earthquake will occur. The risks however have not yet been properly addressed by a governmental or institutional planning and management organization. In 2017, the government of Basel-Stadt installed the position of a cultural property protection manager to implement international and national law and frameworks for cultural property protection on a regional and local level. Since 2018 a new law on civil-protection and cultural property protection is in development with an expected implementation in 2022. Apart from creating a comprehensive legal framework, actions for disaster preparedness and mitigation and risk reduction require introduction and implementation on an institutional and community level.

Fig. 1 The Barfüsserkirche, home of the Historic Museum.
Source: http://www.hmb.ch

Although Switzerland has a well-established civil-protection system, which also includes cultural property and heritage on a federal level, training for disaster response for cultural heritage have been suspended in the canton of Basel-Stadt in the 1990s. Training started again in 2019 as part of the overall reorganisation of cultural property protection with a focus on disaster risk mitigation instead of protection in case of armed conflict. However, there is not yet a developed strategy to increase disaster preparedness and response. The cultural heritage sector shows deficits in risk-awareness and disaster-preparedness. Although the ICOM code of ethics addresses the governing body as responsible to "develop and maintain policies to protect the public and personnel, the collections and other resources against natural and human-made disasters"[4] neither government nor institutions have implemented consistent disaster risk management plans for cultural heritage in case of a disaster or states of emergency in the Basel region.

2. Case Study Site

With more than 400 cultural heritage sites of high importance in an area of 37km^2, from which over 30 are museums, risk mitigation in Basel-Stadt needs an application on the macro- and micro-level. It is important to analyse hazards and their potential damage to cultural heritage from an overall perspective down to a single object within a museum collection, archive or library. Therefore, the case study focuses on one specific site, in order to understand risks and measures for mitigation and disaster preparedness. The case-study site is the Historic Museum of Basel, which is one of five public museums of the canton of Basel-Stadt under public governance.[5] The historic museum was founded in 1894 and is divided into three sections, which are all located in historic buildings in the urban area of the city of Basel: Barfüsserkiche (cultural history), Haus zum Kirschgarten (19th century domestic culture), Musikmuseum (musical instruments). The main part of the collection is on display within the historical building known as the Barfüsserkirche, a former monastery church built around 1300 by the order of the Franciscans. The collection of the Historical Museum comprises more than 250,000 artefacts documenting handicraft traditions and everyday culture in the Upper Rhine region with a temporal focus on the 14th-18th century. The history of the collection links to the history of Basel and includes a part of the treasury of the Basel Cathedral, Medieval Tapestries and objects from several 17th century cabinets of curiosities. Most of the objects are stored in the external depots, of which four are located outside of the municipality of Basel-Stadt. The Swiss inventor of cultural property lists the Museum Buildings as well as the collection as objects of national significance (Category A). The case study focuses on the main part including the historic building of the Barfüsserkirche with the exhibition and the adjacent depots and administration offices but considers the multi-local structure of the museum.

3. Heritage Values and Attributes

The Barfüsserkirche (KGS-Nr 1565) as well as the collection of the Historic Museum Basel (KGS-Nr 8522) are Cultural Property of national significance (Category-A).

3.1 The Barfüsserkirche

The Barfüsserkirche is a remarkable example of medieval monastic architecture in Basel. A first church was built in 1250, the construction of a new monastic complex began around 1300. The earthquake of 1356 and the following fire affected most of the monastic buildings, which had to be rebuilt. After the reformation, the monastic complex has seen many alterations and the church was no longer used as religious site. From the 17th to 19th century the building was used as hospital, school, mental asylum or department store. Thanks to historical research and archaeological excavations, the rich history of the building is well documented[6]. The square around the church is referred to as "Barfüsserplatz". It has a high cultural value as many social activities (concerts, markets, fairs and festivals) take place at the square.

3.2 The Historic Museum Basel

The collection of the Historic Museum documents the material cultural of the Upper Rhine region and the three-country-corner between Switzerland, Germany and France. Today, the Basel Historic Collection is one of the most extensive collections in Switzerland on medieval and early modern history. A more recent collection on contemporary history links the historic collection to the present times. While the majority of objects are movable as they are exhibited in showcases or on plinths, many objects (for ex. furniture, panelling) are attached to the building. Other objects may have a reduced movability because of their high weight or spatial dimensions (for ex. stone fountain shafts).

Fig. 2 Selection of museum-objects depicting the diverse variety of objects, from left to right: Celtic pot, 150-95 BC (Inv.-Nr.1915-662); Reliquary of St Pantalus (after 1270, Inv. Nr. 1882.87); Tapestry, around 1500 (Inv. Nr. 1926.40); Dustbin Patent Ochsner, 1935 (Inv. Nr. 2003.109). Source: https://www.hmb.ch/en/museums/objects-in-the-collection/

4. Risk-Assessment

Based on general available information, hazard-maps and historic records of damage-events, three main hazards with high damage-potential can be identified: Fire, earthquake, and climate and weather induced events (flood, heavy-rainfall). Social factors such as the function of the square and area around the heritage site as gathering places increase human induced risks (vandalism, accidents). Although research on

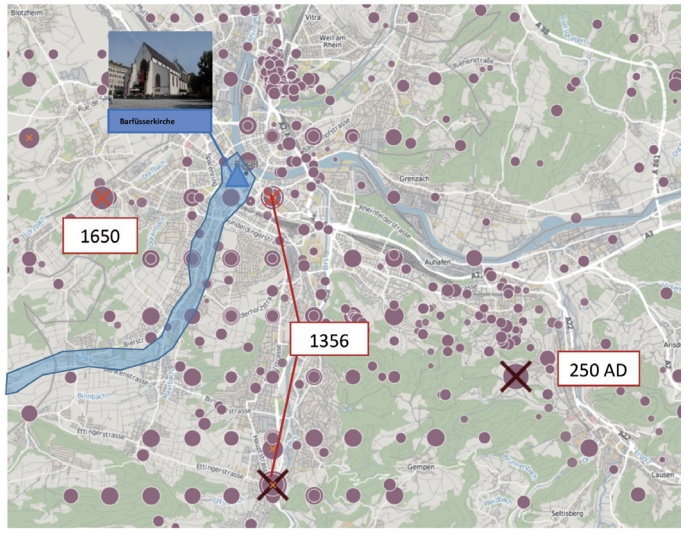

Fig. 3 Hazard map of Basel indicating recorded earthquakes and floods relative to the heritage site.
Source: http://www.seismo.ethz.ch; https://map.geo.admin.ch

historic disasters and damage to cultural property and heritage in the city of Basel is conducted[7], the historic reports on the potential risks of disasters and their potential damages on cultural heritage have not been addressed with adequate mitigation measures. Further, disaster and risk awareness is generally low in the cultural sector. The introduction of a legal basis for cultural property protection in case of armed conflict, disaster and in state of emergencies planned for 2022 should tackle this issue and defined responsibilities for further proceedings.

4.1 Secondary- and Subsequent-Hazard Analysis

Not only have disasters been recorded in the history of the heritage site, but also the interdependency of hazards. The great 1356 earthquake did damage to buildings, but the following city fire burnt not only most of the infrastructure but also the state-archive. Further, the earthquake led to an obstruction of the river Birsig with debris of buildings resulting in the flooding of the monastic complex of the Barfüsser located[8]. As the basement is used for storage and exhibition of objects, it is not clear, how future flood events would affect the museum.

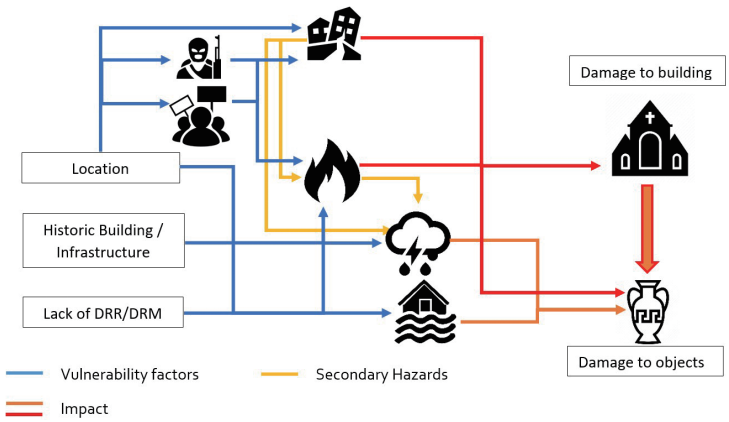

Fig. 4 Secondary and subsequent hazard analysis
Source: by author

4.2 Risk for Individual Objects

Within a collection, it is necessary to know where the most valuable objects in terms of cultural value attributes are located. However difficult it seems to prioritize individual objects of a museum collection, valorisation and priorities are a vital aspect of emergency planning[9]. For immediate response, it is suggested to divide the museum into priority-zones, based on the material and thematic attributes of the objects within a specific zone. The zones resemble the overlaying thematic focusses of the museum and contribute to the uniqueness of the collection and institution. Apart from the value and significance of an object, the materiality of the majority of the object within a specific zone are analysed in accordance with their vulnerability to an emergency. The fourth attribute is the movability of the object according to the number of people required to move objects safely out of the hazard-zone. Each attribute is given an attribute-value (1,2,3). The sum of all attributes-values defines the priority-value and category of a zone. Single objects are marked with a triangle; zones are shaded in the represented colour. It needs to be emphasized, that a limited movability can lower the priority of the object for evacuation or salvage, if no measures for evacuation are considered in the exhibition displays.

Tab. 1 Valorization of cultural heritage attributes for emergency planning

Value	Significance	Rarity	Vulnerability (heat, humidity, vibration)	Movability
3	Global	Unique	Fragile (Ex. Textiles, Paper, Ceramics)	1 Person (P)
2	Regional	Rare	Prone (Ex. Metal, Hardwood)	2 Persons
1	Local	Common	Solid (Ex. Stone)	3+ Persons

Source: by author

Tab 2. Example setting of evacuation or salvage priority evaluation for medieval tapestry.

Object	Significance	Rarity	Vulnerability	Movability	Total value
	3 = Global	3 = Unique	3 = Fragile, Flammable, prone to humidity	2 = 2P	11/12

Source: by author

4.3 Room Situation

The room situation of the Historic Museum and the exhibition is complex but well documented. Thanks to the use of new technology, 3-D models can serve not only as virtual museum exhibitions, but also as a basis for emergency planning, as they represent the relative position of the objects within the museum. It must be noted that 3D-models may not represent the actual position of the objects, as the exhibition structure might have changed.

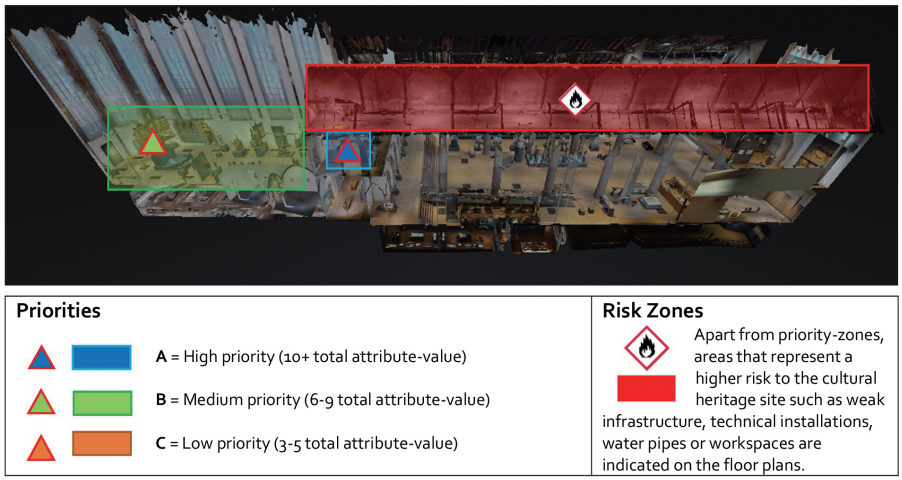

Fig. 5 Risk-Map of the museum based on 3D-Model
Source: https://www.hmb.ch/museen/barfuesserkirche

4.4 Conclusion of Disaster-Risk-Analysis

For the Barfüsserkirche and the collection of the Historic Museum Basel three major hazards have been identified, that can have a damaging and devastating effect on both the building and the objects. While fire is a primary hazard with high impact onto the heritage site and the objects, fire is also a secondary hazard of three other hazards (earthquake, mass-gatherings and armed-conflict). Due to the high likelihood and high impact, fire is the major risk for the heritage site. The lack of risk awareness and emergency plans results in a crucial increase of the vulnerability.

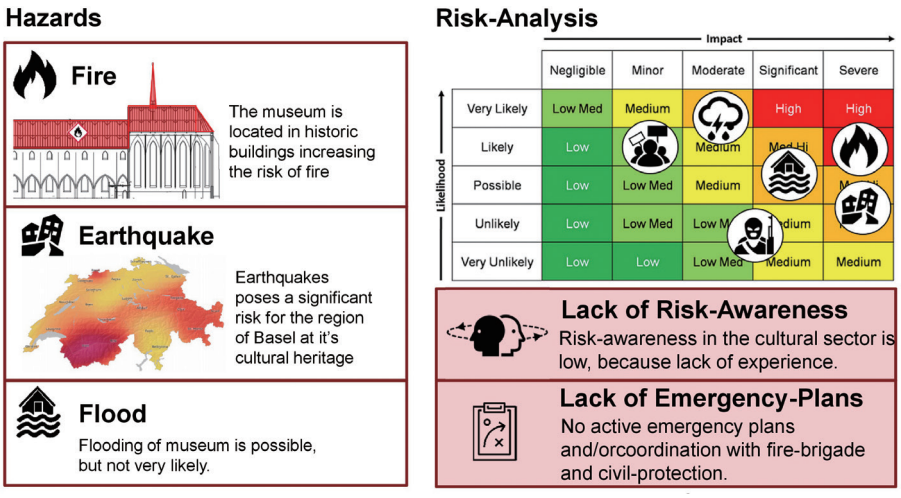

Fig. 6 Conclusion of risk analysis
Source: by author

5. Worst Case Emergency Scenario

The potential damage of the main hazard fire onto the building was analysed based on a likely worst-case scenario. As the Barfüsserkirche and the surrounding area are public places, where events take place frequently, an affection of a high number of persons is very likely. As the safety of humans stands above the safeguarding of cultural heritage objects, the prioritization of humans must be regarded in the emergency planning. The scenario assumes a fire during a special event with many visitors inside the museum, increasing the complexity of the situation. In the scenario, outside temperature (−12°C), technical failure and human errors lead to a delay in the emergency-intervention.

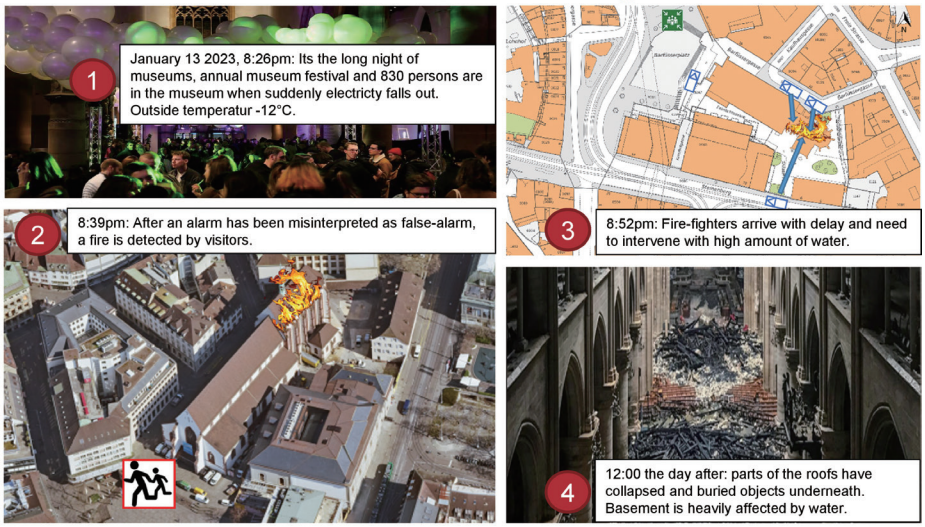

Fig. 7 Scenario – Fire during an event inside the museum.
Source: by author.

5.1. Impact Evaluation

In order to develop an effective and sustainable disaster risk mitigation plan, it is necessary to understand and analyse the impact and the potential damage to the heritage site. Attention must be given to the subsequent nature of hazards. In the depicted scenario (Fig. 7), the intervention of the fire brigade is delayed

because of technical and human induced errors. Extinguishing the fire will result in water affecting the exhibition area. A weakening of the structure will be an obstacle for damage assessment and salvaging of objects, as new hazards occur for both humans and heritage objects.

Tab. 3 Impact assessment

	Structure		Objects
	Destroyed		Destroyed
	Weakened (Access limited)		Severe damage = burnt, buried, soaked, broken
	Affected (Cleaning needed)		Affected (wet, dirty)
	Intact		Cause and subsequent hazards

Source: by author

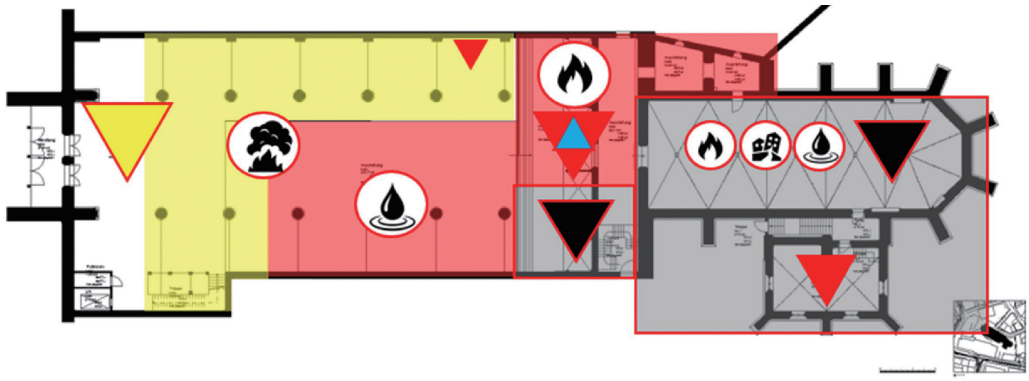

Fig. 8 Impact scheme of a fire in the roof.
Source: by author.

6. Disaster Risk Mitigation and Preparedness

Based on the scenario, a fire at the Barfüsserkirche could have severe impact on the site and the collection of the Historic Museum. The vulnerability of the site is highly increased by the lack of disaster preparedness and awareness on a governmental, institutional and individual level. To lessen the effect of a fire onto the heritage site, several measures can be implemented. However, regarding a risk-based approach, measures must be evaluated for their scale, duration for implementation and cost-effectiveness especially for ongoing processes or new technical infrastructure requiring maintenance. Stakeholder assessment is crucial, as proposed measures can only be implemented when all stakeholders, including the local community agree on their realization. In the case study, three measures have been evaluated regarding their effectiveness and costs:

1. development of disaster mitigation planning including cultural heritage aspects
2. revision and upgrading of fire-prevention systems
3. reinforcement of exhibition areas

In the case of the Barfüsserkirche being both, a museum and a heritage site on its own, risk-mitigation measures need to be between safeties for humans, cultural heritage attributes of the building and the collection. For example, installation of fire-prevention systems can intervene with heritage aspects of the building, although it would decrease the vulnerability. Further, reinforcement of exhibition areas or display need to accord with the exhibition. The focus of disaster risk mitigation for the Historic Museum and the Barfüsserkirche should rely on a comprehensive emergency planning that follows clear instructions for the museum as public space and as cultural heritage site.

Measure	Description	Scale	Stake-Holders	Duration	Costs	Impact	Balance
 Planning	**Low (if presets are definied)** Develop a general safety and security concept for the site.	**Provincial, city and attribute level.**	**Many** Public and Private stake-holders (many departements)	**Short-Periodic** 6 months, ongoing practice and training	**Low** <25'000.- depending on detail level of saftey & security concepts	**High** A general safety and security concepts reduces risks on all levels	**Good**
 Prevention of fire with technical installations	**Medium** Upgrading fire-prevention systems, installation of sprinklers in high-risk areas (roof/truss).	**Attribute** Technical installation s on site	**Few** Museum + Public Admin	**Medium – Long** Upgrade of fire prevention for the site can take **up to 2 years.**	**High > 300'000.-** If costs are higher than 300'000.- CHF, the parliament needs to decide on the expense.	**High** Sprinklers could prevent a fire in a high-risk area. Prone to technical failure. Increase in water-risks	**Medium**
 Reinforcement of exhibition areas with focus on objects	**Low** Reinforcement on display-cases and fire protection blanket for high-valuable objects	**Attribute** Technical installations on site.	**Few** Museum	**Medium** Technical enforcements can be' quickly implemented. Usage of preventive systems take longer	**Medium** 25'000.- CHF - 100'000 CHF Depending on the scale of the enforcement and reorganisation.	**Medium** Hazards for individual objects or small groups of objects can be generally reduced.	**Good**

Fig. 9 Evaluation of measure for risk-mitigation
Source: by author

7. Conclusion and Outlook

a) Fire and earthquakes are hazard with a high risk for museums, especially if they are located within a historic building lacking state of the art fire prevention systems.
b) The lack of comprehensive emergency and evacuation planning results in a higher risk for both humans and cultural heritage aspects, it must receive the highest priority.
c) The development of emergency plans, including plans for recovery must be organized as cooperation between emergency services, the museum staff and governmental and public stakeholders and within a continuous disaster risk mitigation management.
d) Developing and internalizing comprehensive emergency and disaster risk mitigation management take time and effort and need to be in accordance with the legal basis on local, national and international level.

7.1 Pilot-Project: Workshop for a modular emergency planning for cultural heritage

In a first step and as result of the international training course, a workshop with cultural heritage institutions directors and staff, civil-protection, the cantonal crisis-organisation, fire brigade, police as well as representatives of the government administration and insurances is planned for early 2022. According to the revised legal basis, the aim of the workshop is to define the responsibilities, competences and an agreement on the key elements of disaster risk mitigation management for cultural heritage. Another task of the workshop is to set up further proceedings including the organization of an extensive exercise with a real-life set-up and complex scenario within the following months. As the Historic Museum is one of many cultural heritage sites within the Basel region, the workshop and all measures for disaster risk mitigation for the cultural heritage will include representatives from different sites and disciplines.

Acknowledgment

Many thanks go to the speakers, resource persons and participants of the ITC training course 2021 for their valuable advices and feedbacks. In addition, I would like to thank the staff of the Historic Museum for their inputs. The Abteilung Kultur as well as the administration of Basel-Stadt receive furthers thanks for fostering initiatives for an integral and sustainable disaster risk mitigation management.

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2.6 Disaster Risk Management Plan for UMAG, Fung Ping Shan Building, The University of Hong Kong

Dr. Jennifer Lang *Director and Adjunct Associate Professor, MSc (Conservation), The University of Hong Kong, Faculty of Architecture*

1. Introduction and Site Context

This article presents a Disaster Risk Management (DRM) Plan for the Fung Ping Shan Building/University Museum and Art Gallery (UMAG) at the University of Hong Kong, Hong Kong, SAR China. This DRM plan was developed as part of the 15th International Training Course on Disaster Risk Management of Cultural Heritage, Ritsumeikan University, from August through October 2021.

The Fung Ping Shan Building is a three-story, neo-Georgian style building (a listed Monument in Hong Kong) designed by architects Leigh and Orange and built in 1932 as the Chinese Library for the University of Hong Kong (HKU). Founded in 1953, The University Museum and Art Gallery is dedicated to collecting Chineses art. As the oldest continuously operated museum in Hong Kong, the museum has a diverse collection of Chinese ceramics, bronzes and paintings[1]. The museum is located on a steep slope with large heritage trees within the dense urban university campus on Hong Kong Island, near Bonham Road and the East Gate entrance to the campus. Strengths of the site include that the entire art collection is digitized, that the building has a modern automatic fire suppression system, including smoke, fire alarms and sprinkler systems, and that due to the below-ground placement of all electricity lines in Hong Kong, there is rarely any power loss during large storms.

Hong Kong experiences disasters such as severe rainstorms, typhoons and landslides every year. Although Hong Kong has not had a large-scale disaster (except for COVID-19) that caused significant economic or human casualties in many decades, Hong Kong has been ranked as the city with the highest disaster risk in Asia, according to the Sustainable Cities Index[2].

2. Values and Attributes

The Fung Ping Shan Building is significant for five values: historic value, architectural value, art value, social value and educational value. As the oldest continuously operated museum in Hong Kong, it has historic value for its diverse collection of Chinese ceramics and bronzes dating from the Neolithic period to the Qing dynasty, as well as traditional and modern paintings from the Ming to the 21st century. Originally built at the Fung Ping Shan Library of Chinese language publications in honor of its benefactor (Fung Ping Shan 1860-1921) who is an eminent Chineses entrepreneur promoting Chinese education in Hong Kong, it is one of the twelve important heritage buildings forming part of the University of Hong Kong campus. The character-defining elements supporting this value include its use as a library and museum at HKU; the materials including the exterior and interior surfaces, configuration, and finishes (which speak to its age); and the exterior and interior forms functioning as an art museum.

Designed by the prominent architectural firm Leigh and Orange and constructed in 1932, its architectural value lies in its red brick Flemish bond, granite, terrazzo, wood and plaster materials and interior finishes, and its symmetrical neo-Georgian style façade and interior. The character-defining elements include the materials of the interior and exterior, forms as a museum and its exterior and interior design, and the spatial configuration including its layout and plan.

The museum has cultural/artistic value as an institution that promotes understanding and appreciation of

Figs.1 and 2 Front façade and interior gallery of UMAG, Fung Ping Shan Building.
Source: UMAG

Chinese art and culture and other cultures, through its collection and display of art and artifacts. The character-defining elements include the art collection, the use of the building as a museum and depository of art and cultural heritage, and cultural associations and meanings as a museum.

The Fung Ping Shan building has social value as a facility that provides a venue to educate, train and teach students, the public and the community to stimulate awareness and disseminate knowledge of traditional, modern and contemporary art, Chinese culture and art history, to enrich the educational, cultural and artistic community. The use as a facility for the community and public, and its location as a museum on the HKU campus are the character-defining elements of the social value.

Finally, the museum has educational value as a teaching and research institution that educates students and the public through art-historical research, teaching, displaying and interpreting its permanent art collection about Chinese art and culture and presenting noteworthy temporary exhibitions. The use as a teaching and research institution and its location as a museum on the HKU campus are the character-defining elements which support the educational value.

3. Risk Analysis

A risk analysis identifies primary and secondary hazards and how they may interrelate with physical, social, economic, political and attitudinal vulnerabilities which expose heritage to various hazards[3)]. A risk analysis of the UMAG Fung Ping Shan building includes firstly identifying the hazards and threats, secondly identifying the specific vulnerabilities and together these equal the cause/effect relationship and impacts of the values of the site (see Fig. 3). The four hazards and threats affecting Hong Kong include typhoons, heavy rain and floods, fire and landslides. The vulnerabilities include the following: poor museum and university communication; poor condition of portions of the building envelope permitting water infiltration; location of the building on a slope adjacent to an open water drainage channel, and surrounded by large heritage trees; improperly working air conditioning climate control system that is leaking water; inadequately trained building conservation and construction workers who previously worked on the building; no DRM plan for the building and in general, low disaster and emergency awareness in Hong Kong; presence of a water-based automatic fire sprinkler suppression system; and shifting political environment in Hong Kong which has created social unrest and restrictions by the government.

As a result of the hazards/threats together with the vulnerabilities, there are four main cause-effect rela-

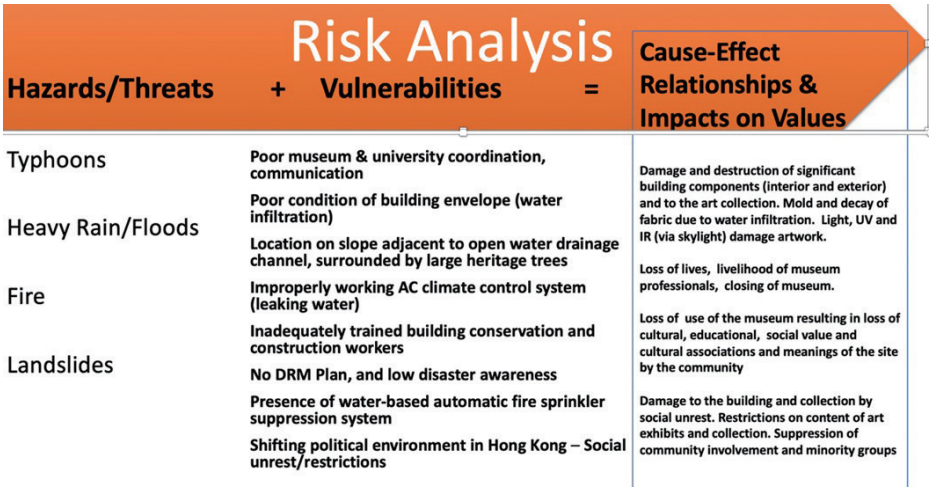

Fig. 3 Risk Analysis for UMAG Fung Ping Shan Building
Source: Jennifer Lang

tionships and impacts on the values of the museum. The first impact is the damage and destruction of significant building components (interior and exterior) and to the art collection. This damage and destruction include mold, decay of fabric due to water infiltration, and light, ultraviolet and infrared light (via the skylight) damage to artwork. The second impact includes the loss of lives, the livelihood of the museum professionals and staff and resulting closing of the museum. The third impact is the loss of the use of the museum thereby resulting in the loss of cultural, educational and social value and cultural associations and meanings of the site by the community. Lastly, impacts include damage to the building and collection by social unrest, restrictions on content of art exhibits and collections, and suppression of community involvement and minority groups in Hong Kong.

4. Worst Case Disaster Scenario

In this worst case disaster scenario for the UMAG building in Hong Kong, the primary hazard in s super typhoon, and the secondary hazards are floods, fire and landslides. A super typhoon (T10) is due to directly hit Hong Kong at 6 pm on Friday 6 September 2023. As a result of Hong Kong's weather preparedness system, the city is on high alert and all residents are at home, businesses are closed and there is little to no traffic on the roads. Accordingly, the museum building is closed with no visitors or staff present. The hazards and vulnerabilities include the high wind rain and resulting falling trees which damage the glass skylight on the roof, portion of the roof and roof parapet, with water entering the building. Water in the open water channel on the slope directly west of the museum breaks over the banks and floods the ground floor outside of the museum and leaking inside of the museum. Electrical fires result inside of the museum as a result of the water infiltration on the first and third floors. The sprinkler fire suppression system is enacted damaging portions of the art collection and interior of the building. After hours of heavy rain, a landslide develops within the campus hillside above the museum building. The landslide results in the demolition of several university buildings and a slide of building debris, rocks, trees and mud comes down the slope blocking access to the museum building and causing damage to the building exterior.

As a result of these events, major portions of the museum building and the art collection are damaged and destroyed. The heritage building (inside and portions of the exterior) was significantly damaged and was not able to remain open as a museum. The museum staff lose their livelihood and the museum will close. The students, visitors, community members and public are no longer able to visit the museum or engage in the educational activities that take place there.

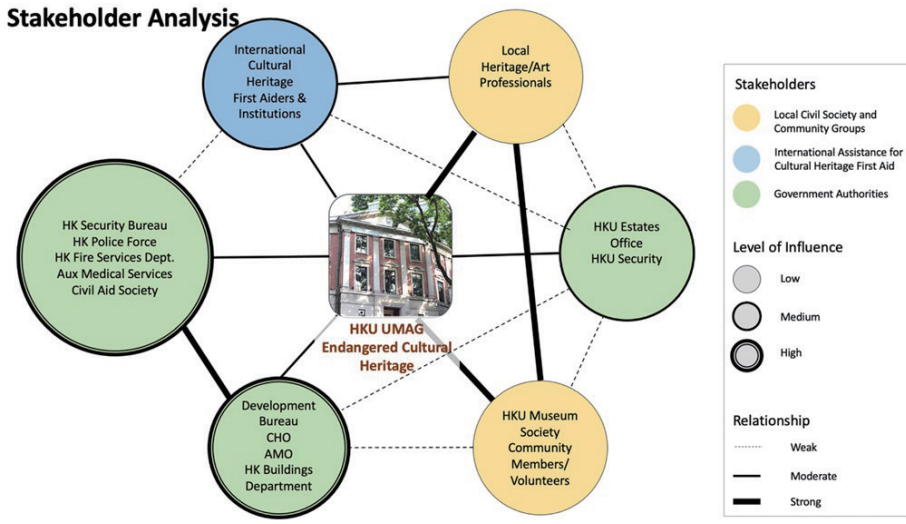

Fig. 4 Stakeholder Analysis for UMAG
Source: Jennifer Lang

5. Stakeholder Analysis

Stakeholder analysis enables an awareness of the respective interests and interrelationships enabling a better understanding of the respective interests and power relations between all stakeholders and actors[4]. A stakeholder analysis and mapping for UMAG divides the stakeholders into three groups: 1) *Local Civil Society and Community Groups (*including HU Museum Society, community members, volunteers, and local heritage and art professionals); 2) *International Assistance for Cultural Heritage First Aid*ers; and 3) *Government and HKU Authorities* (the HK Security Bureau, HK Police Force, HK Fire Services Department, Auxiliary Medical Services, Civil Aid Society, Development Bureau CHO, AMO, HK Buildings Department, HKU Estates Office and HKU Security Office). The level of influence of each of these groups is assessed, as is the relationship between the museum and each of the stakeholder groups and together this information is graphically indicated on the Stakeholder Analysis Chart (see Fig. 4)[5]. This analysis indicates that although UMAG has strong ties and relationships with local civil society and community groups, its relationships with highly influential stakeholders such as government authorities, HKU and international cultural heritage first aiders and institutions could be enhanced and made stronger.

6. Mitigation

Disaster risks can be prevented or mitigated by preventing hazards, mitigating the impact of hazards, reducing the vulnerability of the property and its environs, and training the staff in self-protection strategies[6]. Mitigation aims to reduce loss of life and property by lessoning the effects and impacts of disasters and to reduce or prevent long-term risk from hazards on the existing built heritage, taking action in the timeframe before a disaster to lesson post-event damage to lives and property[7]. Proposed mitigation for UMAG is divided into five parts – Regional Policy, Planning, Technical: Structural, Technical: Non-Structural, and Maintenance and Monitoring and Training and Awareness.

For mitigation related to Regional Policy, there are three recommendations: 1) Include specific provisions for heritage buildings as part of the comprehensive DRM plan for Hong Kong[8]; 2) Provide subsidies and incentives for the preparation of DRM plans for heritage buildings/museums in Hong Kong; and 3) Develop and execute specialized DRM training and educational programs for heritage buildings to improve resilience and low disaster and emergency awareness in Hong Kong.

For mitigation related to Planning, there is one recommendation: 1) Improve and reconfigure open water channel west of the museum building and to install related slope monitoring systems.

For mitigation related to Technical: Structural, there are two recommendations: 1) Strengthen and repair the flat roof membrane, parapet walls and domed skylight components on the roof to ensure watertightness of the roof and the building envelope; and 2) Improve water drainage systems surrounding the perimeter of the building exterior, especially at the rear facing the retaining wall and slope.

There are five recommendations for Technical: Non-Structural Mitigation: 1) Integrate the existing digitized art collection system with a new significance/value system and tie it to specific locations on the building plans; 2) Investigate increasing the number of fire-safe collections storage rooms within the museum; 3) Investigate the feasibility of the installation of new gaseous or clean-agent based automatic fire suppression system to replace the existing system[9]; 4) Install electronic monitoring and detection systems inside the museum to identify leaks (humidity) within the building; and 5) Investigate making the art display cabinets flame retardant/fire safe.

Finally, for Maintenance and Monitoring and Training and Awareness Mitigation, there are five recommendations: 1) Establish an annual cyclical maintenance checklist and plan for the interior and exterior of the museum building to ensure proper monitoring of the site and related staff training of the checklist and plan; 2) Organize regular emergency simulation drills, table-top and mock exercises, and awareness raising activities with museum and HKU Facilities staff, HK Emergency Services and the community[10]; 3) Stage Disaster Imagination Games[11]; 4) Create DRM community awareness programs targeting the community, students and children; and 5) Create a multidisciplinary network of First Aid Experts/Advisors of Cultural Heritage Specialists from government, emergency departments, specialists and the university.

7. Emergency Preparedness Measures

Emergency disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. Proposed emergency preparedness measures for UMAG includes the following: 1) Create an evacuation plan for visitors and staff (including a location of safe shelter/refuge area in the vicinity of the building and campus site), identifying means of escape (place, and number of exit routes from building), and crating architectural plans with utility mains, fire exists and fire extinguishers highlighted[12]; 2) Create an emergency response chain of command/contact list within the museum and university; 3) Identify significance of museum objects (with consultation with HKU Museum Society and community) which are most valuable and should be evacuated first (hierarchy of value, accessibility, condition, damage, size and weight) and tie value/significance to the existing digitized record of objects[13]; 4) Identify and create agreement of a temporary off-site secure emergency storage site for the artwork (and related supplies) and transport of the objects in the museum collection, as well as sites for stabilizing and storing/cleaning of objects and artwork[14]; 5) Create lists of appropriate emergency supplies and equipment, acquire items and create accessible on-site storage of items needed in an emergency[15]; 6) With the assistance of the Commissioner for Heritage's Office (CHO) and the Antiquities and Monument Office (AMO), coordinate documentation of significant exterior and interior architectural features of the museum with 3D laser scanners or photogrammetry to provide precise records, measurements and details of the heritage building; 7) Prepare and create sample damage and risk assessment forms for the museum collection and the heritage building[16]; 8) Create a First Aid List of multidisciplinary professionals in undertaking condition assessment of the building and the collections. The list of professionals may include conservators, architects, structural engineers, curators, historians and conservationists; 9) Liaise and coordinate with HKU and HK Government Emergency Services to coordinate and plan safety assessments for the museum to identify priorities for securing and stabilizing museum objects and the museum building; 10) Arrange for periotic

testing of fire suppression system (if not already in place); and 11) Confirm existence of or create a new back-up cloud system for museum staff computers[17].

8. Planning for Recovery

Planning for recovery includes utilizing a clear recovery framework to ensure that a disaster is managed effectively in order to minimize the risk of further damage to the site through uncoordinated action and to prepare and train staff to carry out the process to return museum operations to normal[18]. Proposed short term actions include the following: 1) Secure and stabilize the museum building and collection; 2) Provide temporary cover for exposed built elements, fragments and objects[19]; 3) Post-event evacuation of art collection to another safer temporary location; 4) Salvage damaged art collection and building fragments including sorting and stabilization through surface leaning and/or drying objects; 5) Provide safe and secure temporary storage for evacuated and salvaged art and building fragments; and 6) Dry the museum building in the aftermath of a flood[20].

Proposed medium and long-term actions for planning for recovery include the following: 1) Conduct detailed damage assessments of the building and art collection; 2) Monitor and review the risks; 3) Monitor and review information sources; 4) Periodically review the DRM Plan based on the effectiveness of the plan and in light of the experience of any emergencies; 5) Continuously develop and engage in staff training and capacity building for DRM and emergency situations; and 6) Continuously engage with stakeholders, community and volunteers.

9. Conclusion

Formulating a DRM plan is an important exercise that presents the opportunity to identify, assess and reduce risks and hazards associated with disasters. It is hoped that this DRM Plan for the UMAG Fung Ping Shan Building in Hong Kong will be implemented with a view to preserving its heritage and ensuring that it contributes to the sustainable development of the Hong Kong community in the future. Additionally, it is hoped that the creation of this DRM Plan will have direct benefits beyond UMAG in that it could be utilized by the University of Hong Kong Estates Office as a model for the development and dissemination of additional DRM plans for the remaining heritage buildings owned by the university.

Acknowledgements

I would like to express my sincere thanks to Rohit Jigyasu, Dowon Kim and the entire UNESCO Chair Programme on Cultural Heritage and Risk Management ITC R-DMUCH teaching team. Special thanks also to Ksenia Chmutina for providing excellent mentoring and guidance throughout the program. Finally, thanks to Florian Knothe for allowing me to collaborate with UMAG to utilize the museum and Fung Ping Shan building as my case study for the course.

Footnotes

1) Florian Knothe, "Treasures, Traditions and Transformations: UMAG at Sixty" and the heritage appraisal and description of the listed monument building by the Hong Kong Antiquities Monument Office, https://www.amo.gov.hk/form/DM118_Related_Information_En.pdf
2) 2015 *Arcadis Sustainable Cities Index*, at file:///Users/jenlang/Downloads/307237_ARCADIS%20Sustainable%20Cities%20Index%202015.pdf
3) ICCROM, *First Aid to Cultural Heritage in Times of Crisis Handbook: 58.*
4) Ibid*: 34.*
5) Ibid*: 34.*
6) UNESCO, *Managing Disaster Risks for World Heritage,* 2010: 32.

7) Ibid: 58.
8) Emily Chan, Yeung and Lo, *Hong Kong's Emergency and Disaster Response System Policy Brief,* October 2015, *and* Harvard T.H. Chan School of Public Health, *Disaster Preparedness in Hong Kong: A Scoping Study,* 2016.
9) National Parks Service 2002, *National Parks Museum Handbook, Part I, Chapter 9: Museums Collections Security and Fire Protection.*
10) Valerie Dorge and Sharon L. Jones, *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions: 89-107.*
11) Originally developed in Japan, Disaster Imagination Game (DIG) is a method developed for disaster drills, which uses maps, transparent overlay and designates, among participants, members of the virtual command post of disaster relief activities with the objective of facilitating the training of directing activities to help people. It is a simple, low cost and versatile methodology, and very effective for strengthening of local capacities for disaster prevention. See Gifu Prefectural Government (2012). *Disaster Imagination Game (DIG) Guidebook for Leaders.* Gifu-shi, Japan.
12) ICCROM, *First Aid to Cultural Heritage in Times of Crisis Handbook: 36-37, and 73.*
13) UNESCO and ICCOMOS, *Endangered Heritage: Emergency Evacuation of Heritage Collections:* 12-14.
14) ICCROM, *First Aid to Cultural Heritage in Times of Crisis Handbook,* pages 69-119 and ICCROM, *First Aid to Cultural Heritage in Times of Crisis Toolkit,* pages 39-93, and UNESCO and ICCOMOS, *Endangered Heritage: Emergency Evacuation of Heritage Collections.*
15) ICCROM, *First Aid to Cultural Heritage in Times of Crisis Toolkit,* pages 9, 67-69 and 93-96 and UNESCO and ICCOMOS, *Endangered Heritage: Emergency Evacuation of Heritage Collections.*
16) ICCROM, *First Aid to Cultural Heritage in Times of Crisis Toolkit:*15-27.
17) Valerie Dorge and Sharon L. Jones, *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions: 210.*
18) Ibid*: 24.*
19) ICCROM, *First Aid to Cultural Heritage in Times of Crisis Toolkit:*73.
20) Ibid*:* 69-121.

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2.7 Disaster risk management for collections in the National Library of Latvia (Riga, Latvia)

Katrina Kukaine *Mg geogr, Development department director*
The National Library of Latvia

1. Introduction

The National Library of Latvia (the NLL) is established in 1919, but the new building is completed in 2014. The building itself is nominated for the national list of architectural monuments (architecture and design). It contains 4 million units' collection, including documentary heritage collections and legal deposit archives. In the building, the object of the UNESCO Memory of the World register – the cabinet of folksongs – is located. Infrastructure building contains the servers for keeping digital collection (including digital heritage and digitally born heritage). As for the brand new building, a lot of risks concerning collections are mitigated, especially concerning fire safety and appropriate microclimate and security for collections. Anyway, there always exist risks due to water accidents, the hazard of floods is never evaluated, as well as the disaster response plan for collections safety has never been elaborated.

Fig.1 The National Library of Latvia
Source by *Latvijas Nacionālās bibliotēkas Atbalsta biedrība*; photo by Indriķis Stūrmanis

2. Characteristics of the Area

The NLL is located on the left bank of river Daugava across the Historic centre of Riga – the World Heritage site – in its buffer zone. There is no active seismic zone, and since the land is flat, there are no landslide risks. Flood map of the city of Riga shows that the site is near the flood zone but isn't affected directly. Also floods hazard maps show a minimum risk to the site because of the location of dam and proper drainage system. In general, the most significant flood risks for the city of Riga are related to wind surges in the Gulf

Fig.2 Floods risk information system - flooding once 200 years and location of the NLL
Source by http://pludi.meteo.lv/floris/sistema.html

of Riga (as opposed to spring floods, rainfall, or melting snow).
Anyway, historically Riga was affected by floods also on the left side of river where the NLL is located, the latest case was in 1929[1].

Fig.3 Floods on the left bank of river Daugava in 1924
Source by www.zudusilatvija.lv; the National Library of Latvia

Meteorological observations in recent years indicate more heavy rainfalls and winds caused by climate change which can cause flooding. And all publicly accessible flood risk assessments are made five to ten years ago, so there is no actual flood risk assessment available[2].

3. Attributes and Values

The main cultural heritage attribute of the NLL is its Collection as a whole, but we can identify the attributes according to priorities: the cabinet of folk songs dated from the 19th century which is inscribed in the UNESCO Memory of the World Register; Special collection of rarities and manuscripts; collection of the Museum book history; Special collection of legal deposit archive. Besides, the building itself can be considered as a monument of architectural significance.

Fig.4 The cabinet of folk songs
Source: by author

1 http://www.videsvestis.lv/riga-un-pludi/
2 https://www.rdpad.lv/wp-content/uploads/Rigapretpludiem/dokumenti/06riskmanagment.pdf

The NLL cultural heritage attributes have a wide range of values: Historic, Educational, Scientific, Artistic, as well as Symbolic (for example, building itself with its design narrative).

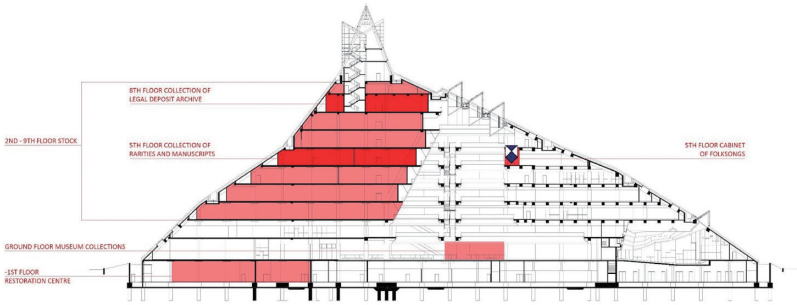

Fig.5 Location of attributes in section of the building
Source by the author; architectural drawing by M. Mežulis/ K.Kukainis

4. Risk Assessment

Tab. 1 The summary of risks assessment

HAZARD	LIKELIHOOD	IMPACT	DISASTER RISK
Riga HES dam rupture	1	5	High
Floods from heavy rains, ice melting, storms	3	4	High
Fire during reparation works	3	4	High
Flooding from intern systems	2	2	Medium
Fire from electric installation	2	2	Medium
Terrorism, vandalism/other criminal activities	2	3	Medium
Theft/ Looting	1	2	Low
Mold and biodegradation (broken microclimate systems)	1	2	Low

Source: by author

There is a high risk of the breakdown of the Riga hydroelectric dam Similarly, fire during repair may be controlled by enhanced construction surveillance during works. Therefore, we consider flooding as the highest risk due to various vulnerabilities and lack of preparedness.

5. Disaster Scenario

The floods caused by heavy rainfall followed by strong winds that outgrew in the storm was chosen as the scenario of high risk. Strong wind surges coming from the Gulf of Riga (the sea) rapidly raised the water level in the river. 12 hours after the heavy rainfall started and 6 hours after the water level in the river started to rise, the NLL underground floor and ground floor were flooded. From the point of view of endangered attributes, floods affect the restauration centre on the underground floor where manuscripts are undergoing conservation and the museum collection is on the ground floor. The danger is exacerbated by chemical contamination from the restoration centre. On the flooded floors, the microclimate could change without immediate action, and the units on the ground floor and the basement have the risk of mould. In the wider area, surroundings of the NLL could be flooded, and local community from quarters (there are several small two-storey wooden houses) can look for the safe place– the library is the highest building in the area and located at a higher level.

6. Mitigation Measures

From risks and scenario perspective there are some mitigation measures considered at different levels: from national and city level to building and attributes level. Proposed measures help to mitigate the spread of floods or to minimize their impact on the NLL collections.

Tab. 2 The summary of mitigation measures in case of floods

Description of Mitigation Measure	Scale of Intervention	Which hazards are eliminated, reduced	Who would be involved	Duration of implementation	Estimated Cost level
Cooperation network for emergency situations among cultural heritage institutions	National level	To be prepared an effective response in the case of emergency Recovery funding	Ministry of Culture, Heritage institutions (museums, National archive, NLL), municipality, rescue services, NGOs	Medium	Low
Extra drainage system for the rain water	City level	Limit floods over a wider area Early warning system	The city council, engineers and environment specialists	Medium	High
Rescue plan for collections	Building level	Reduce impact on collections	NLL management, all departments	Short	Low
Emergency team Emergency kit Staff trainings	Site level, attributes level	Preparedness for an effective response in the case of emergency	NLL management and other involved departments	Short-medium	Low – medium

Source: by author

7. Preparedness and Response Measures

The NLL has built an emergency team for rescuing collections in the emergency situation, including team manager, conservators, suppliers, business continuity managers, communication managers etc.. One of the proposed preparedness and response measures are the emergency kits with supplies for first aid to rescued collections, especially in the case of water damages. They will be placed in the storage and reading rooms where parts of collection are located.

Fig.6 and 7 Staff training on rescue of wet books and the emergency kit
Source: by author

As part of the response measures, the NLL plans to establish contact lists for an emergency situation – for internal and external help, including partners and private companies for supplies; floor plans with crucial information as evacuation routes, fire extinguishers, emergency kits as well as the location of most valuable collections and heritage objects (for example, the cabinet of folk songs). In addition to already existent civil protection plan, the NLL also plans to elaborate a rescue plan for collections with flowcharts of

action in emergency situations.
For recovery, the most important measure is the establishment of the network at the national level: ministries, rescue services, GLAM sector (galleries, libraries, archives and museums), international contacts, and professional NGOs.

8. Conclusion

By analyzing the risks and developing possible disaster scenarios, we concluded that in the event of a disaster, the NLL building itself is probably the safest place. Its special layout, where storages are located on the upper floors, guarantees their safety, and rescue involves "lifting" people, values and services up. Because the surroundings of the museum are much more dangerous during a wider disaster situation, the NLL premises can be a "safe place" for the local community. Equally important is the awareness of the community's potential in dealing with emergencies.

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2.8 Disaster Risk Management Plan for the World Heritage Property of The Historic Center of Urbino

Luana Alessandrini *Architect, Municipality of Urbino Sector World Heritage Office - Urban Decorum Urban Hygiene - Community Policies*

1. Introduction

Urbino is located in the region of Marche, in central Italy and in the central Apennines, at an altitude of 485 metres above the sea level. With a size of over 220 km^2, the municipality is home to just under 14,000 residents. In addition Urbino is also home to approximately 15,000 university students. Urbino represents a pinnacle of Renaissance art and architecture, harmoniously adapted to its physical site and to its medieval precursor in an exceptional manner. The historic centre is defined by its Renaissance walls that survive virtually intact, complete with bastions. Within these walls, several buildings of extraordinary quality have been retained such as the Ducal Palace, the cathedral, the Monastery of Santa Chiara and a complex system of oratories.

During the Renaissance era, Urbino became, for a short time, one of the major cultural centres of Europe. During the 15th century, it attracted artists and scholars from all over Italy and beyond which, in turn, influenced cultural developments elsewhere in Europe. Between 1444 and 1482, Federico da Montefeltro ruled in Urbino and his court brought together some of the era's leaders: artists such as Luciano Laurana, Francesco di Giorgio Martini, Paolo Uccello, Piero della Francesca and Ambrogio Barocci; humanists of the time such as Leone Battista Alberti, Marsilio Ficino, and Giovanni Bessarione and mathematicians like Paul van Middelburg. These men created and implemented outstanding cultural and urban projects and this cultural climate made it possible for Raffaello, Donato Bramante, and the mathematician Luca Pacioli to flourish in their own art and science.

(1.1) Inscribed area and buffer zone

The Historic Centre of Urbino has been inscribed in the UNESCO World Heritage List in the 22nd session of the World Heritage Committee held in Tokyo, November 30 - December 5, 1998, on the basis of the following selection criteria established by the World Heritage Committee:

Criterion (ii) To exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town planning or landscape design;
"*During its short cultural pre-eminence, Urbino attracted some of the most outstanding humanist scholars and artists of the Renaissance, who created there an exceptional urban complex of remarkable homogeneity, the influence of which was carried far into the rest of Europe*."
Criterion (iv) To be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;
"*Urbino represents a pinnacle of Renaissance art and architecture, harmoniously adapted to its physical site and to its medieval precursor in an exceptional manner*"[1)].

The area inscribed in the World Heritage List corresponds to the Historic Centre of Urbino, limited by the city walls attributed to Gian Battista Comandino. The buffer zone was widened defined during the inscription and include the area classified as "*Urban Park*" in the Master Plan regulations approved in 1997 by the Municipality. This area extends to the first circle of hills surrounding the historic city and its modern periphery and covers the non urbanized external areas as greens with different components. It includes also the second and third level zones that form the panoramic background seen from the Historic Centre. They

are the hills of the "*Urban Park*"; the "*Scientific Park*", the ridge of which limits the southern horizon of Urbino; the "*Panoramic Scenery of Maciolla and Rancitella*" with the system of ridges closing the western horizon towards the " Alpe della Luna", the "Sassi Simone and Simoncello" and the "eastern part of the *Cesane Park*" which delimitates the eastern horizon towards the State parks of the Cesane massif[2].

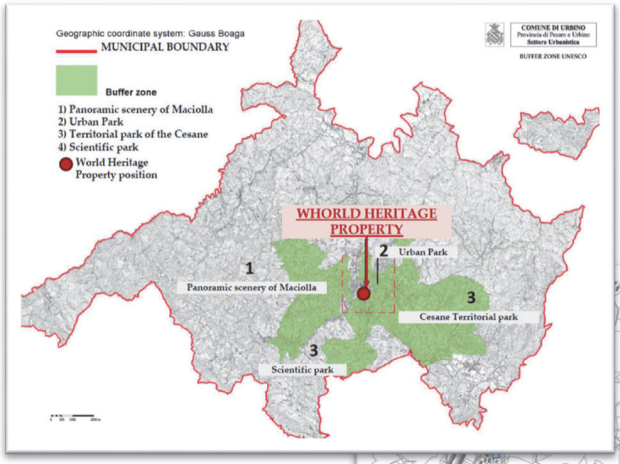


Fig.1 World heritage property historic center of Urbino - Inscribed area and buffer zone

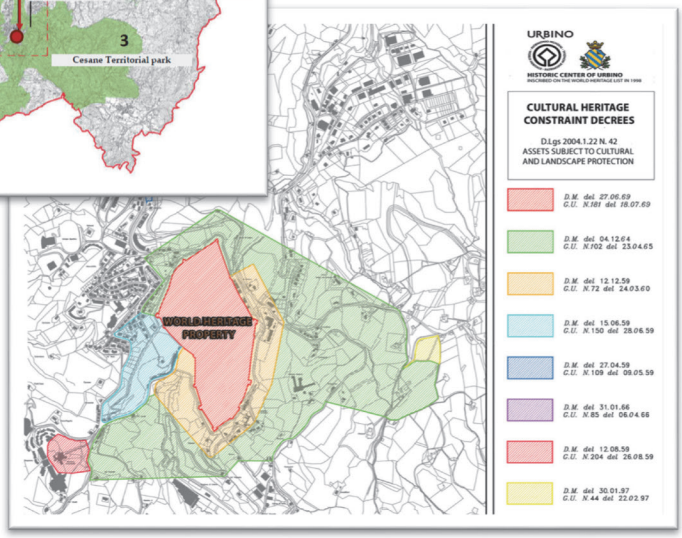


Fig.2 World heritage property of the historic center of Urbino - Inscribed area and protection views

Fig. 3 One of the views from Urbino: the buffer zone

(1.2) Attributes and Value

The Historic Center of Urbino appears as a continuous and concentrated space of the highest value defined today, as it has been for many centuries, by the renaissance walls. Within these walls, a significant number of buildings from that era survive.

The authenticity of the Historic Centre of Urbino is high as it has retained much of its urban form in terms of street layout within the renaissance walls. As a result, it has preserved its spatial characteristics and volumes and decorative features dating back to the older mediaeval layout, with its narrow streets, as well as to the subsequent Renaissance additions. Even the interventions from the 18th and 19th centuries left the Renaissance layout almost completely untouched. The building of a new theatre, designed by Vincenzo Ghinelli

situated beside Francesco di Giorgio's tower, was compatible in style and proportions with its neighbours. Moreover, it has preserved its authenticity through the use of traditional and historical techniques and building materials in the maintenance and restoration work on buildings and in the public areas of the historic centre, preserving the formal characteristics, types and dimensions of the existing architecture. The interventions in the town planning have never transformed the older constructions, perfectly complying with the urban landscape and the morphological conformation of the site[3)].

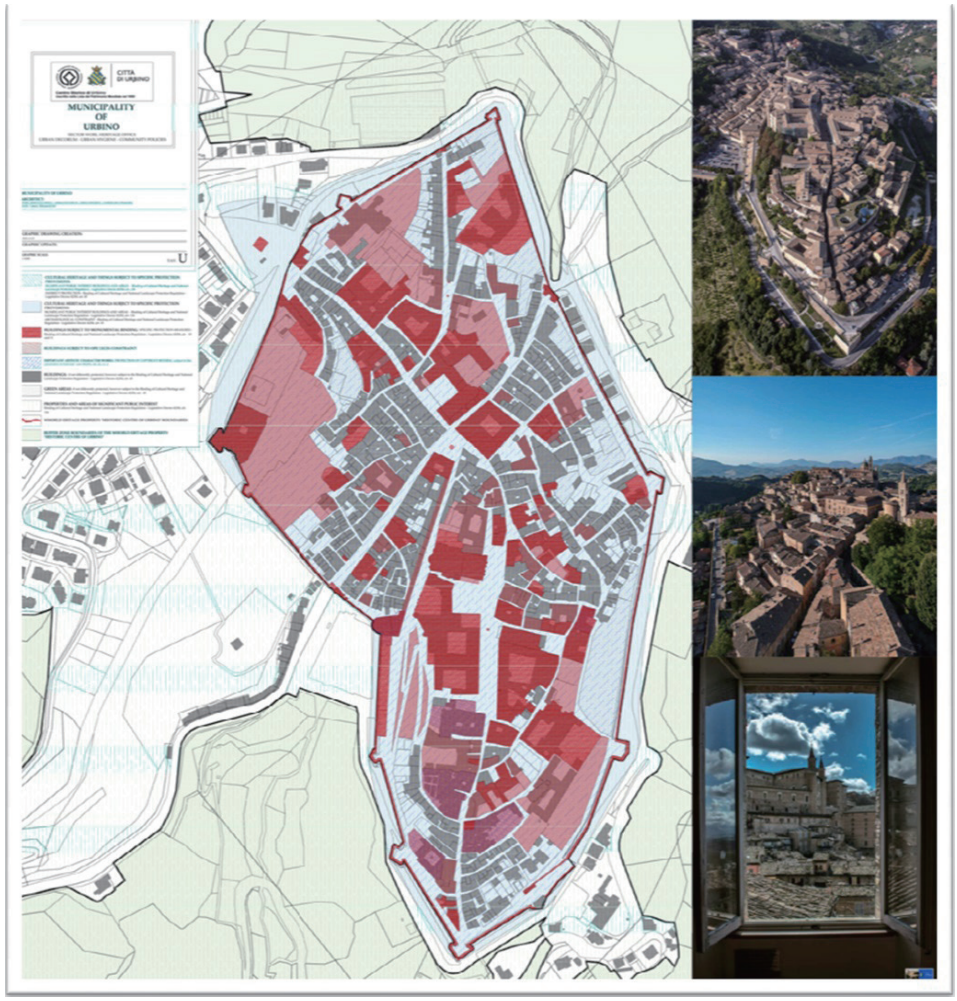


Fig. 4 World heritage property historic center of Urbino - Inscribed area and photographics views

The main attributes of the World Heritage Property Historic Center of Urbino are the following: renaissance urban complex of remarkable homogeneity and harmoniously suited to the morphology of the territory and to the pre-existing medieval structures; integrity of the Renaissance walls and relative bastions; architectural significance of the renaissance city, represented by its main monumental buildings of extraordinary quality and related collections: Palazzo Ducale and other city complexes including the Monastery of Santa Chiara and the system of oratories; Palazzo Ducale as a symbol of the Renaissance, patronage and cultural avant-garde of Urbino; spatial and volumetric unchanged characteristics of the medieval urban structure (narrow alleys and piole); urban planning and building interventions dating back to the 18th and 19th centuries, implemented in the pre-existing historic fabric, such as Vincenzo Ghinelli's theater, compatible in style and form with the surrounding buildings; use of traditional techniques and

materials in restoration interventions; protection and enhancement of the quality of the landscape and its peculiarities, of the Buffer Zone and of the Renaissance skyline.
The main strengths of the site are strongly linked to its rich cultural heritage and unique geographical position: built heritage including monuments; urban identity; views; parks; agricultural landscape; traditional and organic agricultural practices and traditional crafts[4].

2. The connections between the Management Plan and the Disaster Risk Management Plan of the World Heritage Property Historic Center of Urbino

The Municipality of Urbino is currently working on updating the Management Plan of The World Heritage Property. The scope is to preserve and enhance the Outstanding Universal Value of the property, raise awareness about the site's cultural values, integrate cultural heritage in the overall vision for the city and collaboratively design a path forward with the local communities. The aim is to protect the attributes and the strengths, promote a sustainable and inclusive cultural and natural heritage, reduce the environmental impact of the city and promote sustainable local development. The project is on local scale, but is involving the stakeholders from the city, the buffer zone, the municipality and beyond, outside the municipal perimeter, up to the territorial scale.

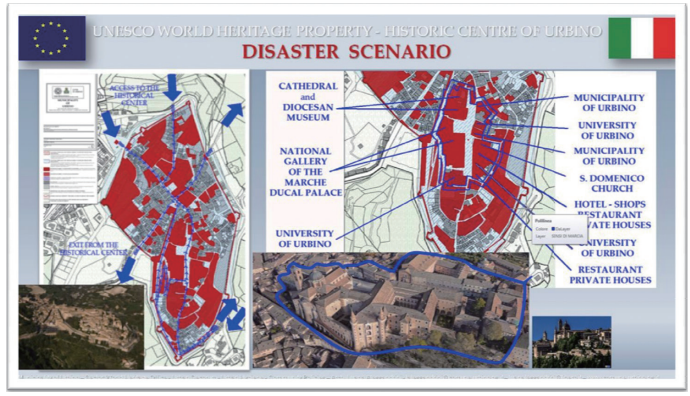
The Management Plan of The World Heritage Property will also use the approach of the Historic Urban Recommendation on the identification and protection of the historical layers of the city, and the integration of heritage conservation with short- and long-term urban development policies[5].

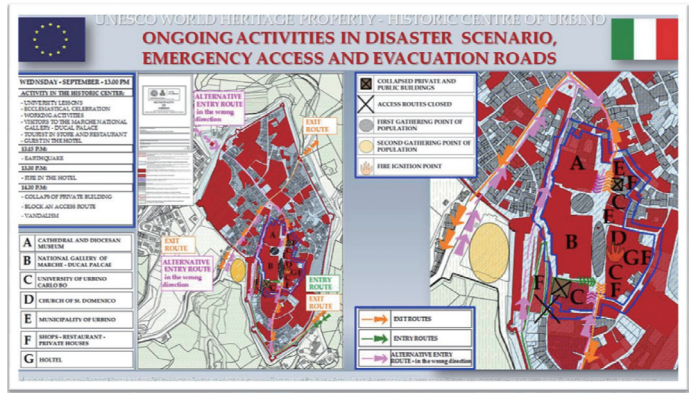
The update of the Plan will include the Urbino Climate Change Adaptation and Mitigation Plan (SECAP – Sustainable Energy and Climate Action Plan) approved by Municipality and submitted and validated by the EU Covenant of Mayors and the Disaster Risk Management Plan. The Disaster Risk Management Plan in turn will include within the risk management system provided by Italian legislation: Civil Protection Plan which analyzes the risk sectors related to hydrogeological (floods, landslides), seismic, forest fires, extreme snow, industrial sectors and pandemic sectors and the Municipal Snow plan.

3. Risk Analysis: key hazards, vulnerabilities, potential impacts and the restricted disaster scenario - the process of developing the Disaster Risk Management Plan

Thanks to the intensive work carried out within the International Training Course (ITC) on Disaster Risk Management of Cultural Heritage, the Disaster Risk Management Plan will be updated and risk analysis for the entire city will be undertaken. The method applied during ITC Course in a restricted area of the city (chosen in the top of the hill, as a richer monumental area and difficult to access) will in fact be applied to the entire Historic Center. In future development of the Management Plan, this method will be developed and applied also in the buffer zone.

The analysis and studies developed during the course allowed us to examine and collect more data about the city from various departments. These included the assets of high cultural value indicated in the Regional and Municipal Information System of Cultural Heritage; the access and exit system of the city; mapping of hazards in the hydrogeological Plan (landslides and floods) and the Civil Protection Plan (earthquake, seismic microzonations and emergency limit conditions); the hazards related to Climate Change defined in the SECAP – Sustainable Energy and Climate Action Plan related to cultural heritage (meteorological drought, intense rainfall, superficial recession of materials and touristic comfort index), environmental protection and forest fires (trigger and climatic factors), meteorological drought, critical infrastructure and hydrogeological risk; water pollution; historical fires; Municipal snow plan; hydrants and the water resource; the defibrillations point.





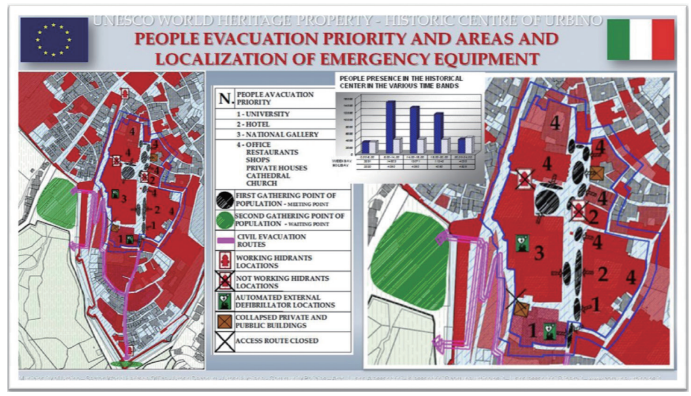


Fig. 5-6-7-8 Overview of restricted disaster scenario defined during ITC course

At the end, the city was able to link hazards and vulnerabilities with the values of the World Heritage Property and also to define the disaster scenario in the chosen area and prioritise the movable and immovable heritage in the risk scenario and verify the priority evacuation (linked with saving peoples' lives and heritage value).

4. Mitigation measures and pilot project: The transition from the Disaster Scenario to the real application of disaster risk reduction measures in the Historic Center and future application to the buffer zone

During the ITC Course, a check list of the existing mitigation systems in the Historic Center was developed and meetings were initiated with the various existing and potential stakeholders to be involved in the concrete development of Disaster Risk Management Plan.

The development of disaster risk scenario of the chosen area has allowed the city to define the first hypothesis of mitigation measures, to be applied not only to the scenario in the chosen area, but also to the entire Historic Center. These measures were divided into structural and non structural measure and classified in accordance with the type and time of application; the hazards, risks and vulnerabilities; the affected attributes; the impact levels; the stakeholders involved and the costs.

Based on the case study project undertaken during ITC, Urbino can now apply the method and the acquired knowledge and various mitigation measures to the entire Historic Center as part of the Disaster Risk Management Plan. In the next year, the municipality will involve all the institutional actors in the development of the Disaster Risk Management Plan. Urbino will therefore have to further share the activities and the actions developed during the ITC Course; structural and non structural mitigation measures drawn up and define a list of concrete actions and relative implementation timelines to mitigate the risk in the Historic Center in agreement with all the subject involved.

Based on this experience, the same line of action can be developed for the buffer zone and then applied to the environmental context of the City, characterized by natural green areas.

Fig. 9 Development lines defined during ITC course

References

1) The criteria for the inscription of the Historic Centre of Urbino are also available at the following links:
   http://whc.unesco.org/en/list/828
   http://www.sitiunesco.it/urbino-il-centro-storico.html
   http://www.rivistasitiunesco.it/sito.php?id_sito=30
2) World Heritage Property Historic Center of Urbino Management Plan 2013.12.03
3) Retrospective Statement of Outstanding Universal Value Historic Centre of Urbino (Italy, 828)
4) World Heritage Cities Programme - examples of management practices, events, and activities related to World Heritage and historic cities. The collected case studies: https://whc.unesco.org/en/canopy/urbino/
5) World Heritage Cities Programme: https://whc.unesco.org/en/canopy/urbino/

Note:

The source of all the figures and tables is from author, municipaliry of Urbino.

2.9 Fort Jesus World Heritage Site – Mombasa, Kenya

Raphael Shem Igombo *Head of Education and Public programs*
Fort Jesus, National museums of Kenya
Mombasa, Kenya.

Introduction

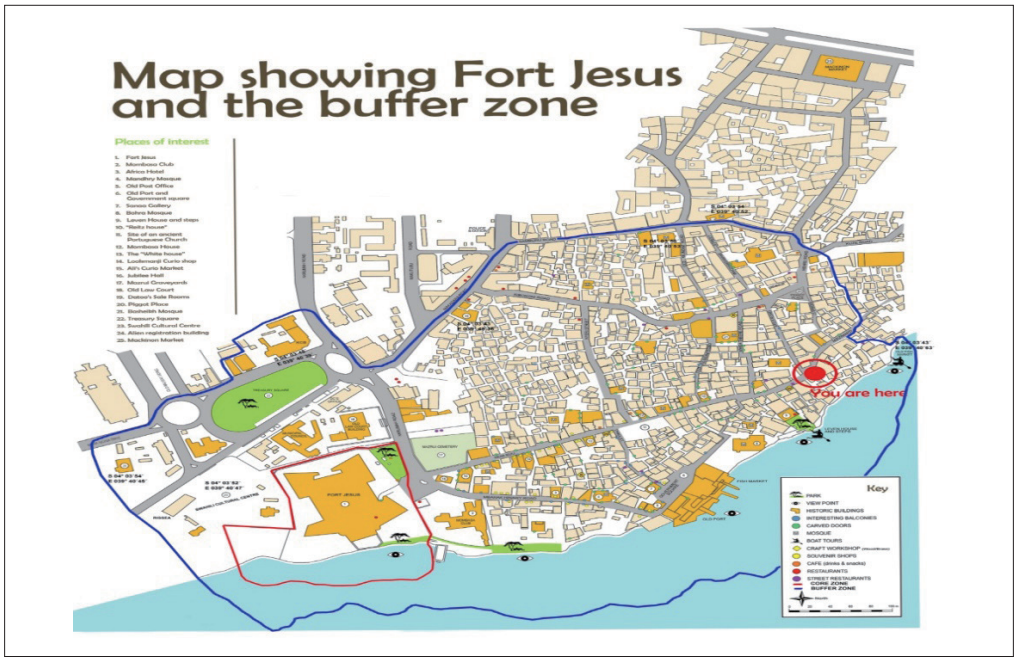
In recent years there have been frequent reports of large-scale disasters across the world. In addition to causing enormous loss of life and property, these disasters have caused widespread damage to the cultural heritage in many countries. Kenya like many other countries in the world is experiencing an increase in the frequency and severity of disasters. The potential losses due to disasters are set to increase as the impact of climate change continues to unfold. The most common disasters in Kenya include but are not limited to drought, floods, an outbreak of diseases, and the most recent threat of terrorism. These have had adverse effects on the communities, the economy, infrastructure, and the environment, as well as potentially on the cultural heritage of our nation.

It is essential to take proactive measures to reduce risks to cultural heritage from these catastrophic events through adequate mitigation and preparedness. Thus, developing a disaster risk management strategy for cultural heritage is of paramount importance within the overall planning and management frameworks. The ITC training course thatparticipants were involved in for seven weeks online has really informed me of the best way to mitigate the issue of risks that loom in our cultural heritage sites in the world.

Disaster Management is a continuous and integrated multi-sectoral and multi-disciplinary process of planning and implementation of measures aimed at Disaster prevention – mitigation, preparedness, response, recovery, and rehabilitation (Knysna Municipality, Disaster Management Act 2007)

The Disaster Management Plan ensures preparedness and effective response by the Fort Jesus management in particular, and National Museums of Kenya in general, in the event of a disaster. Comprehensive disaster risk management plans need to be formulated based on the specific characteristics of cultural heritage and the nature of hazards within a regional context. These plans should take into account the principles of risk management, response to historic, aesthetic, and other values of cultural heritage, and, at the same time, address greater urban development challenges.

In the case of Fort Jesus world heritage site, there is a need for a plan because currently there does not exist any. My initiatives will be to ensure the required steps to be in place because Disaster Risk Management is and will always be everybody's business on the site. (Fort Jesus is located in the city of Mombasa on the East coast of Kenya. It is located between latitude 3 S 55° - 4 S 10° and Longitude 39 E 35° - 39 E 45°)



Historical background of Fort Jesus

Fort Jesus, Mombasa is located in the city of Mombasa on the east coast of Kenya. Mombasa is one of the oldest port cities on the coast of East Africa and was re-known for its beautiful architecture as recorded by the great Arab traveler Ibn Battuta in 1331 A D. Located in the middle of the western Indian sea coast, Mombasa occupied a strategic location as trade and military matters were concerned in the western Indian Ocean. It became a major trade port used by traders from Asia, Arabia, and the East for exotic and other goods. Mombasa, therefore, attracted the attention of powers that wanted to have a share of the Indian Ocean trade and the Portuguese were not an exception. To control this part of the world and the trade routes to Asia, they decided to build a fort in Mombasa.

The East African Coast between Somalia and Mozambique had for centuries been inhabited by people of various backgrounds. Most of the Bantu-speaking groups that arrived in the area between A.D. 500 and 800 have come from the south. By about A.D. 1000, they had been joined by Arabs who came from Asia to settle along with the coastal areas of East Africa. Independent city-states such as Lamu, Mombasa, Malindi, Pemba, Kilwa, and Zanzibar flourished along the coast. These Coastal settlements traded in gold, silk, ivo-

ry, and skins with traders from as far as Persia, Arabia, Syria, India, and even China. Some of the settlements grew more powerful than others.

The difference in wealth and the resultant competition for control of the trade led to rivalries and even wars. For a long time, Kilwa was the most important and most prosperous settlement on the coast. However, by 1490, its prosperity had begun to decline and was slowly giving way to Mombasa. Mombasa was founded about the same time as a rival settlement of Malindi, further north and prosperity of Mombasa brought fierce rivalries between it and city-states including Malindi, Lamu, and Pate.

Before the coming of the Portuguese however, a number of foreigners had entrenched themselves at the coast and were actively involved with the local people in the trans-Indian Ocean trade. The Portuguese had to break into the market and compete with these already established groups such as the Oman Arabs. This involved confrontations and ruthless takeovers of towns such as Mombasa and Kilwa that offered open resentment and unwillingness to pay tribute to Portugal. By 1509, the Portuguese had managed to take control of the area between Sofala, in Mozambique in the south and Socrata in the northern part of the East African coast.

In order to consolidate their hold on the coast, the Portuguese Captain to the Coast, Mateus Mendes de Vasconcelos, then based at Malindi, was instructed to take his fleet to Mombasa and build a fortress. Initially Portuguese recaptured Ras Serani Fort rehabilitated it and renamed it Fort St. Joseph but this was not strategically positioned in relation to the harbour. Therefore in 1593, the Portuguese began to build a fortress in Mombasa at its present location that was to be called Fort Jesus, Mombasa. Fort Jesus, Mombasa became the new Portuguese Headquarters on the East African Coast and had a permanent garrison of a hundred soldiers.

Towards the end of the 16th century, English and Dutch joined the competition for control of the Indian Ocean trade. The Portuguese with limited men and ships began to find it impossible to keep a check on their Arab and Turkish enemies while at the same time having to watch for rival English and Dutch ships.

The defeat of the Portuguese left the Omani Arabs in charge of the coastal settlements until the area was colonized by the British in 1885. Once under British rule, the fort was used as a prison until 1958 when it was declared a National Park, subsequently becoming a national monument and a museum. It still serves this function to date.

Disaster risk management plan for the Fort Jesus

Objectives

The general purpose of this risk management plan is to identify potential risks to the property before they occur so that risk-handling activities are planned and invoked as needed across the life of the product or project so as to mitigate adverse impacts on the property.

Effective risk management includes early and aggressive risk identification through the collaboration and involvement of relevant stakeholders. Strong leadership across all relevant stakeholders is needed to establish an environment for the free and open disclosure and discussion of risk.

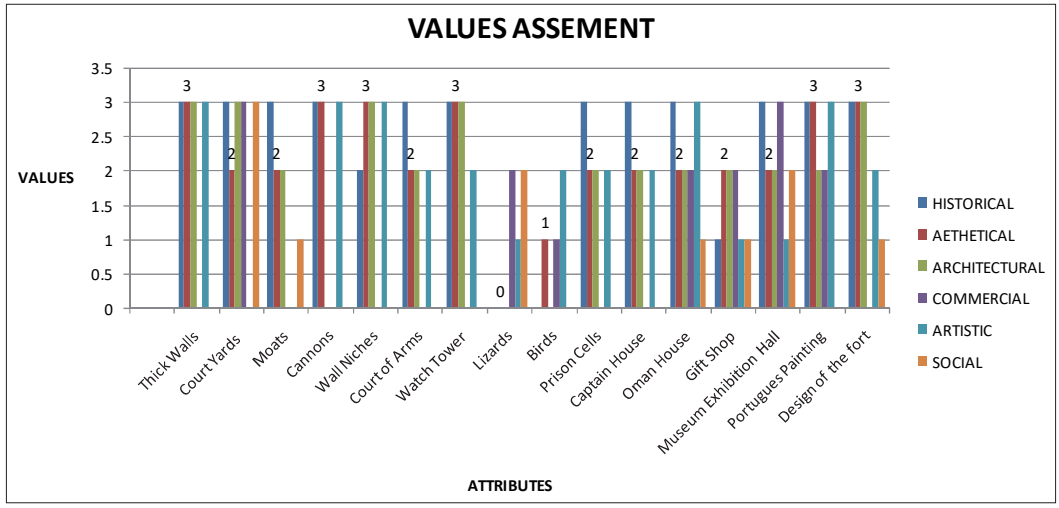
Specific objectives are:

1. To identify and prioritize potential risk events in and around Fort Jesus
2. To provide guidance towards rapid and timely disaster prevention, preparedness, response, and recovery

3. The Plan will be a guide in planning for other World heritage sites in the Coastal and others ones in Kenya.
4. To enhance the capacity of the Fort Jesus management to take precautionary measures and to reduce the impact of the disaster if and when they occur.
5. The Disaster Management Plan shall be used as a source of information to guide other stakeholders in similar situations.

Assessment and Values of the Sites Attributes

At the Fort Jesus World heritage site, most of its Sites attributes and Values are mainly Historical, Aesthetical, and Architectural. Few sites attributes are Commercial, Social, and Artistic which does not contribute much to the sites.



Threats/Hazards

Threats/ hazards (catastrophic and slow) are the physical, social, attitudinal vulnerabilities as well as the capacities and strengths:

The following is the list of the threats and hazards:

- Sea Rise/erosion and Strong winds
- Climate change
- Fire
- Terrorism
- Collapsing of Buildings (Old Town)
- Floods
- Ethnic Violence
- Mass tourism

Worst Case Scenario

In this case study, fire is the worst case scenario for the site because there is no plan in the case of Fire. A restaurant now operates in the fort with a kitchen inside which uses gas for food preparation. The possibility of starting a fire is too high because of the wooden items and thatched roof entrance at the ticket stamping area which is inflammable.

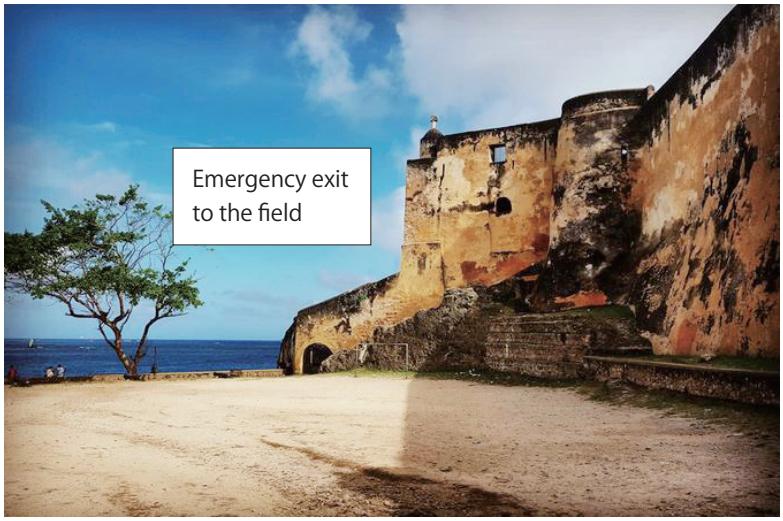
The other fire risk is from the night sound and light show (Fort Jesus enchanting experience show) that starts at 6:30 pm when all the staff have left the fort and remain a few security officers to man the gates. The climax of the show is fireworks that are planted outside the fort but some are also placed on the walls

of the fort. A 100 KV generator is used for the powering of the lesser lights projection and is also situated in the fort just nearby the restaurant. This is also a risk in case it explodes and causes panic among visitors and staff in the Fort.

The sound and light show climax is the fireworks and the show is powered by a generator.

Emergency preparedness measures

The evacuation plan would be the exit after the passage of the arches which leads to the football pitch overlooking the sea. Visitors and staffs can be assembled at the pitch awaiting more instruction for evacuation to a safer place. The objects from the main gallery and the Omani house shall be assembled at the courtyard just in front of the main gallery and the Mazrui hall that also has objects displayed. This is an open area which will allow proper movement of the objects to a safer room outside the fort. The conservation store is in a basement under the administration office and can also be used to secure objects from the Galleries due to its locality in the event of a fire. There is only one entrance to the Fort hence the need to open up the blocked passages.



The playing field can be very safe for evacuation and the open courtyard would ideal for objects before they are taken to the conservation store in the post-recovery measures.

Conclusion:

The short Paper has outlined the steps I would take for risk assessment in our cultural sites similar to Fort Jesus and other important structures in the town. The methodology is key in terms of reducing and preparing for any hazards that might happen in the cultural heritage site. Considering the complexity of heritage sites both in terms of their values and their qualifiers (authenticity and integrity) this is a very important task though quite challenging.

It is quite important that we develop a practical tool that can be used in analyzing and assessing the probability of risks and prioritizing risk mitigation measures especially taking into account costing factors versus benefits.

Acknowledgement

I wish to acknowledge the knowledge and skills that I have acquired in the training and thank the ITC training team of lecturers and my colleague participants for motivation. I also thank my family and my organization for allowing me time to undergo the training with ease. I also acknowledge my mentor who made me understand a lot of aspects of the course. We thank god for his mighty strength and love.

References:

1) Kirkman, J (1974): *Fort Jesus A Portuguese Fortress on the East African Coast*. Oxford University Press
2) Republic of Kenya (2011); *Fort Jesus Nomination Dossier*. Fort Jesus, Mombasa
3) Knysna Municipality, Disaster Management Act 2007
4) American Institute of conservation of historic and Artistic works (AIC), commentary 20: preventive conservation , commentaries to guidelines for the practice of the AIC; http://aic/stanford.edu

2.10 Disaster Risk Management Case Study for the Heritage Town of Taal, Batangas – Philippines

Richard Hael – BAULA *Conservator, Materials Research Conservation Division*
National Historical Commission of the Philippines

1. INTRODUCTION

The Philippines is located in the Southeast Asian region: facing the vast Pacific Ocean with no natural barriers from typhoons and tsunamis, it is also located within the Pacific Ring of Fire, an area with active trenches and volcanoes. South of the capital Manila around 115 km is the historic and culturally significant town of Taal in the province of Batangas. It has a population of 56,327 from the 2015 survey, with equal distribution of males and females. The population is concentrated at the town center, while the rest is distributed on fertile land depending on the livelihood of fishing, farming, and backyard industries. Tourism and related activities are the main sources of revenue of the town.

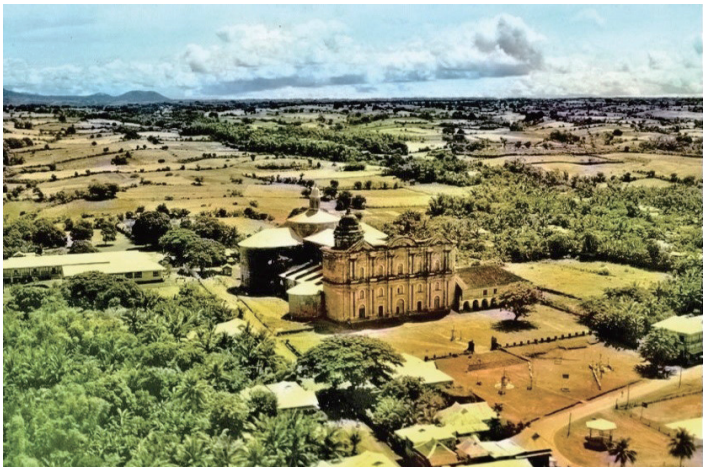


Fig. 1 Town of Taal, Batangas
Source: https://taal.ph/history-culture/

The historical town center has a dense concentration of ancestral houses exhibiting colonial Spanish and American Periodstyles of architecture and has an area of only about 32 hectares. The town was once nominated in UNESCO World Heritage List in 1987 although it has yet to achieve that distinction. The houses are located within a designated Heritage Zone, with core and buffer zone, and were consequently declared a National Historic Landmark in 1987 and protected by the state laws to help strengthen the preservation and protection of the town. Two main cultural agencies of the country were mandated by the government to continually mark, recognize, maintain, protect and preserve these assets: the National Museum of the Philippines and the National Historical Commission of the Philippines.

2. HERITAGE ATTRIBUTES AND VALUES

Outstanding Universal Values

In a cultural mapping done in the town, there exist a total of 142 old ancestral houses with outstanding value historically, architecturally, culturally, among others. Most of these houses are in excellent condition, with some adaptively reused as commercial establishments, hotels or inns, museums, or government offices. Eleven of these structures were marked as National Historic Landmark, Monument, or Important Cultural Properties. Six main attributes are synonymous with the town:

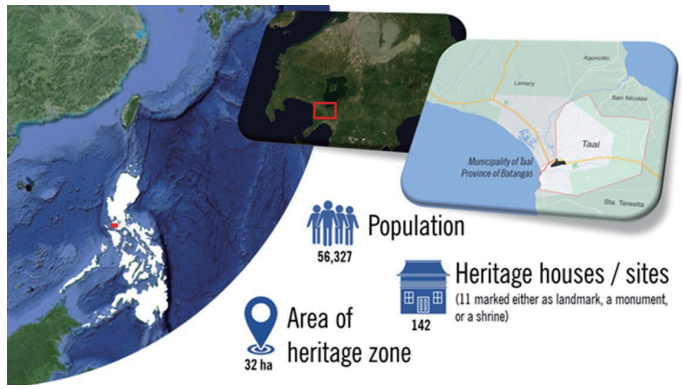


Fig. 2 Location of Taal in the Philippines
Source: Google Earth

1. Taal is the hometown of prominent historical personages who have contributed to the enrichment of Philippine cultural, political, social, and historical legacy;
2. Aside from historical significance, the town also reflects architectural importance, with houses depicting local aesthetic values of their builders and owners;
3. Taal has retained its colonial-era ambiance, with old houses and churches still well-preserved after centuries of existence and need to be safeguarded and preserved for the promotion of Filipino culture and history, as well as tourism;
4. The unique architectural features of Taal houses have been adapted by designers and builders, and transported to other provinces in the Philippines, and thereby making a significant contribution to the "*bahay na bato*"[1] architecture in the Philippines;
5. The magnificent church of Taal, known as the Basilica of St. Martin of Tours, is the largest Catholic church in Asia, which has withstood time and the elements for more than a century. It also reflects the religiosity of the people that serve as a cohesive soul of the town and a known pilgrim site.
6. Taal is well-known for its indigenous and traditional home industries including "Barong Tagalog"[2] makings and embroidery, metal crafts, and local delicacies which have made the town famous and tourism-magnet.

The town of Taal, because of its uniqueness in physical, historical, and cultural attributes, is outstanding among typical Philippine towns. A resolution declaring a portion of Taal into a National Historic Landmark by the government is complemented with the set of rules and regulations which govern the exercise of planning, restoration, and regulatory functions in its preservation. Today, this set of policies are further strengthened with the passage of Republic Act No. 10066 or the National Cultural Heritage Act of 2009 and consequently, the local government of Taal adoptedly passed a municipal ordinance in accordance with it.

Fig. 3 Vicinity map of the heritage center/town of Taal
Source: by the Author

Tab. 1 Attributes and Values

ATTRIBUTES	TYPE OF ATTRIBUTES	VALUES
Hometown of many imminent Filipinos in history	• Intangible • Town identity	• Historical • Economic • Educational • Cultural • Societal
Architectural importance colonial houses of Spanish and American style mixed with indigenous materials and style	• Tangible • Visible • Immovable	• Historical • Social • Educational • Architectural • Cultural • Authenticity • Artistic
Time period ambiance; economic driver as tourist attraction; heritage promotion	• Tangible • Visible • Both movable and immovable	• Historical • Social • Educational • Cultural • Societal • Economic
Basilica of St. Martin of Tours, largest Catholic church in Asia; religious center of the town; pilgrim site	• Both tangible and intangible • Town identity • Visible • Immovable	• Historical • Social • Religious • Architectural • Cultural • Economic
Well-known for native delicacies and home industries like metal smith and embroidery and local festival, tourist magnet	• Both tangible and intangible • Town identity • Visible	• Social • Religious • Cultural • Economic

Fig. 4 Ancestral "*bahay na bato*", houses typical in Taal
Source: National Historical Commission of the Philippines

3. RISKS ANALYSIS

One of the many hazards that challenge the town of Taal is its proximity to one of the most active volcanoes in the country, which is its namesake, Taal Volcano. The whole town had already relocated thrice since its foundation mainly due to volcanic activity and the risks that come with it. The present town of Taal is now located further from the lake but is not necessarily safe since it is still within the 17-km radius 'danger zone'. Volcanic earthquake, ash/tephra fall, at times very dense, and base surge are major hazards that the town faces whenever the volcano become restive. Landslide and ground deformation including fissuring and subsidence are hazards indirectly associated with a volcanic eruption. On a very regular basis, flooding in area relative to sea and frequency of destructive typhoons are also of major concern. Aside from natural hazards, human-induced activities left unmonitored could lead to disasters. The vulnerabilities of structures to fire, thief or burglary, lack of maintenance, and negative impact of urban developments are some of the ever-present threats that needed to be addressed.

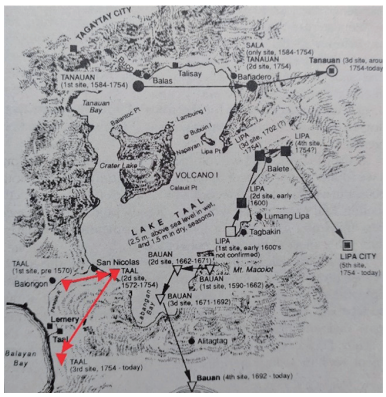
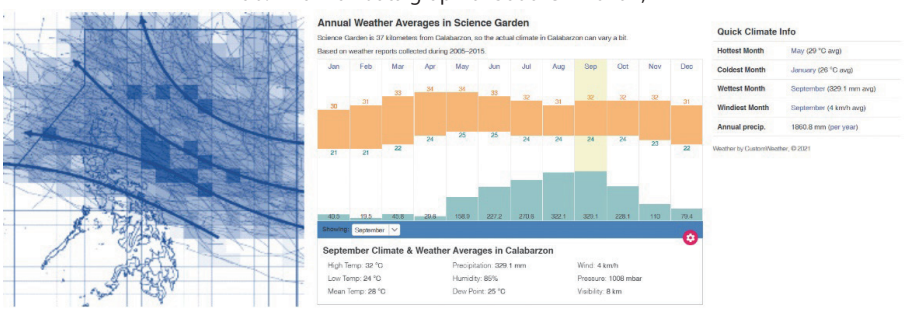


Fig. 5 Relocation of various towns around the periphery of Taal volcano
Source: The Mysteries of Taal by Thomas Hargrove

Tab. 2 Rainfall data graph of Southern Luzon, PH



Source: https://www.timeanddate.com/weather/@7521303/climate

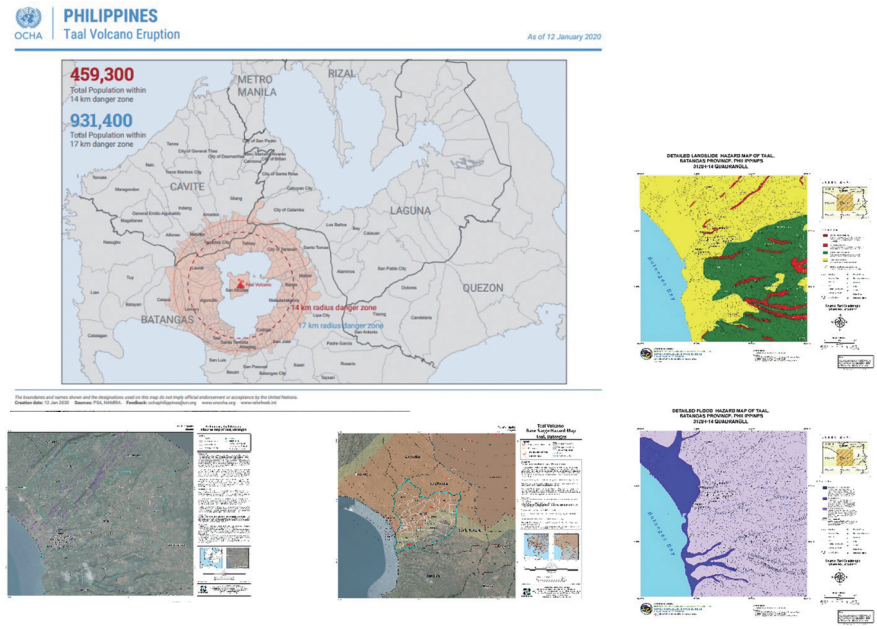


Fig. 6 Micro-hazard zonation maps
Source: UN OCHA, PHIVOLCS, Mines and Geosciences Bureau-PH

(1) Worst Case Scenario

Taal volcano had erupted 42 times since first documented in 1572. The historical record shows activity characterized a mild phreatomagmatic eruption to very violent, full-scale intensity that can destroy structures and bury the whole town in ash and stone. One particular year is 1574, when the volcanic eruption activity lasted for 6 months, displacing several towns, including Taal. One of the most violent and destructive is 1911 where almost 1,400 died in a matter of days of continued activities.

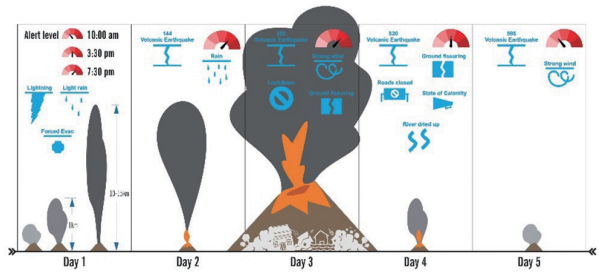
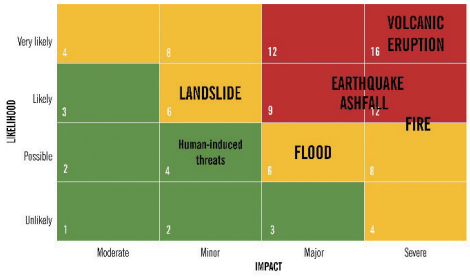


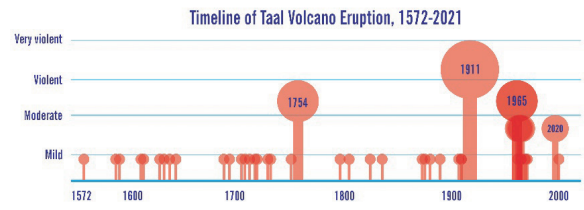
Fig. 7 Worst case scenario in the event of a volcanic eruption
Source: by the Author

In the 1965 eruption, million cubic meters of materials were expelled, blanketing towns in thick meters of ash. The most recent activities happened in January 2020 (right before the worldwide pandemic crisis) and in the middle of 2021, from which the worst-case scenario of a volcanic eruption was drawn.

Tab. 3 Risk matrix



Tab. 4 Historical eruption of Taal Volcano

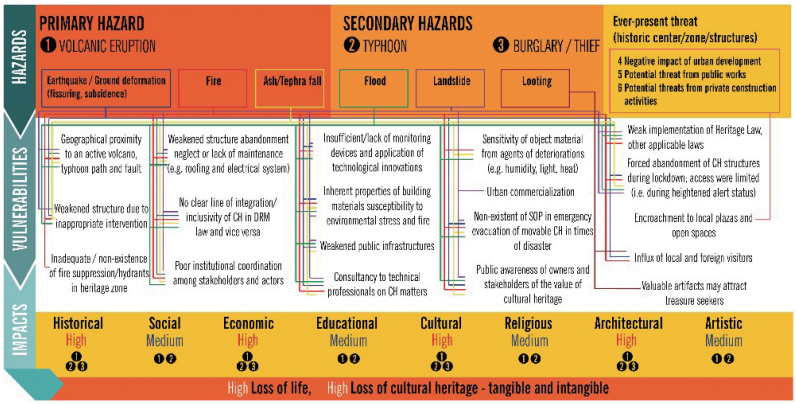


(2) Inter-Relationships Between Hazards/Threats, Vulnerabilities and Impacts

In risk analysis with information gathered from hazard maps from government agencies, literature, interviews, written histories, and documents, volcanic eruption and its resulting consequences stood out as the primary hazard to the town. Although not directly vulnerable to eruption, earthquake, fire, and ash fall are the hazards that have a direct impact especially on the social and economic aspect. Further complications may have a greater result if it is complemented with the effects from secondary hazards like typhoon, which has become stronger in intensities in recent years.

Under the circumstance of a raised alert level on the volcano, the town of Taal immediately became under the danger zone limit. Whenever this happened, all aspects of human life and activities halt, and everyone is mandatorily evacuated. People are moved out for safety and their very means of livelihood, and even their homes and properties became imperil. In the aspect of heritage properties, it became subject to a greater risk of destruction by the primary and secondary impacts of volcanic activities.

Tab. 5 Hazards, Vulnerabilities and Impacts Analysis



4. MITIGATION MEASURES

Mitigating measures were grouped into three: Strategic/Institutional, Technical, and Management/ Planning. This would fan out into different mitigation measures that will strengthen the sector of cultural heritage, the cultural institutions down to grassroots like owners and museums, by carrying out platforms

Tab. 6 Mitigation Measures

Mitigation Level	Measures Policy, Planning, Technical, Maintenance, Monitoring	Scale of Intervention and actors Level and stakeholders	Target Vulnerabilities and risks	Duration S / M / L / Periodic	Estimated cost L / M / H
Strategic / Institutional	Capacity building or maintenance, monitoring and documentation of heritage assets (tangible and intangible, movable and immovable)	• Owners of heritage houses and public structures • Cultural agencies (Cultural mapping)	Storage, security and documentation	Short term with periodic measure	Low
	• Introduction and drill on using fire suppression equipment • Mapping of possible location and installation of fire hydrants	• Owners of heritage structures • City level and Local Fire Bureau	Inadequacy / lack of fire suppression hydrants in town	Short	Medium
	Integration of DRM in programs of CH, and vice versa	National level and Cultural sector	Concept of DRM in CH and vice versa	Medium to long	High
	Mapping, line of communication between key stakeholders and actors	Owners and cultural sectors with concern agencies	Institutional coordination of stakeholders	Short	Low
	Introduction of importance of DRM plan	Owners and cultural sectors with concern agencies	Non-existent of SOP in emergency evacuation of CH	Short	Low
	Awareness program and integration of valuation	Owners and cultural sectors	Public awareness on the value of CH	Short	Low
Technical	Structural retrofitting and restoration of old houses especially the roofing and trusses, windows and point of entries	• Owners • City level (programs in terms of local gov't units • National level (marked sites of national importance (National Cultural Treasures, Historical Landmarks	• Collapse of structures/tenc in • Slow and progressive effects of ash on heritage objects	Medium to Long period	High
	Consultancy with appropriate heritage professions	Owners with CH professionals	Weakened structure due to inappropriate intervention	Medium to Long period	High
	Application of appropriate monitoring innovations	Owners	Insufficiency or lack of monitoring devices and application of technological innovations	Short	High
	Selecting, compatible and safe building materials	Owners with CH professionals	Susceptibility of building materials	Short	Medium
	Retrofitting and rehabilitation of public infrastructures	• City level • Provincial level	Weakened public infrastructures	Medium	High
Management / Planning	Open communication line between stakeholders and actors	• City level (Taal Heritage Conservation and Heritage Code) • National level (Heritage Act of 2009 / R.A. 10066)	Consultancy to technical professionals on CH matters	Medium period	Medium
	Seek State funding grant for restoration and rehabilitation	Owners, supported by heritage groups and local gov't	Weakened structure due to neglect, abandonment or lack of maintenance	Medium to long period	High
	Strict implementation of national laws and ordinances on cultural heritage and other guidelines on conservation of CH	• City level (Taal Heritage Conservation and Heritage Code) • National level (Heritage Act of 2009 / R.A. 10066)	Urban commercialization	Short	High

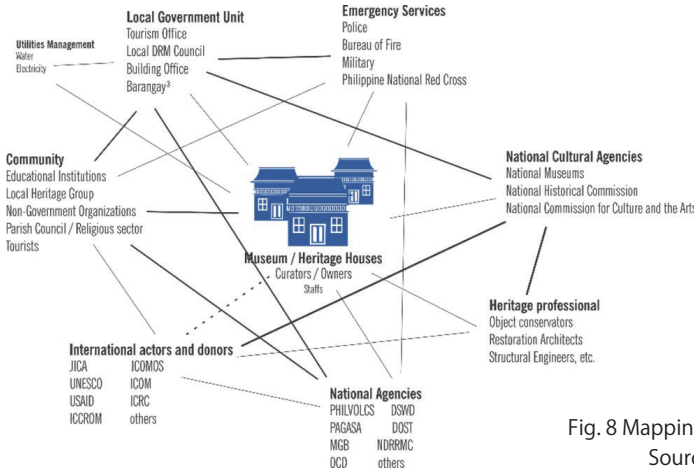


Fig. 8 Mapping stakeholders and actors
Source: by the Author

and innovations in policies, management, and planning, monitoring and maintenance, technical aspects such as conservation works, documentation, capacity building in terms of training workshops, hazard drills and awareness and public consultation and networking.

5. EMERGENCY PREPAREDNESS AND RESPONSE

- Emergency stabilization of structure to ensure the safety of users and workers and of the building itself.
- Development of master plan that provides programs and projects aimed at recovery. It should be adapted to the availability of existing facilities and resources (traditional and contemporary, including materials available on the market, skills of local workers, local building techniques, among others).
- Permanent maintenance which is essential for the long life, and function of the structure and collections that are housed within. This includes staff training, suitable equipment, and appropriate method and materials with the application of conservation principles.

With these priorities, the guidelines for actions plans will be laid out for the short, medium, and long term. Among these are:

Short:

- Damage assessment and mapping of structure and objects
- Evaluate the condition of cultural properties
- Restore utilities
- Conduct post-disaster evacuation
- Engage and coordinate stakeholders, volunteers, cultural workers

Medium

- Set up linkages
- Capability building on conservation works
- Promote DRM concept, especially on prevention, mitigation, preparedness and emergency response
- Fundraising and community involvement

Long

- Integrate DRM in policymaking
- Monitor and assess plan on a regular basis

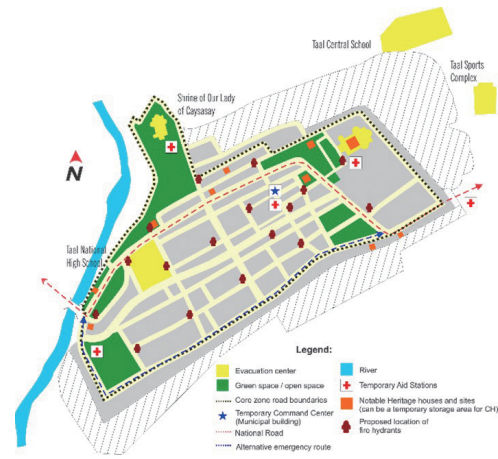


Fig. 9 Evacuation plan
Source: by the Author

6. CONCLUSION

The State passed in 2009 a law that helps the government in setting guidelines and policies for identification, recognition, preservation and conservation of the various historic sites and structures in the Philippines to effectively implement Republic Act No. 10066 or the National Cultural Heritage Act of 2009. On the other hand, in 2010, the National Disaster Risk Reduction and Management Law was also passed, strengthening the framework for National DRRM Plan. The Plan for 2020-2030 is said to be more inclusive of all stakeholders and actors, including the sector of cultural heritage. With this, establishing important linkages with stakeholders is vital as all plans relative to disaster risk management need to be properly coordinated and integrated within various stakeholders and actors at every level possible. This includes, but is not limited to, government agencies responsible for civil and property protection, cultural agencies, non-government organizations, and private owners, as well as international organizations.

The concept of disaster risk management in the context of cultural heritage and vice versa is relatively new, yet the need to have a comprehensive and inclusive plan of the integration of the two is now widely recognized and accepted. Culture and heritage represent the national patrimony of the nation, and its very soul and its preservation and care lie in the hands of every citizen of the country. This can be done through community-based DRM planning, backed with evidence-based and progressive vulnerability reduction strategies and aligned with the sustainable development agenda of the country.

ACKNOWLEDGMENT

Acknowledgment is extended to my colleagues in the National Historical Commission of the Philippines especially to the Materials Research Conservation Division, the Historic Preservation Division, and the Serafin D. Quiason Resource Center from where much of the resources in this study came from. I would also like to thank our curators and guides in the two museums located in the town of Taal, Batangas for helping me get linked with resource persons. Finally, I humbly thank everyone from this Course: participants, presenters/lecturers, mentors, and organizers for the wonderful one and a half month that we are together, appreciating the learnings, recognizing the challenges, and sharing experiences from different perspectives and different countries around the world.

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17) National Risk Reduction and Management Plan 2020-2030, National Disaster Risk Reduction and Management Council (NDRRMC)

Notes:

[1] House typical of stone/clay brick and plaster materials for lower floor and wood for second floor, with clay roof.

[2] Made from finest plant fibers, meticulously handcrafted and considered to be a national dress

[3] Smallest unit of government

2.11 Disaster Risk Management Draft Plan for the Historic Core of Split with Diocletian's Palace

Vinka Marinković *Conservator-restorer, Croatian Conservation Institute*

1. Introduction

Located on the Adriatic coast, on a peninsula covering an area of about 79km^2, the city of Split is the second-largest city in Croatia and, according to the 2011 census, home to 178,192 people (the population density of its inhabited area is 2,255 people per km^2)[2]. Historically, the economy of the city and the surrounding area were based on agriculture, fishing industry, trade, extraction of stone, and masonry. At the end of the 19th century and in the 20th century, there was a booming shipbuilding and cement industry. Unfortunately, in the last couple of decades, all of these activities and industries have been in the decline, while tourism has become the main engine for the regional economy.

Fig.1 Diocletian's palace, present state
Source: Ivo Pervan

Fig. 2 Diocletian's palace, reconstruction of original state
Source: E. Hèbrard (1912)

The city of Split is an important heritage area, with several intertwining historic and urban layers which make it a complex site of outstanding importance. In 1979, the historic core of the city with Emperor Diocletian's palace was inscribed on the UNESCO World Heritage List.

The focus of the present short study, whose goal is to create a framework DRM plan for the historic centre of Split, is on its oldest part – the area occupied by the former Diocletian's palace[1], as it is the city's most exposed and vulnerable section. Namely, the majority of buildings in the palace are historic structures which are not earthquake resistant. Also, we are talking about a very small area with a high concentration of cultural heritage property here.

2. Diocletian's Palace: General Character, Heritage Attributes, and Values

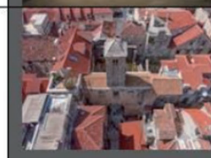
Fig.3 Historic core of Split, protected zone and heritage assets
Source: L. Petrić, 2015.

Diocletian's place in Split was built between the end of the 3rd century and the beginning of the 4th centuries AD, as a private residence of the retired Augustus and founder of the tetrarchy, Diocletian[2]. In later times, the well-preserved remnants of the former Roman palace served as the basis for the development of a medieval commune that gradually grew into the centre of a modern city, in which people live and work. The palace extends over an area of 20.8 hectares, enclosed by tall classical walls. The palace's narrow streets are reserved for pedestrian-only use.

According to the 2011population census, 2,320 people still live inside the palace perimeter. A recent demographic and sociological survey has shown that they are middle-old age persons living in average-income households.[3] The space inside the palace has different stakeholders, including the state, the city, the Catholic church, other religious communities, as well as local and business entities.

In Diocletian's palace, there are three museums: the City Museum of Split, which operates at three locations, the Ethnographic Museum, and the Treasury of Split Cathedral (church collection). Their valuable collections are housed in historic buildings. Although it is difficult to differentiate and enumerate all the features, attributes, and values of Diocletian's palace, Table 1 gives a list of those which are considered as of primary importance.

Tab. 1 The selected list of attributes

ATTRIBUTES	VALUES	VULNERABILITY TO HAZARDS	PICTURE
Cathedral of Saint Dominos/Mausoleum of the Roman Emperor The presence of collections or movable heritage: Yes	Historical Architectural Religious Associational Artistic	Earthquake (HIGH) Fire (HIGH) Vandalism (HIGH)	
The Substructures of Diocletian's palace The presence of collections or movable heritage: Yes	Historical Architectural	Earthquake (HIGH) Rise of sea level (LOW) Floods (MEDIUM)	
Architectural complex: Western Gate of Diocletian's palace and Church of Our Lady of the Bell Tower The presence of collections or movable heritage: Yes	Historical Architectural Cultural/social Religious Artistic	Earthquake (HIGH) Fire (MEDIUM) Vandalism (LOW)	
Split City Museum / the Papalić Palace The presence of collections or movable heritage: Yes	Historical Architectural Artistic	Earthquake(MEDIUM) Fire (HIGH) Floods (LOW)	

Source: by author.

3. Hazard and Vulnerability Analysis

The city of Split, including Diocletian's palace, is classified as a high risk zone. This means that it is at risk of earthquakes, floods, and fire. Inrecent years, a series of such unwanted events have been recorded, as illustrated in Table 2.

Tab. 2 Recently recorder hazards in the area of Diocletian's Palace

FIRE	EARTHQUAKE	HEAVY RAIN
17 July 2017	9 December 2016 (**4,7 Mw**)	23 July 2011
25 June 2019	17 February 2020	7 October 2018
18 July 2019	16 September 2020 (**2,4 Mw**)	13 November 2019
26 July 2019	29 March 2021 (**3,0 Mw**)	20 November 2019
3 August 2019	6 October 2021 (**4,6 Mw**)	4 November 2019
3 August 2020		4 December 2020
		3 March 2021

Source: by author.

Tab. 3 Number of the tourists in August per year

Year	Number of tourists (August)
2017	536,766
2018	622,393
2019	659,366
2020	315,024

Source: by author.

Earthquakes are relatively frequent there, although so far they haven't caused larger damage. The past decade has seen an increase in floods due to heavy rain and the rising sea level. Apart from making it difficult

for the city to function normally, the water threatens the substructure (cellars) of the palace and the neglected buildings, including roof frames. For example, at the beginning of 2021, due to heavy rain, a run-down roof collapsed, causing significant material damage[4].

Tab. 4 Detailed correlation between hazard, vulnerability and the ensuing effects

HAZARDS	VULNERABILITIES	IMPACTS
EARTQUAKE (high probability) **FIRE** (medium probability) **FLOODS** (medium probability) **HEAVY RAINFALL** (high probability) **RISE OF THE SEA LEVEL** (medium probability) **LANDSLIDES** (high probability; impact on wider area of city)	**Social system** - No DRM plan -Shared (private) ownership of properties -Lack of risk preparedness of local people, government and attribute staff - Distrust in authority **Heritage** - No DRM plan - Sensitivity of material - Lack of earthquake-resistant design - Lack of maintenance - Narrow roads, presence of steep slopes and stairs - Old infrastructure - Visitors	**On people and social system** - Loss of lives - Loss of economic activities (cultural and touristic) - Loss of livelihood - Collapse of historical buildings and loss of heritage attributes -Displacement of residents **On heritage** -Loss of the authenticity value -Loss of the heritage attribute -Damage to historical buildings -Damage to museum collections

Source: by author.

If closer attention is paid to the data presented in Table 2, it can be noticed that fires occur more often in summer, which is logical. Yet, it is interesting to observe that in 2019, in a very short time (one and a half months) as many as four fires broke out at the centre of the palace. Considering other data, e.g., number of tourists per month (Table 3), it can be concluded that the number of fires is correlated not only to the rise in atmospheric temperature but also to the number of tourists (in summer 2019 the overnight stays reached a record number). It has also been observed that with the increase in the number of tourists, the number of people living in the old city core drops (e.g., in 1980 the palace had 4,000 inhabitants, in 2001 3,235 and by 2011 their number fell to 2,320). The exodus of residents has reduced the need for traditional activities in the palace and has led to the abandonment of single spaces (especially those with safeguarded purposes). The abandonment of spaces is typical of properties without a clear title, and it has led to non-maintenance which makes the complex of Diocletian's palace vulnerable to all sorts of hazards[5]. A detailed correlation between hazard, vulnerability and the ensuing effects are shown in Table 4.

4. Developing a Disaster Scenario

The unwanted events relevant to potential hazards include the situation as follows: A destructive earthquake strikes; the hypothetic time is July, Saturday, 9:00 AM. The narrow streets of Diocletian's palace are crowded with tourists who are sightseeing, breakfasting and taking coffee at the numerous food and drink facilities. The local residents are walking by, using the green market – fish market route (the very heart of Diocletian's palace). The earthquake damages historic structures. The non-maintained roof frames collapse. People are injured, and the main access streets are blocked and impassable. The earthquake causes fire breaking out in one of the food and drink facilities (2nd hazard). The situation gets complicated as the ambulance crews and the fire brigade enter the centre of the palace only with difficulty. The hydrants are in function, but they are underground and covered with debris, which causes additional problems to the firefighters in extinguishing the fire. There is panic in the streets. Irresponsible individuals profit from the situation and there is a danger of theft of private property, museum collections, etc., taking place (3rd hazard).

The outcomes of such a scenario can be:

- loss of lives,
- loss of economic activities (cultural and touristic),
- loss of livelihood,
- the collapse of historical buildings and loss of heritage attributes,
- loss of authenticity value,
- damage to museum collections.

5. Mitigation Measures

In order to avoid or mitigate the consequences of the above-described scenario, some measures can be taken (see Table 5). The creation of the disaster response policy and disaster response planning are time-consuming activities that should be done on the State level. Yet, although the preparation of response measures involves hard and tedious work, and is slow, the plan should not be given up on, as the results are long-term, solid, and ultimately have a positive impact on the development of other measures such as maintenance measures.

In the case of Diocletian's palace, the maintenance measures also mean the consolidation of priority structures (particularly those located along the evacuation routes and access streets) and the maintenance of roofs, draining systems and hydrants, on a permanent basis. The cost of the majority of these preventive interventions and activities are low-to-moderate, and the results are immediate.

Measures such as education and raising awareness are very important, and their implementation should involve groups who spend significant periods of time in the old city centre: residents, tourist guides, own-

Tab. 5 Proposed Mitigation Measures

MEASURE	DESCRIPTION	SCALE	ACTORS	DURATION	COSTS	EFFECT
Policy and Planning	1) Developing management and DRM plan for the site and its attributes	City, attribute level	City and the Government	MEDIUM	MEDIUM	Connects institutions, improves risk preparedness
	2) Developing protection regulations and encouraging local crafts	The Government, City level	City and the Government	LONG	MEDIUM	Sustainability of crafts and livelihood
	3)Amending laws on shared ownership	The Government	The Government	LONG	MEDIUM	Allows better building maintenance
Maintenance	4) Consolidation of structures	City, attribute level	City, a.owners	MEDIUM	HIGH	Reduces earthquake effect
	5) Roof maintenance	City, attribute level	City, a.owners	SHORT	MEDIUM	Reduces earthquake and heavy rain effects
	6) Hydrant maintenance	City level	City, a.owners	SHORT	LOW	Reduces fire effect
	7) Drainage maintenance	City level	City, a.owners	SHORT	LOW	Reduces heavy rain and flood effects
	7) Vegetation cutting	City level	City, a.owners	SHORT	LOW	Reduces earthquake effect
Training	8) DRM drills	City, attribute level	Museum and attribute staff, locals, tourism sector employers	SHORT	LOW	Improves risk preparedness/
	9) Lectures	City, attribute level		SHORT	LOW	Connects actors and institutions
Awareness	9) Developing street signalization	City level	City	SHORT	LOW	Improves risk preparedness

Source: by author.

ers of food and drink facilities, museum staff. Considering the fact that the space of the palace is criss-crossed with narrow streets, stress should be put on the development of street signalization and the signalization of main evacuation routes.

6. Preparedness and Response Measures

In case of occurrence of a disaster, good preparedness and organization can facilitate the process of early recovery. Sites with a high concentration of cultural attributes such as Diocletian's palace require a well-defined emergency team, which includes, along with the standard rescue team (firefighters, paramedics, police, civil protection), also cultural property experts, who, apart from taking care of artworks evacuation and preliminary damage assessment, can and must act as a coordination body in the contacts with the Government when it comes to renewal priorities[6]. Fig. 6 illustrates the proposal of the expert CH team, in which the existing capacities of the State and public institutions are taken into consideration.

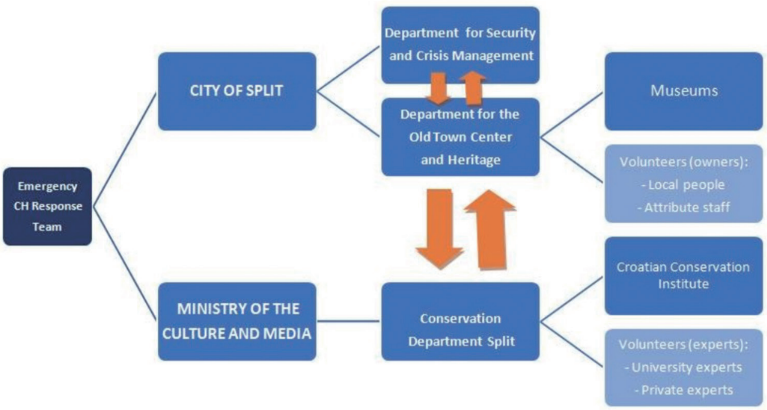


Fig.6 The proposal of the expert CH Team
Source: by author

7. Conclusion

Diocletian's palace is a specific site with a large number of users, owners and stockholders in a small area. It is an excavation site, open-air museum, and a space in which people live and work. The potential disaster wouldn't only have a bearing on the cultural heritage property but also on the quality of life of its residents. For sites like this prevention is of crucial importance. In order to mitigate the scale of the potential disaster, it is necessary to raise consciousness and to engage all the interested parties in active and systematic implementation of the protective measures.

It is the duty of owners and users to maintain their buildings, and it is a duty of the State and public services to assist them in doing that, with advice, financial support and legal regulations. In conclusion, it should be noted that the city of Split and its surroundings have been significantly impoverished in terms of economy and production in the last half-century. In the event of a disaster, this will make recovery more difficult. It is very important to note that for this reason, one should work on encouraging products and traditional crafts (e.g. stonemasonry, stone extraction).

References

1) The present study is a product of the work carried out during the 15th UNESCO Chair International Training Course (ITC) on Disaster Risk Management of Cultural Heritage, held at the Institute of Disaster Mitigation for Urban Cultural Heritage (D-MUCH), Ritsumeikan University, Kyoto, Japan. During the production of a detailed and comprehensive DRM plan, the city of Split will be considered

as a unique cultural and historic site, with all of its attributes.

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3 Appendix

List of Resource Persons

(As of 2021 October)

Yoshio NAKATANI
Chancellor,
Ritsumeikan University

Valerie MAGAR
Unit Manager, Programmes
ICCROM

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,
Ritsumeikan University
Director,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

Rohit JIGYASU
Project Manager,
Urban Heritage, Climate Change and Disaster Risk Management
Programme Unit, ICCROM

Dowon KIM
Associate Professor,
Department of Civil and Environmental Engineering,
Ritsumeikan University

Lata SHAKYA
Associate professor,
Kinugasa Research Organization,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

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

Lee BOSHER
Professor of Disaster Risk Management
Group Leader-Water Engineering and Development Center (WEDC)
School of Architecture, Building and Civil Engineering, Loughborough University

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

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

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

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

Junko FURIHATA
Chair,
Department of Conservation science,
Curatorial Division,
Kyoto National Museum

Daisuke YAMANOUCHI
Fire Prevention Division,
Kyoto City Fire Department

Aparna TANDON
Senior Programme Leader
First Aid and Resilience for Cultural Heritage in Times of Crisis | Sustaining Digital Heritage Programmes Unit
ICCROM

Yasumich MURAKAMI
Professor,
Department of Historical Heritage,
Faculty of Humanities,
Kyoto Tachibana University

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

Wesley Webb CHEEK
Senior Researcher,
Kinugasa Research Organization,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

Hirofumi IKAWA
Project Manager (Japanese secondment),
ICCROM

Tomoya INAGAKI
Specialist for Cultural Properties/ Architect,
Architecture and Other Structures Division,
Department of Cultural Properties,
Agency for Cultural Affairs, Government of Japan

Eugene JO
Programme Manager,
World Heritage Leadership,
ICCROM

Giovanni BOCCARDI
Former Chief,
Emergency Preparedness and Resporse Unit,
Culture Sector, UNESCO

Elke SELTER
Research Fellow,
Cultural Heritage,
British Institute for International and Comparative Law

Ming Chee ANG
General Manager,
George Town World Heritage Incorporated

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)

Elena MAMAMI
Project Manager,
Deputy Head of Office,
Cultural Heritage without Borders (CHwB)

Joeseph KING
Director,
Partnership and Communication,
ICCROM

Akira KANBE
Executive Director,
Community development Council, Ponto-cho

Yuichi KANEDA
Executive Director,
Community development Council, Ponto-cho

Seigen MORI
Assistant Butler,
Kiyomizu-dera Temple

Takafumi BANSAKA
Chief,
General Affairs Department,
Higashi Hongan-ji

Takeshi OKUMURA
Councilor,
Cultural Property Promotion Office,
Kansai Brunch,
Nohmi Bosai Ltd.

Hiroaki OHASHI
Senior Researcher,
Kinugasa Research Organization,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

List of Participants

Alexandre A. COSTA
Founder and partner and head of research and development / Invited professor
NCREP — Consultancy on Rehabilitation of Built Heritage, Ltd. / Polytechnic Institute of Porto, School of Engineering

Ana GóMEZURIBE
Advisor on conservation and collections management
Strengthening Museums Program /Colombia National Museum / Ministry of Culture

Artnet HASKUKA
Chairperson
Council of Cultural Heritage –Prizren Historic Center

Aya MIYAZAKI
Doctorate Student
University of Tokyo (Until 3 May 2021, UNESCO Office in Lima)

Flavio HAENER
Cultural Property Protection Responsible
Canton Basel-Stadt, Government

Jennifer LANG
Adjunct Associate Professor, Director of MSc(Conservation)
The University of Hong Kong

Katrīna KUKAINE
Mg geogr, Development department director
The National Library of Latvia

Luana ALESSANDRINI
Head for the UNESCO World Heritage, Urban Decorum, Urban Hygiene and Communitarian Policies Sector
Municipality of Urbino

Mikael GARTNER
Infrastructure Design Reviewer
United Nations Office for Project Services

Raphael IGOMBO
Head of education and Public programs Department
National Museums of Kenya

Richard BAULA
Conservator
National Historical Commission of the Philippines

Veronica PIACENTINI
Officer
Italian Civil Protection Department

Vinka MARINKOVIć
Conservator restorer
Croatian Conservation Institute

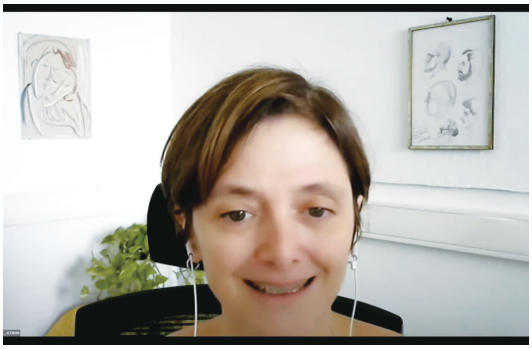
List of Observers

Mohamed SOLIMAN
JSPS International Researcher,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

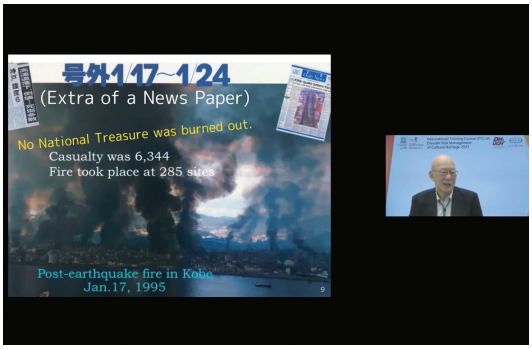
Suzana KASOVSKA GEORGIEVA
Deputy director and trainer
Institute for Research in Environment, Civil Engineering and Energy

Photos of ITC 2021

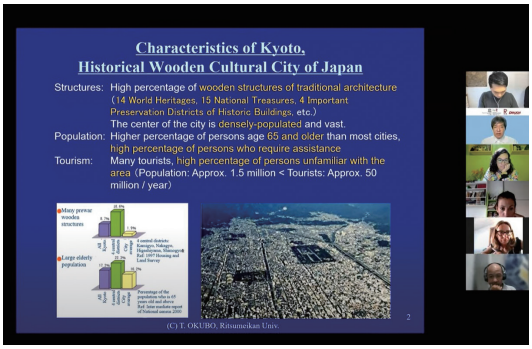
Opening Remarks from Prof. Yoshio Nakatani, Chancellor of Ritsumeikan University



Opening Remarks from Ms. Valerie Magar, ICCROM

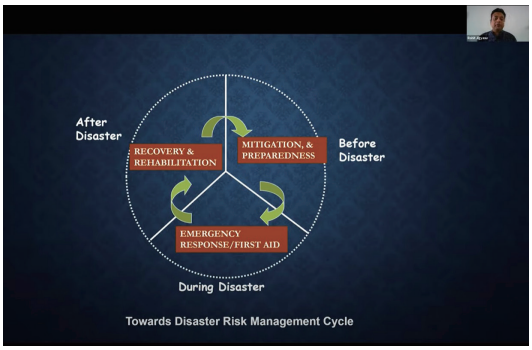


Lecture on Development of Disaster Risk Management (DRM) for Cultural Heritage in Historical City Kyoto



Lecture on Environmental Water Supply System in Kiyomizu-dera Area

Lecture on Histric Context of Living Heritage City Kyoto

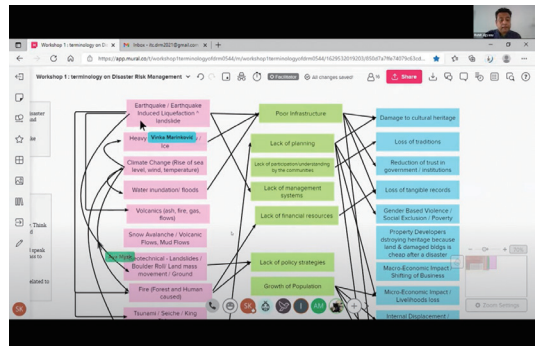


Lecture on Core Principles of Disaster Risk Management (DRM)

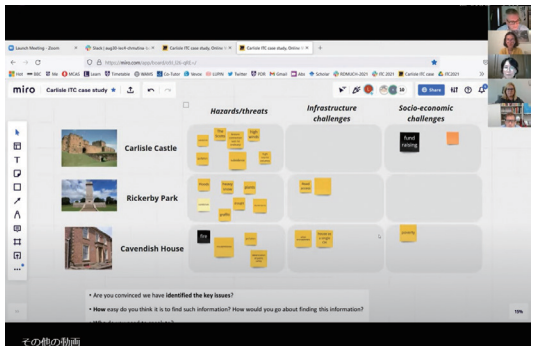
Site Visit Video, Ponto-cho

Site Visit Video Kiyomizu-Dera

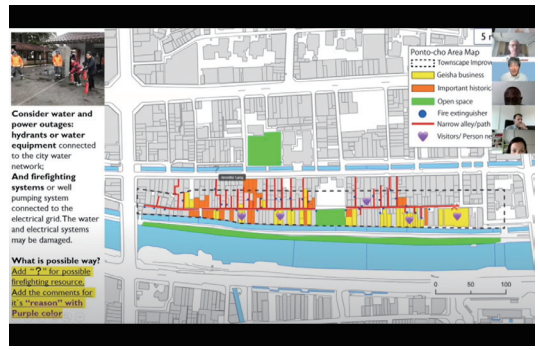
Site Visit Video Higashihongan-Ji



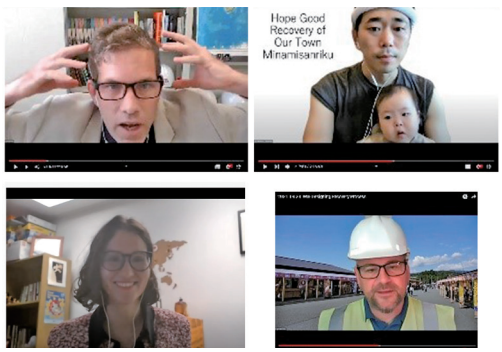
Workshop on Core Principles of Disaster Risk Management (DRM)



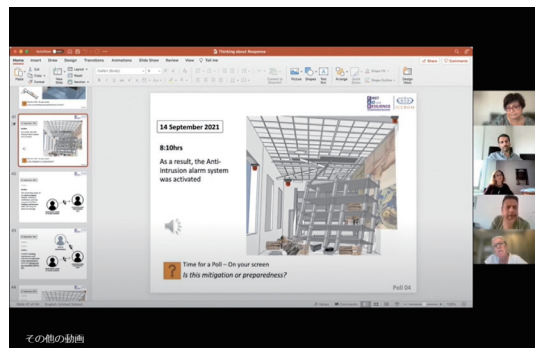
Groupwork on Disaster Risk Reduction or Disaster Risk Production Considering Urban Challenges in Historic Urban Areas



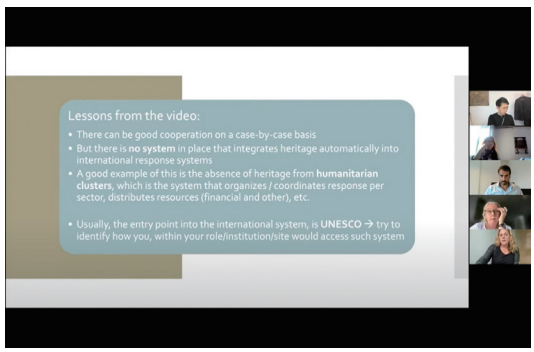
Workshop on Disaster Imagination Game (DIG)



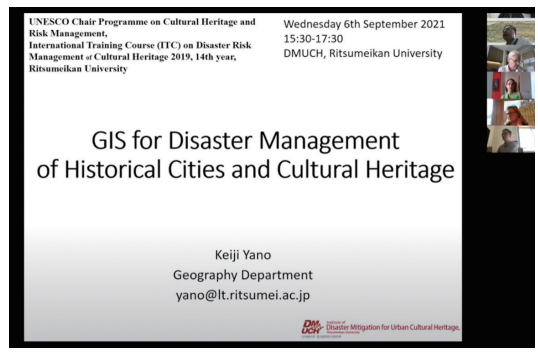
Workshop on Designing Recovery and Reconstruction Process



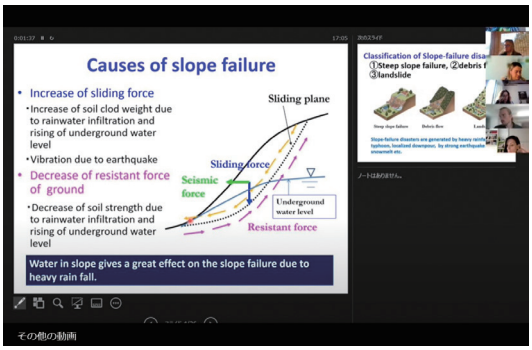
Lecture on Formulation of Scenarios



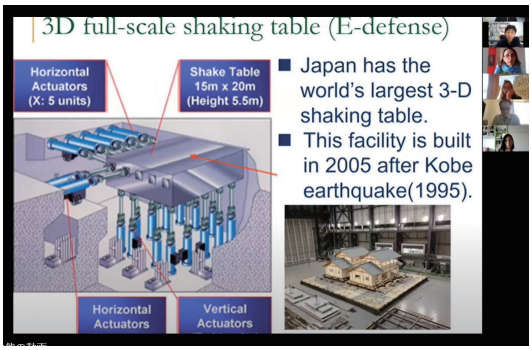
Lecture on Post Disaster Needs Assessment (PDNA) and Post Disaster Recovery Frameworks



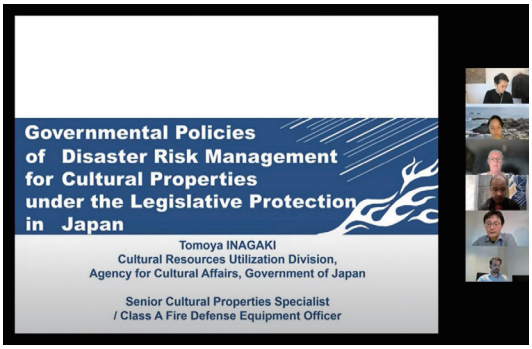
Lecture on Geographic Information System (GIS) for Disaster Management of Historical Cities and Cultural Heritage



Lecture on Landslide Assessment



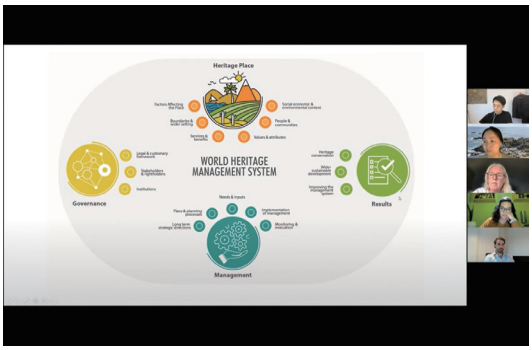
Lecture on Seismic Performance of Japanese Historical Structures



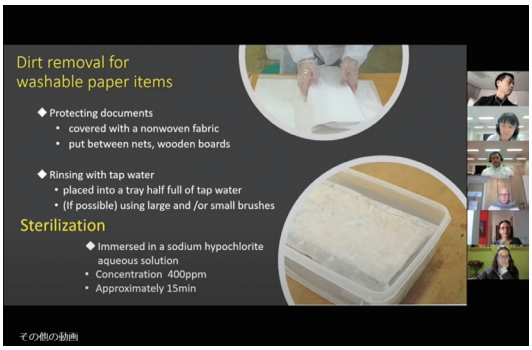
Lecture on Governmental Policies of Disaster Risk Management for Cultural Properties

Lecture on Disaster Mitigation for Cultural Heritage by Kyoto City Fire Department

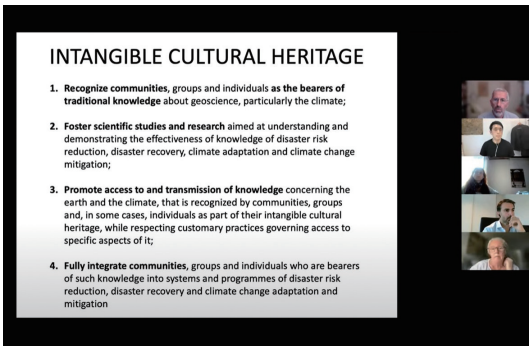
Lecture on Lessons Learned from Experience of Kobe Earthquake



Lecture on Management System and Management Planning for Heritage Site



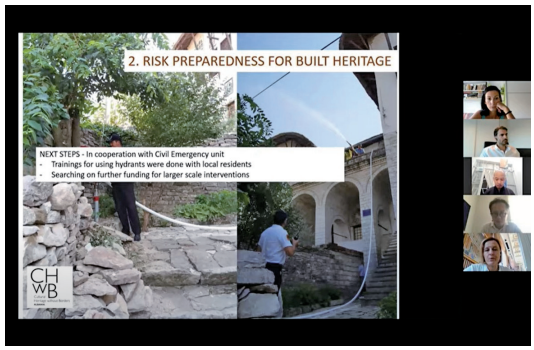
Lecture on Disaster Risk Management (DRM) System in Kyoto National Museum



Lecture on Recent Development and Emergency Response to Cultural Heritage in Crisis Situations

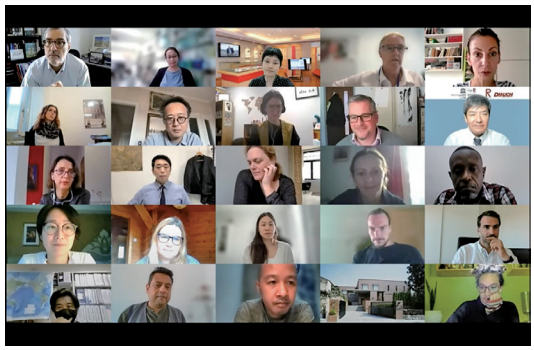
Lecture on Governmental policies of Disaster Risk Management for Cultural Properties

Lecture on Post Disaster and Recovery Process in Tohoku Case of Minami sanriku cho

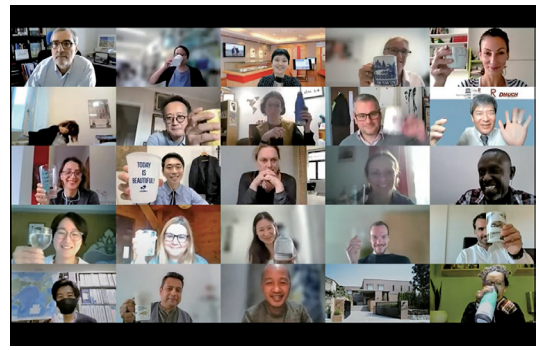


Presentation of Good Practices of Disaster Risk Management (DRM) by former Participants

Farewell Party



Final Day



Toast! KANPAI!

Demonstrating how to use fire extinguishing sprinkler in Higashi-Hongan-ji. Taken during the making of site visit video for ITC 2021 online course.

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