Proceedings of
UNESCO Chair Programme
on Cultural Heritage and
Risk Management,

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

2015, 10th year
From 12th to 28th September 2015,
In Kyoto, Kobe and Minami Sanriku-Cho,
Japan

Organized by Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH), Kyoto, Japan In Cooperation with UNESCO, ICCROM, ICOMOS / ICORP
Supported by Toyota Foundation “Initiative Program”

Typhoon Talas attacked the world heritage “Sacred Sites and Pilgrimage Routes in the Kii Mountain Range” in 2011. It caused many landslides and debris flows occurred on its routes. This photo shows one of the debris flow site, it caused damage of Nachi-Taisha, one of the very important Shinto shrines in the Kii Moutain.

Proceedings of
UNESCO Chair Programme
on Cultural Heritage and
Risk Management,

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

2015, 10th year
From 12th to 28th September 2015,
In Kyoto, Kobe and Minami Sanriku-Cho, Japan

Organized by Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH), Kyoto, Japan
In Cooperation with UNESCO, ICCROM, ICOMOS / ICORP
Supported by Toyota Foundation “Initiative Program”

Date of Publication: February 2016

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

In cooperation with: UNESCO
ICCROM
ICOMOS / ICORP

Supported by: Toyota Foundation “Initiative Program”

Authors: Participants of ITC2015 and Former participants of ITC

Coordinated by: Rohit JIGYASU, UNESCO Chair Holder, Professor
Naoko USHITANI ITAYA, Associate Professor
Dowon KIM, Senior Researcher

Layout by: ADTHREE Publishing Co., Ltd.
4-27-37 Higashi Nakano, Nakano-ku, Tokyo 164-0003 Japan

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

.

Preface

Recently devastating earthquakes in Nepal in April and May 2015 have caused significant loss to rich living heritage of Nepal. North Italy earthquake of 2012 caused widespread damage to the historic city of Ferrara while earthquake in Philippines in 2013 damaged historic Bohol churches. Floods in Balkan region in 2014 affected numerous historic towns, 2011 floods in Thailand severely damaged the World Heritage Site of Ayuthhaya and 2010 floods in Pakistan affected many archaeological sites and vernacular settlements along River Indus. As exemplified through these incidents, cultural heritage is confronted with various kinds of disaster risks, due to natural hazards such as floods, fires, earthquakes etc. as well as human induced events such as terrorism, vandalism, armed conflict and arson. As a result, many cultural heritage sites including those on the World Heritage List have been significantly damaged in the recent years.

World is facing increased rate of urbanization than ever before. Number of people living in cities equaled those in villages in 2007 and is rising ever since. Such a fast pace of urbanization accompanied by densification, poorly constructed buildings and overburdened infrastructure is putting tremendous pressure on heritage sites especially those located in urban areas, thereby increasing their vulnerability to earthquakes and floods.

Moreover, Climate Change is contributing towards increased intensity and frequency of hydro-meteorological events such as heavy rainfall and cyclones. 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.

While vulnerability of cultural heritage is increasing more than ever before, there are countless examples of traditional knowledge evolved by communities through series of trials and errors that demonstrate that cultural heritage can be an effective source of resilience. Through this accumulated wisdom these communities have developed effective indigenous mechanisms of dealing with earthquakes and floods rather than trying to only resist them through technocratic measures.

However, despite the increasing vulnerability of cultural heritage to hazards, disaster risk reduction unfortunately does not register as a priority area for management. This is supported by the fact that only handful of World Heritage Properties have formulated disaster risk management plans and even fewer and implemented them. Among other factors, this is result of low levels of awareness among various stakeholders and the public and the limited capacity building of those in charge of protection and management.

Therefore it is important to conduct site-based risk assessments and, where appropriate, develop the necessary disaster risk management plans outlining mitigation, emergency preparedness, response and recovery measures for various hazards to which the properties are exposed. On the other hand, measures must be taken to advance heritage concerns in the wider agenda for disaster risk reduction and to raise awareness among heritage managers and professionals.

This necessitates building the capacity of heritage managers, civic defence/emergency response agencies as well as decision makers from heritage as well as disaster management fields on reducing disaster risks to cultural heritage. In this direction, a pioneering initiative has been undertaken by the UNESCO Chair established within the Institute of Disaster Mitigation for Urban Cultural Heritage at Ritsumeikan University, Kyoto (Japan), which in cooperation with ICCROM, ICOMOS-ICORP and the UNESCO World Heritage Centre has been organizing international training course on disaster risk management of cultural heritage every year since 2006. The target groups for this course include

government institutions, departments, universities, NGOs and private consultants from cultural heritage, as well as relevant disaster management fields. Many of the former participants of the course have been undertaking several initiatives in their home countries and regions based on their learning from the course. Therefore in these proceedings, we have included reports from some of our participants highlighting their work after attending our course.

The proceedings also contains brief reports on disaster risk management plans for case study sites from the home countries of the participants based on the outlines prepared by them during the course.

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

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

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 10th time supported by UNESCO, ICCROM, Toyota Foundation and many national and international organizations. I would like to thank these colleagues for supporting us and participants from all over the world. The purposes of this training course are education of practical experts in each field of cultural heritage conservation and disaster risk management, and development of draft plan for disaster risk management to secure the safety of people and cultural value in each cultural heritage site and historical city. I hope these plans to be actual projects in each country and contribute to cultural advancement in the world.

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

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

Preface

The International Training Course, Ritsumeikan University is the first attempt at the international level to provide high level education opportunities for people in the cultural heritage field and for people in the natural disaster field. In the 10 years that the course has been implemented, we had 856 applicants and 99 people from 41 countries have been trained. The accepted number of trainee is only 11.6% and it is small percentage. Particularly in 2012, we could receive only 9 people as trainee among 175 applicants and this is only 5%. We, therefore, have been proposed to increase the number of trainee from past applicants and people of relevant fields, both of domestic and international communities. The course, however, is financially supported by COE of the Ministry of Education program and the budget of the training course is not large enough to accept all the applicants because the course is one of the projects of COE program.

Recognizing our activities and achievements by ITC, the Toyota Foundation has decided to support the course for three years from the fiscal year 2014. Then the total budget has been almost doubled and the number of trainee has increased. Moreover we could increase speakers not only from domestic but also abroad. In 2015, the second year with the support from the foundation, we could invite 15 trainees and it is the largest number than ever. On the other hand, we have been proposed to establish a follow-up program from the graduates of our course and people of relevant fields, which is to establish a similar course to our training course in their own counties and communities. We will carry out a follow-up training course in Kathmandu, Nepal in 2016 where people need quick recovery from the Gorkha earthquake which occurred in April, 2015.

In this way, the support by the Toyota Foundation allowed us to provide better course for more people, so that our course has been receiving high evaluation from the international community. A noteworthy fact is that trainees gave us very good assessment for our course. Hereby we appreciate the recognition and evaluation of activities of our training course by the Toyota Foundation and we would like to express our heart-full gratitude to the foundation. We promise to continue this training course as one of our most important missions.

Kenzo TOKI
Representative, Toyota Foundation “Initiative Program”,
Enhancement of the UNESCO Chair International Training Course on Cultural Heritage and Risk Management and Post-training Follow-up.
Professor, Ritsumeikan University

Table of Contents

1 Introduction

1.1 Background and Objectives of the 10th International Training Course 2015

Disasters and Cultural Heritage

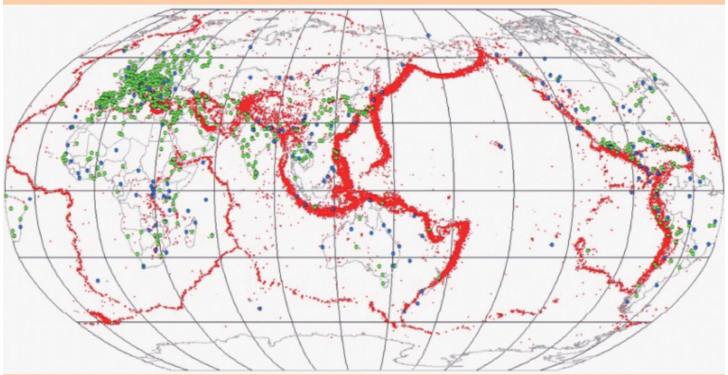
Recent disasters such as Nepal earthquakes in April and May 2015, earthquake and cyclones in Philippines in 2014, fires in Lijiang, China in 2013 and 2014, the devastating tsunami in North East of Japan in 2011 and as well as earthquakes that hit Christchurch, New Zealand in 2010 and 2011, Haiti and Chile in 2010 have caused enormous loss of life, property and cultural heritage. This disaster has once again shown that cultural heritage is highly vulnerable to natural disasters such as earthquake, the Tsunami, fire, floods and 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. In the post disaster phase, the challenge is how to salvage heritage properties, which are at risk of demolition and to assess their damage. The long term challenge during recovery phase is how to repair and retrofit them and undertake reconstruction that respects tangible as well as intangible heritage values.

In the light of these challenges, comprehensive 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 risk management plans that are based on the characteristics of cultural heritage and nature of hazards in the regional context.

One of the main reasons for extensive damage to cultural heritage is due to earthquakes and floods, which may also cause secondary hazards such as landslides and fires thereby exacerbating the damage. Considering these issues, the 10th International Training Course on Disaster Risk Management of Cultural Heritage will specifically focus on **'Protecting cultural heritage from disaster risks due to earthquakes and floods'.**

World Heritage Sites Located in the Earthquake Zones 2008



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

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

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

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

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

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

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

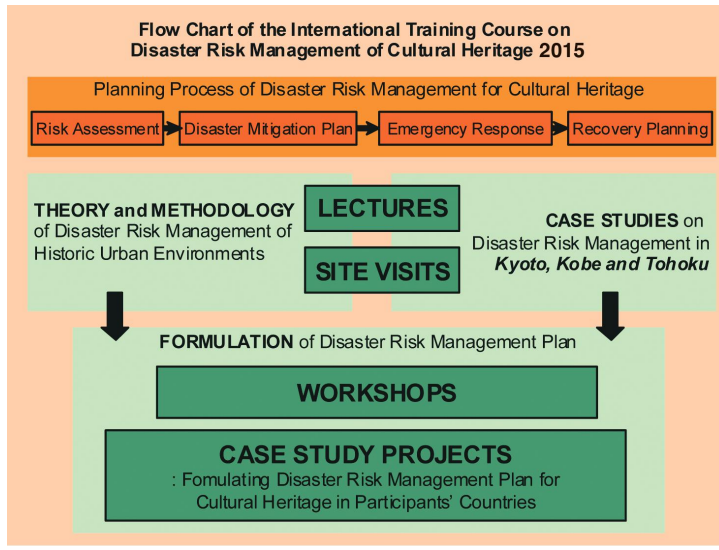
The past training courses have been attended by participants from China and Korea from East Asia; Indonesia, Malaysia, Myanmar, Philippines and Thailand from South-East Asia; Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka from South Asia; Australia, Fiji, New Zealand and Palau from the Pacific region; Colombia, Ecuador, Honduras, Jamaica, Mexico and Peru from Latin America and the Caribbean; Albania, Croatia, Italy, Moldova and Serbia from Europe; Afghanistan, Iran, Iraq, Syria and Turkey from Middle East; Egypt, Kenya, Nigeria, Tanzania and Uganda from Africa.

Objectives and Methodology of the Training Course

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

- ✓ Undertake an integrated risk assessment by analyzing the vulnerability of cultural heritage to disasters caused by natural and human induced hazards;
- ✓ Build an integrated system for disaster risk management of cultural heritage, incorporating prevention/mitigation, preparedness, response and recovery measures;
- ✓ Formulate disaster risk management plans for cultural heritage that correspond to the urban and regional disaster management plans and policies; and
- ✓ Establish an international scientific support network for risk management of cultural heritage in order to build the institutional capacity needed to formulate comprehensive risk management plans that are based on the characteristics of cultural heritage and nature of hazards in the 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 information obtained from lectures and site visits, and exercises through workshops, the training course also sets the goal of raising planning skills in cultural heritage disaster prevention, by having each participant make a plan during a team project for the prevention of disaster to his/her country's cultural heritage, in line with each country's respective social and economic situation. In order to do so, the Institute has asked the participants to prepare the relevant materials before coming to Japan, so that the two participants from each country could learn from each other's experience through this process.

Special Theme of 2015 International Training Programme:

Protecting cultural heritage from disaster risks due to earthquakes and floods

Earthquakes and floods cause immense damage to cultural heritage. Recently devastating earthquakes in Nepal in April and May 2015 have caused significant loss to rich living heritage of Nepal. North Italy earthquake of 2012 caused widespread damage to the historic city of Ferrara while earthquake in Philippines in 2013 damaged historic Bohol churches. Floods in Balkan region in 2014 affected numerous historic towns, 2011 floods in Thailand severely damaged the World Heritage Site of Ayuthhaya and 2010 floods in Pakistan affected many archaeological sites and vernacular settlements along River Indus.

World is facing increased rate of urbanization than ever before. Number of people living in cities equaled those in villages in 2007 and is rising ever since. Such a fast pace of urbanization accompanied by densification, poorly constructed buildings and overburdened infrastructure is putting tremendous pressure on heritage sites especially those located in urban areas, thereby increasing their vulnerability to earthquakes and floods.

Moreover, Climate Change is contributing towards increased intensity and frequency of hydro-meteorological events such as heavy rainfall and cyclones. 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.

While vulnerability of cultural heritage to earthquakes and floods is increasing more than ever before, there are countless examples of traditional knowledge evolved by communities through series of trials and errors that demonstrate that cultural heritage can be an effective source of resilience. Through this accumulated wisdom these communities have developed effective indigenous mechanisms of dealing with earthquakes and floods rather than trying to only resist them through technocratic measures.

Considering these issues and challenges, the 10th International Training Course will give special focus on the protection of cultural heritage from floods and associated hazards.

Historic Bohol churches in Philippines damaged by earthquake on 15 October 2013

Monasteries damaged due to earthquake in Myanmar on 11 November 2012

World Heritage Site of Ayutthaya in Thailand got inundated for weeks due to 2011 Floods

Unprecedented heavy rainfall in Balkans in 2014 flooded many historic towns and villages

Previous International Training Courses (2006-2014)

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-Gokokuji 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.

Organizers and Participants

The training course is organized from the beginning in cooperation with the UNESCO, ICCROM, ICOMOS and relevant institutions of the government of Japan. In 2014, the Toyota Foundation "Initiative Program" has proposed to support our training course by providing the budget for three years. Participants will include managers of cultural heritage, disaster risk management experts, decision makers and government officials involved in cultural properties or disaster management.

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	BANGLA-DESH	Deputy Secretary, Ministry of Home Affairs, GOVT. of Bangladesh	Lal Bagh Fort, Dhaka, Bangladesh
2	Md. Rafiqul ALAM	BANGLA-DESH	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	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
8	Shang Chia CHIOU	TAIWAN	Professor, Department of Architecture and Interior Design, National Yunlin University of Science & Technology	Fort San Domingo in Tamsui and Surround Historical Buildings
9	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	BANGLA-DESH	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	AFGHA-NISTAN	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 SIRIPHATTHA-NAKUN	THAILAND	Landscape Architect Ministry of Culture, Fine Arts Department, Office of Architecture	Historic City of Ayutthaya, WHS

ITC 2014, the 9th year

No	Name	Country	Work Position and Affiliation	DRM Plans of Cultural Heritage Formulated by the Participants
1	Elena MAMANI	ALBANIA	Project Manager, Deputy Head of Office, Cultural Heritage without Borders (CHwB)	Gjirokastra, WHS
2	Catherine FORBES	AUSTRALIA	Built Heritage Advisor, GML Heritage; Australia Institute of Architects, Australia ICOMOS	The Rocks Historic Urban Precinct
3	Sasa TKALEC	CROATIA	Head of Office of Director, Croatian Conservation Institute	Castle Batthany in Ludbreg
4	Juan Diego BADILLO REYES	ECUADOR	Architect Conservator freelance, Volunteer South America Coordinator	San Antonio del Cerro Rico de Zaruma
5	Abdelhamid SAYED	EGYPT	Chairman, Conservator in the Ministry of Antiquities, Egyptian Heritage Rescue Foundation (EHRF); Training & Capacity Building Unit Manager, Egyptian Earth Construction Association (EECA)	Bab El-Wazir, El-Darb Al-Ahmar District, Historic Cairo, WHS
6	Anaseini KALOUGATA	THE FIJI ISLANDS	Senior Project Officer Levuka, Department of National Heritage, Culture and Arts	Historical Port Town of Levuka, WHS
7	Cinthia CABALLERO	HONDURAS	Urban control and planification unit, Alcaldia Municipal Del Distrito Central (Gerencia Del Centro Historico)	Central District Historic Area
8	Jyoti PANDEY SHARMA	INDIA	Professor, Department of Architecture, Deenbandhu Chhotu Ram University of Science & Technology	Fatehpur Sikri, Agra District, Uttar Pradesh, WHS
9	Saut SAGALA	INDONESIA	Senior Fellow, Resilience Development Initiative	Gedung Sate Building, Governor office of West Java Province
10	Alaa HAMDON	IRAQ	University Lecturer, Researcher and Earthquake Expert, Remote Sensing Center, Mosul University	Al-Hadba Minaret and Nirgal Gate / Mosul City
11	Richard NESTER	NEW ZEALAND	Technical Advisor – Historic, Department of Conservation	Government Buildings Historic Reserve
12	Zafar SHAH	PAKISTAN	Regional Emergency Officer (South Punjab), Punjab Emergency Service (rescue1122), Emergency Services Academy	Lahore Fort, WHS

13	Hussain SALEH	SYRIA	Head of the scientific research commissions department, Higher Commission for Scientific Research	Crac des Chevaliers (in Arabic: Castle Alhsn), WHS
14	Kaichard RUTTANAWO-NGCHAI	THAILAND	Captain assistant, Klongtoey fire station, second operation, fire department, Bangkok metropolitan	Vimanmek Palace, WHS

1.2 Timetable of UNESCO Chair Programme on Cultural Heritage and Risk Management of Cultural Heritage 2015, 10th year, Ritsumeikan University

	9/11 Fri	9/12 Sat	9/13 Sun	9/14 Mon	9/15 Tue	9/16 Wed	9/17 Thu	9/18 Fri	9/19 Sat
THEME	Arrival	Introduction and The First Presentation	Core Principle and Value	Principles, Framework and Risk Analysis at Site Level	Risk Assessment at Urban Level	Disaster Scenarios for Prioritization	Risk Prevention and Mitigation	Emergency Preparedness and Response	The Middle Presentation
Venue		DMUCH	DMUCH	Kiyomizu-Dera	Sannei-Zaka	DMUCH	DMUCH	Ninna-Ji	DMUCH
9:00									
		Registration	Lecture 2 Disaster Risk Management of Cultural Heritage - Significance and Core Principles (R.JIGYASU)	Lecture 5 Introduction to the Context of Japanese Wooden Cultural Heritage (N.TSURJOKA, Kyoto Pref.)	Recap	Recap	Recap	Recap	
10:00		Opening Address			Lecture 8-1 Disaster Imagination Game (T.OKUBO)	Lecture 9 Ecology and Sustainability of Historic Urban Areas (P.Head)	Lecture 13 Introduction to the Integrated Methodology for Assessing Risks (R.JIGYASU)	to Ninna-Ji	Lecture 19 Engaging Communities for Disaster Risk Reduction (R.SHAW)
		Orientation to the Course (R.JIGYASU)			to Sannei-Zaka			Self Study	
11:00			Lecture 3 Introduction to the Context of Historic City of Kyoto (M.YAMASAKI)	Lecture 6 Landslide, Prevention and Mitigation Techniques (R.FUKAGAWA)	Site Visit 2 and Field Work Sannei-Zaka Important Preservation District (T.OKUBO)			Site Visit 3 World Heritage Site Fire Prevention Facilities at Ninna-Ji Temple (H.OMORI)	
		Lecture 1 The Need for Disaster Risk Management for Cultural Heritage in Historic Cities: The Case of Kyoto (K.TOKI)	Lecture 4 Assessing the Values of Cultural Heritage (R.JIGYASU)	Lecture 7 Dynamic Analysis of Earthquakes and Seismic Performance of Japanese Historical Structures (S.Yoshitomi)		Lecture 10 Disaster Mitigation and Integrated Planning of Historic Cities' (P.Head)	Lecture 14 Flood Prevention and Mitigation Techniques (K.SAWAI)		Lecture 20 Emergency Response and Recovery of cultural heritage following the Great Gorkha Earthquake 2015- Challenges and way forward (K.Weise)
12:00		Lunch	Workshop 1 Assessing the Values (R.JIGYASU)	Lunch		Lunch	Lunch	to DMUCH	Lunch
13:00			Lunch		to DMUCH			Lunch	
				to Kiyomizu-Dera	Lunch				
14:00		The First Presentations by the Training Participants/ Cultural Heritage and Disaster	Self-Study	Site Visit 1 Observations of Risks at WHS in Kiyomizu-Dera (N.TSURUOKA, Kyoto Pref.)	Workshop 3 Risk Assessment Exercise: Presentation and Discussion on DIG (T.OKUBO)	Workshop 4 Building Disaster Risk Scenarios (P.Head)	Lecture 15 Multimodal Disasters under the extreme heavy rainfall event (M.Fujimoto)	Lecture 18 Disaster Prevention for Cultural Heritage in Kyoto City (Y.MACHIDA, Kyoto City FD)	The Middle Presentations by the Training Participants
15:00							Lecture 16 Mitigating floods- the Dutch Experience (E.Luijendijk)	Workshop 5 Role Playing Workshop on Emergency Response (R.JIGYASU)	
16:00				Observations of Risks at WHS in Kiyomizu-Dera	Lecture 8-2 Disaster Imagination Game (DIG) (T.OKUBO)	Lecture 11 GIS for Disaster Management of Historical City, Kyoto (K.YANO)	Lecture 17 Disaster Risk Management of Ayuthaya World Heritage site in Thailand (H.SIRIPHATTHANAKUN)	Case Study Project Work	
17:00				to DMJCH	Case Study Project Work	Lecture 12 Lessons learnt from Uttarakhand flash floods in India (V.Arora)	Case Study Project Work		
18:00				Workshop 2 Impact of Disaster on Cultural Heritage/ in Case of Kiyamizu-Dera Temple, Introduction to Key Terminology (R.JIGYASU)					
19:00		Welcome Dinner							
Accommodation	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto

Management, International Training Course (ITC) on Disaster Risk

9/20 Sun	9/21 Mon, Holiday	9/22 Tue, Holiday	9/23 Wed, Holiday	9/24 Thu	9/25 Fri	9/26 Sat	9/27 Sun	9/28 Mon	9/29 Tue
Planning for Recovery: Lessons from Kobe	From Response to Recovery: Great East Japan Disaster	From Response to Recovery: Great East Japan Disaster		Policy for Risk Management	Pilot Project	Pilot Project	DRM	The Last Presentation	Departure
Kobe to Sendai	Minami Sanriku-Cho	Minami Sanriku-Cho	Sendai to Kyoto	DMUCH	DMUCH	DMUCH	DMUCH	DMUCH	
to Kobe	to Minami Sanriku	Lecture 25 Thinking about Disaster through a social science lens (W.Cheek)	to Kyoto						
Disaster Reduction and Human Renovation Institution Theater and 3D	Site Visit 5 Minami Sanriku-Cho Affected by the East Japan Disaster	Lecture 26-1 Nature and Recovery (T.Suzuki) Lecture 26-2 Forestry and Recovery (K.Sato) Lecture 26-3 Tourism and Recovery (K.Sugawara)		Lecture 27 International Cooperation for Risk Management of Cultural Heritage (I.KISO, Special Adviser to the Cabinet)	Recap Lecture 30 Post Disaster Ricovery of Movable Heritage (A.TANDON, ICCROM)	Recap Lecture 32 First Aid to Cultural heritage - Experience of Egyptian Heritage Rescue team (A.SAYED)	Recap Lecture 34 Management Systems for Heritage Sites (J.KING, ICCROM)	Preparation for the Last Presentation	
Lecture 21 Experience of the Great Hanshin-Awaji Earthquake, Risk Assessment (Y.MURAKAMI, Hyogo Pref.)	Lecture 23 Faith and Recovery, to join the local festival event (M.Kudo)			Lecture 28 Post Disaster Recovery of Cultural Heritage after Dujiangyan Earthquake (Q.WEI)		Lecture 33 Emerging Polices for Disaster Risk Management of Urban Cultural Heritage in Japan (K.SHIMOTSUMA, ACA Japan)	Case Study Project Work		
Lecture 22 Planning for Disaster Mitigation of Cultural Heritage Training of Heritage Manager (Y.MURAKAMI, Hyogo Pref.)		Workshop 6 Group Work for recovery of Minami Sanriku Cho		Lunch	Lunch	Lunch	Lunch	Lunch	
Lunch JICA	Lunch								
				Lecture 29 Post Disaster Needs Assessment for Cultural Herigtage and Blue Shield (A.Takahashi, UNESCO)	Case Study Project Work	Case Study Project Work	Case Study Project Work	The Last Presentation	
Site Visit 4 After the Kobe Earthquake Site	Field investigation	Lunch Presentation to the local		Case Study Project Work	Lecture 31 Making Historic Cities Resilient (J.VELASQUEZ, UNISDR) Case Study Project Work				
to Sendai	Lecture 24 Post Disaster and Recovery process by the Government and community in case of Minami Sanriku Cho (Y.Hiraoka)	to Sendai					Lecture 35 Global Initiaitves for Disaster Risk Management of World Cultural Heritage (G.BOCCARDI, UNESCO)		
								Farewell Party	
Sendai	Minami Sanriku-Cho	Sendai	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	

Organized by Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University, Kyoto, Japan
In Cooperation with UNESCO, ICCROM, ICOMOS/ICORP
Supported by Toyota Foundation "Initiative Program"

2 Formulating Disaster Risk Management Plans by ITC 2015 Participants

2.1 Historic Quarter of the Seaport City of Valparaíso, Chile

Marcela Hurtado SALDIAS
Universidad Técnica Federico Santa María, Valparaíso, Chile

1. Introduction

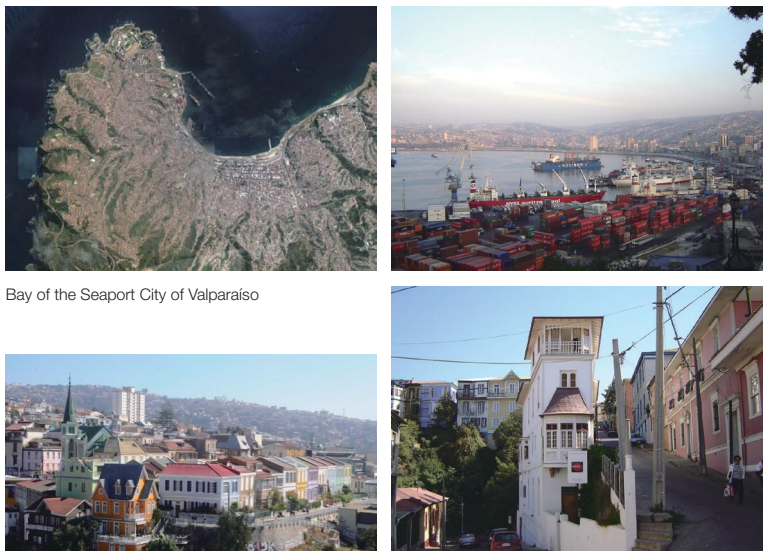
The Historic Centre of Valparaíso (HCV), a UNESCO World Heritage Site since 2003, faces a number of hazards that could endanger its preservation, including earthquakes and fires. More than 10 years after it was named a World Heritage Site, the HCV still lacks a Risk Management Plan organized by the public and the municipality. As a result, we have lost a significant number of buildings, mostly due to fire, while earthquakes have damaged others, most recently in 2010. On the whole, the HCV's management faces social, economic and environmental problems that have delayed the design and implementation of a Risk Management Plan. Quite recently, in April 2014, a devastating fire in Valparaíso destroyed more than 800 houses and left more than 12,000 of the city's residents homeless. The tragedy exposed how the city is unprepared for a disaster of this magnitude and that the city's complex characteristic—its geography, urban layout and building materials—significantly hinder management of this type of threat. Fire is, indeed, one of the most destructives hazards in the city at the moment. This paper focuses on this specific risk, explaining the historic centre's conditions and a recovery plan based on its physical and social characteristics.

2. Attributes and values /stakeholders / OUV

The HCV was inscribed on the World Heritage List under criterion (iii): *Valparaíso is an exceptional testimony to the early phase of globalisation in the late 19th century, when it became the leading commercial port on the sea routes of the Pacific coast of South America*[1].

This quality is linked to tangible and intangible components in the city, such as public buildings, housing, public spaces, port facilities, and the city's inhabitants strongly identified with the city (Fig. 1).

Table 1 summarizes the relation between the attributes – obtained from the Outstanding Universal Values – and the specific values and stakeholders involved with them.



Bay of the Seaport City of Valparaíso

Fig. 1 Urban landscape of Valparaiso: housing and public spaces facing the harbour

Table 1 Attributes, values and stakeholders involve in the WHS Valparaíso

Attributes of the HCV	Type of attribute	Associated Values	Scores for these value 1 (low) to 3 (high)	Stakeholders for these values
Particular geographical and topographical environment: "the bay, the narrow coastal plains and the steep hills scored by multiple ravines together created the city's amphitheatre-like layout."	Immovable Tangible	Environmental _ Urban _ Aesthetic _ Historic	3 3 2 2	_ Site manager _ Urban planner _ Inhabitants _ Visitors
Urban layout: "with squares, viewing points, promenades, alleyways and stairways.	Immovable Tangible	_Urban _ Environmental _ Social	3 2 2	_ Site manager _ Residents _ Visitors
"The particularities of each architectural object, grounded in the technological and entrepreneurial mind-set typical of the era."	Immovable Tangible	_ Historic _ Urban _ Technological _ Aesthetic	3 2 3 2	_ Manager of the site _ Residents _ Visitors / tourists
Strong sense of identity among its inhabitants connected to the history and tradition related to the sea.	Cultural Intangible	_ Social _ Economic _ Touristic	3 2 2	_ Local community _ Visitors / tourists _ Site manager
"Represents an extraordinary example of industrial-age heritage associated with the international sea trade of the late 19th and early 20th centuries."	Cultural Intangible Immovable	_ Historical _ Economic _ Cultural _ Social	3 2 2 2	_ Local trade / industry _ Inhabitants _Visitors / tourists

3. Natural disasters / hazard and vulnerabilities

Chile is located in one of the world's areas with the highest seismic activity. The Nazca Plate runs along the Pacific coast, and as a result, strong earthquakes constantly affect Chilean cities. In the case of Valparaíso, the 1906 earthquake was tremendously destructive, razing entire neighbourhoods in the lower part of the city. However, the hills have more favourable conditions due to the soil type (rock) and construction material (wood). This has meant the structures in that area have held up better and faced less destruction. The case of fire presents different problems. The hills are highly vulnerable places for fire for many reasons, especially because of the conditions imposed by Valparaíso 's geography; its complex layout of narrow streets, stairways and alleys typically remain inaccessible to firefighters and safety equipment. In addition, most of the buildings are made of wood with no firewall. There are additional factors such as lack of maintenance, obsolescence of electrical installations, inoperative taps and scarce coverage by firefighters that contribute to fire's hazards. The most recent fire (2014) started in a forest and moved toward the lower part of the city, where it destroyed consolidated areas. More than 800 houses were destroyed. The general increase in the temperature also plays a significant role; hotter summers increase the risk of forest fires drastically. For this reason the specific risk scenario for Valparaíso is from fire and not from earthquake or other natural hazards (Fig. 2).

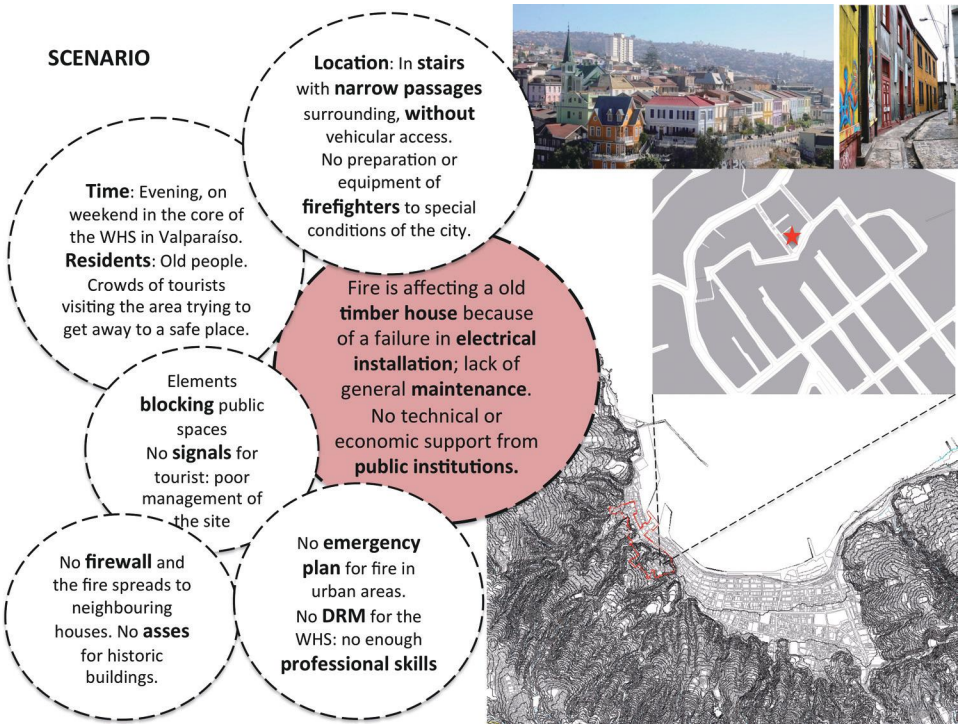


Fig. 2 Scenario

4. Risk mitigation measures

Mitigation measures against a devastating fire (or other threats) are grouped in five fields, linking specific actions and actors in the process.

a. In the institutional framework, necessary actions would be:
- Improve network between different public institutions
- Define protocol action between public institutions
- Strengthen site management office
- Enhance community collaboration on Disaster Risk Reduction
- Design a Disaster Risk Management Plan for the WHS

b. Measures related to legislation:
- Integrate different levels and types of legislation related to risk preparedness
- Integrate Disaster Risk Management for the WHS in Valparaíso's urban planning
- Implement periodical maintenance plan for buildings in the WHS
- Limit number of tourist facilities

c. In terms of preparedness, the actions are:
- Enhanced firefighter capacities for special conditions of the site
- Improve the network of pipes, hydrants and/or ponds in the hills
- Improve conditions for fire detection in public and private buildings
- Evaluate state of conservation of buildings and public spaces

d. Mitigations related to urban mobility are:
- Improve conditions in the urban space (cleaning, removing obstacles, installing signals in critical points)
- Define escape routes and install signs

e. Finally, actions from the community:

- Identify the different groups linked to the site and their roles and responsibilities
- Strengthen networks of community collaboration
- Identify community leaders
- Strengthen and formalize the relationship between the community and public agencies
- Establish periodic simulation plans (drills) for residents and tourists

5. Emergency preparedness and response

Considering that the city still lacks a Risk Management Plan, it is important to coordinate the different actors involved and define their specific roles and all the elements of the problem. This is a medium-term task, which should be initiated to deal with future disasters. It is important to link national and international institutions related to heritage management in Valparaíso in order to establish a regulation framework where the objective is preservation of the OUV of the WHS, in addition to people's lives, in the case of a disaster. Another important aspect to consider is the training of human resources. This includes technicians in charge of the site, firefighters, military forces who can collaborate in an emergency, community residents at the site and volunteers. Coordinated action is essential to respond to an emergency. Finally, an emergency fund for disasters should be provided, including funding for the emergency phase and reconstruction. This fund would consist of local and national contributions, as well as international cooperation.

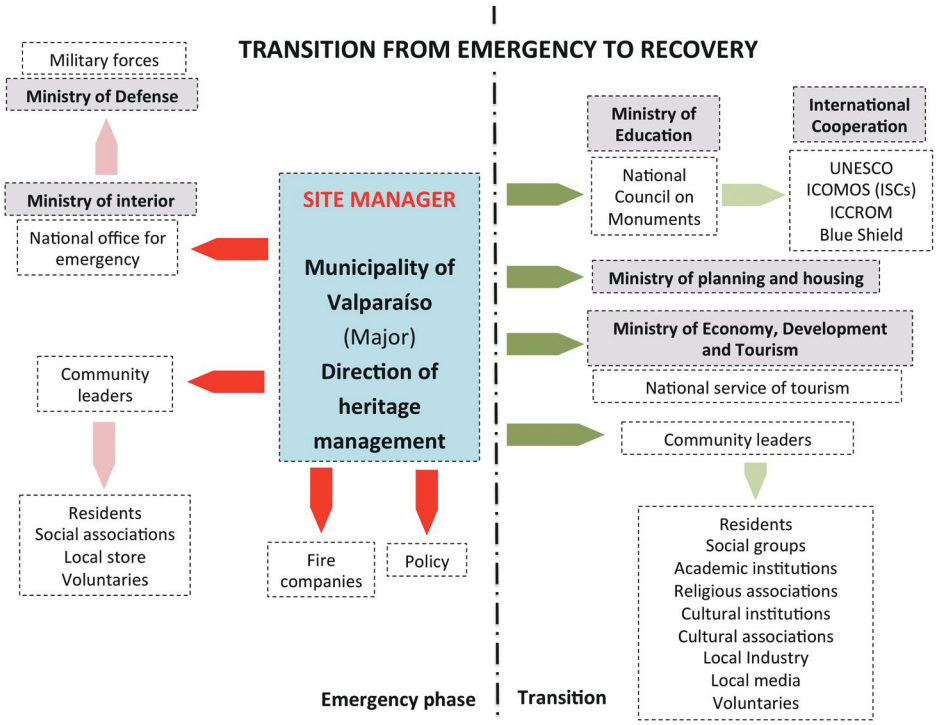


Fig. 3 Emergency response

For the specific case of Valparaíso, Fig. 3 explains the response to the supposed scenario. The process leader has to be the Site Manager. During an emergency, the municipality (Site Manager) is expected to have an active role leading and coordinating with emergency organizations. In the next phase (transition), more institutions and groups are added, with some connections to the site always under coordination by the Site Manager.

6. Recovery plan

The reconstruction plan (Fig. 4) is divided into three steps (short, medium and long term). The first, very briefly, is the immediate response where urgent action must be taken to assist residents and prevent further damage to the buildings. This stage also includes an investigation of the causes of the incident and assessing the state of the properties. This step is critical to the design of the recovery plan (the next step), which includes more actors as well as technical, economic and social aspects to ensure better preparedness in the future. This stage may also include international assistance for the designed risk reduction plans. The last phase, the implementation phase, should include reconstruction and risk mitigation measures, such as more fire detection equipment in housing, improvements to equipment in public spaces, improved water provision on the hills, and emergency plans for the population.

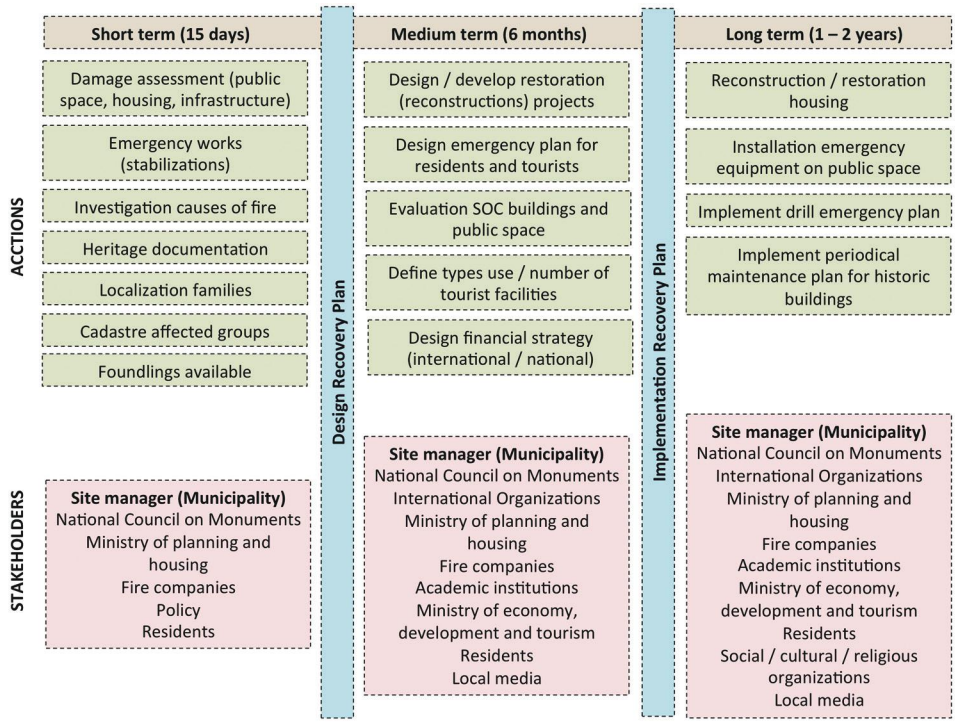


Fig. 4 Recovery Plan.

References

1) http://whc.unesco.org/en/list/959
2) Jigyasu R: *Risk assessment of World Cultural Heritage: Tools & Methodology.* Seminar ARP 2010 "Risk assessment in Heritage: a need or a luxury." Conservation Institute (IC) of the Faculty of Engineering of the University of Porto, 2010.
3) UNESCO, ICCROM, ICOMOS, IUCN: Managing Disaster Risks for World Heritage. World Heritage Resource Manual, 2010. http://whc.unesco.org/en/managing-disaster-risks/
4) Consejo de Monumentos Nacionales: Postulación de Valparaíso como Sitio del Patrimonio Mundial / UNESCO. Cuadernos del Consejo de Monunentos Nacionales, 2004. http://www.monumentos.cl/consejo/606/articles-48020_doc_pdf.pdf

2.2 Thapathali – TekuDobhanGhat Area, Kathmandu, Nepal

Hisila MANANDHAR
Urban Planner, Kathmandu Valley Development Authority

1. Introduction (Fig. 1)

Kathmandu Valley (KV) is the capital region of Nepal, covering an area of about 570 sq. km. The primary river flowing through the valley is River Bagmati along with its numerous tributaries. The Valley is divided into three districts of Kathmandu, Lalitpur (popularly known as Patan) and Bhaktapur. The proposed heritage site is located along the Bagmati riverbank flanked by the two over urbanized metropolitan cities. The river frontage of the site faces south towards Bagmati River and is about 1.95 km long. It is delineated by Vishnumati River at west and the Teku to Thapathali road converge at the Patan Bridge at east. The proposed area lies under jurisdiction of two wards – 11 and 12 of Kathmandu Metropolitan City (KMC).

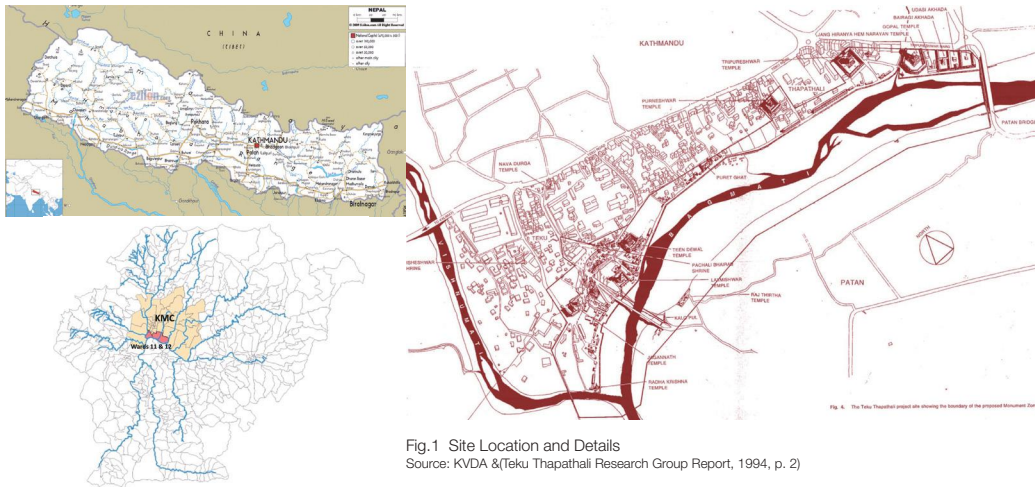


Fig.1 Site Location and Details
Source: KVDA &(Teku Thapathali Research Group Report, 1994, p. 2)

2. Historical Background (Fig. 2)

Bagmati River has been the religious and cultural lifeline of Kathmandu Valley for centuries. The proposed site is one of the six most significant sites along the river. The most substantial role of these ghats*[1] is in traditional practice of funeral rites. Only temple complexes and shrines surrounded by agricultural land existed in the area in the earlier times. As of now, the area is surrounded by a chaotic ribbon development consisting of hotels, commercial buildings, schools and private dwellings. The development has spread and encroached upon the public threshold of the river ghats as well (Teku Thapathali Research Group Report, 1994).

The present temple and *sattal*[*2] structures mostly date from the 19th century, when Rana prime ministers constructed the temples following traditional Newari style with certain North Indian influences in the use and adaptation of the shikhara style temples. A stepped podium gives them prominence in the courtyard formed by the sattals built around these central temples. Jagannath Temple (1972), Teen Dewal (1850) and Radha-Krishna temple (1887) are the temples that were built following the Shikhara style architecture. Laxmishwar temple (1813) and Tripureshwar temple complex (1818) were built following more of the traditional Newari style architecture with tiered roofs and sattal courtyard. Purneshwar temple originally followed the same style, but was reconstructed in Mogul style after the 1934 earthquake. A prominent example of strong Mogul influence could be

seen in Jung Hiranya Hem Narayan temple (aka Kalmochan temple), built in 1868 by then Prime Minister Jung Bahadur Rana. Various akhadas*3 were also built in the surrounding area of the temple. Sanyasi, Vairagiand Udasi are the 3 akhadas of Kalmochan which were built for the purpose of temporary stay of the jogis, mainly for the pilgrimage purpose.A highly significant open shrine (consisting only of a small stone dedicated to a god - Bhairav) known as Pachali Bhariav is the major focal point of the area. The foundation date of the shrine is unknown but the one of the earliest inscriptions available dates back to 1682 AD. The shrine, surrounded by patis, is an important part of a yearly traditional procession and is very popular for marriage ceremonies (Teku Thapathali Research Group Report, 1994).

Various proposals have been made for the rehabilitation of the area in order to preserve cultural heritage and promote tourism in the area. Proposal of Temples and Ghat restoration was done by Teku-Thapathali Research Group (1993) and few renovations and reconstructions were done on the temples in mid 90s. Some of the sattals have been adapted to various purposes such as National Braille Library; Shelter for old age population; Dental clinic; Offices of Guthi Sansthan divisions etc. A walkway project has been proposed by Kathmandu Metropolitan City Office – Building and Heritage Division for the stretch of the river banks from Teku to Thapathali in 2015 (Coming soon: The Bagmati Heritage Walkway, 2015).

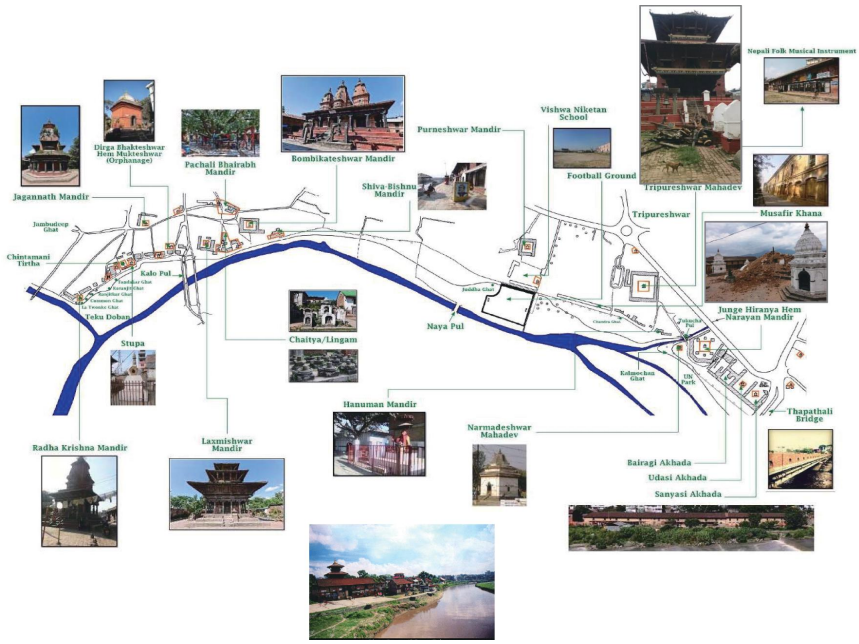


Fig. 2 Site Plan showing cultural properties
Source: Edited from (Kathmandu Metropolitan City Office, 2014)

*1 The term ghat refers to an embankment structure, a series of steps leading down to a water body, usually a holy river. They are broad flights of stairs delivering a safe and easy access to the water's edge and are usually constructed of dressed stones and bricks. Ghats are useful for both mundane purposes (such as cleaning) and religious rites like ritual bathing or ablutions that are considered to be imperative before performing numerous religious practices(Manandhar & Joshi, 2011).

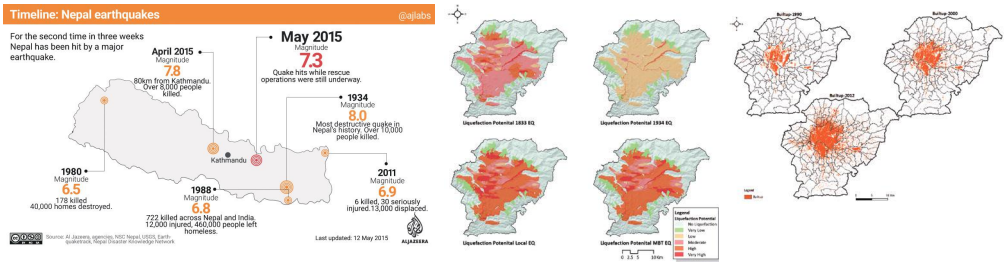
*2 Sattal is a long sojourn rest house usually occupied by the priests and their assistants responsible for the rituals, festivals and upkeep of the temple and its associated buildings. The sattal (2 storeys) usually creates a courtyard space around the temple. The ground floors are partially open for public use where itinerant pilgrims are given night shelter

*3 In Hinduism, Akhara/ Akhadais an organization of different sects. Akhadas are divided into different types according to the concept of god they worship - Shaiva akhadas for Shaivism followers, Vaishnava or vairagiakhadas for followers of Vishnu and Kalpwasis for followers of Lord Brahma.

3. Risk Analysis (Fig. 3)

Kathmandu Valley is tectonically located on the collision zone of the Indian Plate and Eurasian Plate. Due to the geological formation of its land that comprises of soft sedimentary layers; the valley is considered as one of the highest vulnerable areas to the earthquake. In addition the rapid and haphazard urbanization has added to its susceptibility of liquefaction. The risk analysis chart shows catastrophic as well as progressive hazards that might affect the site.

As the cultural properties of the site have suffered few damages due to the recent earthquake, the temple and other structures are very vulnerable to the risks of another earthquake. Due to the proximity of the site to the dense mixed use residential area, human lives as well as infrastructure are also under threat.



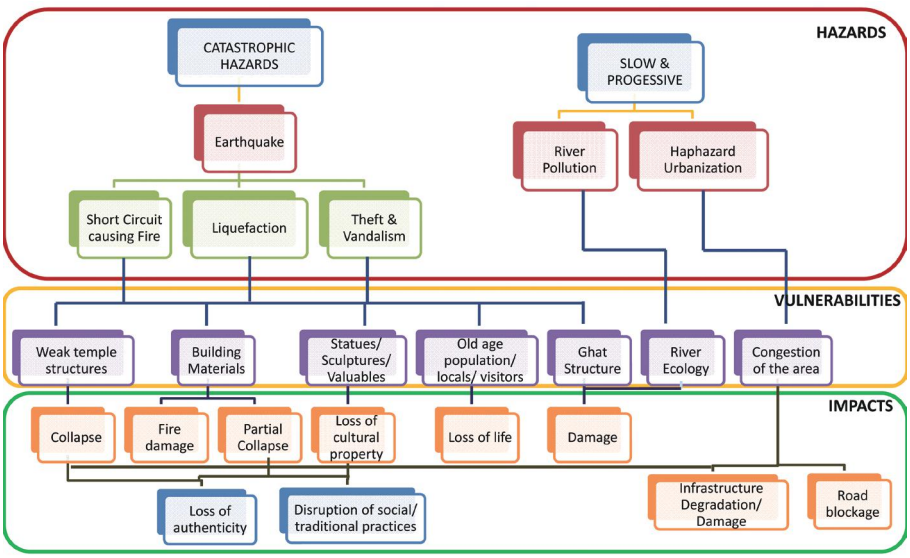


Fig. 3 Risk Analysis Chart

4. Disaster Scenario (Fig. 4)

For the purpose of exercise, a disaster scenario of earthquake similar to the Gorkha earthquake of April 2015 is chosen. An earthquake of M 8 strikes at the western Nepal on a weekday 9 AM, i.e. busy office hour period. The susceptible liquefaction factor aggravates the situation and creates settlements of some residences in the area. In addition, the haphazard urbanization leads to many narrow roads being blocked. Few of the temples also collapse as they are already weak due to the recent earthquake. People panic and try to run to safe areas and instigate stampede. Infrastructure

such as water suppply, sewerage, and electricity lines are disrupted at few points. The major road is congested with traffic creating more panic and confusion. Some people try to take advantage and loot the valuables from the temples after the shaking has subsided.

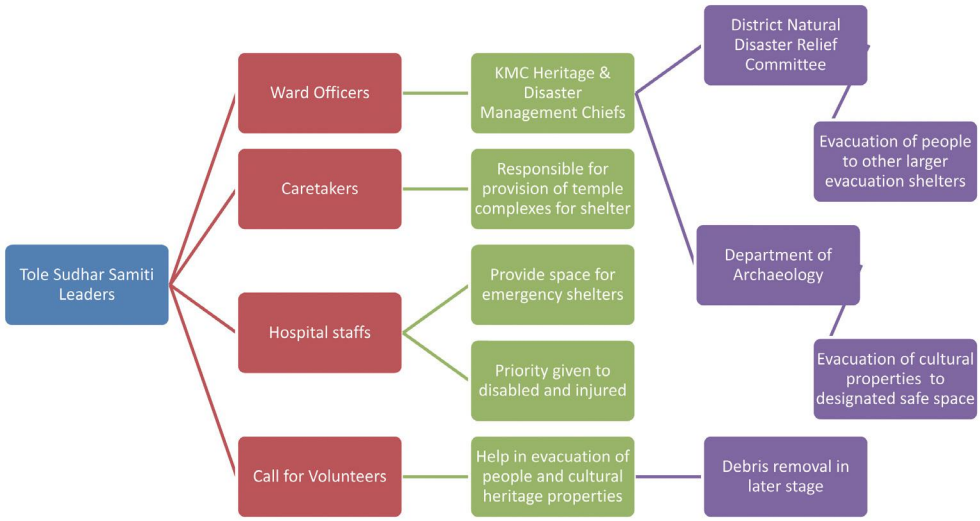


Fig. 4 Disaster Scenario for the site

5. Disaster Mitigation Measures & Recovery Activities

As an emergency preparedness, retrofitting of the sattals / courtyards need to be performed so as to create safe space for storage of cultural heritage properties and provision of temporary shelter space. Emergency evacuation could be done towards ghat areas as they might prove to be safer than other built up areas. The Ward chiefs, KMC's Heritage and Disaster Management chiefs, Local community leaders (Club leaders) – commonly known as Tole Sudhar Samiti etc. would be the emergency contact persons. The recovery activities that need to be implemented in short term and long term periods are given in the following Table.1.

6. Conclusion

The proposed site lies in the central area of Kathmandu Valley and forms an important component of Bagmati River. The importance of the heritage site is felt by general public as they continue to visit and carry on the daily ritual practice. Nevertheless, the site does not appear as a priority for related agencies related since they are more concerned with World Heritage Sites. Hence, preliminary restoration activities need to be initiated in order to attract investments for further implementation of rehabilitation action plans.

Table 1

S. No.	MITIGATION ACTIONS	IMPLEMENTING AGENCIES		FUNDING PROVISIONS
		PRIMARY	SECONDARY	
SHORT TERM				
1	Training on damage assessment survey to engineers and architects	Nepal Engineers Association (NEA), Society of Nepalese Architects (SONA)	Universities, DoA, KMC	NEA, SONA Volunteering
2	Damage Assessment of cultural properties (movable/ immovable)	NEA, SONA	Universities, DoA, KMC	NEA, SONA Volunteering
3	Prioritization of monuments/ structures to reconstruct	DoA	KMC, Guthi Sansthan, Local Community, NEA, SONA	DoA, NGOs
4	Emergency measures for affected cultural properties - Shoring/ Scaffolding of the temples/ structures	DoA & KMC	Local Committee, SONA, NEA	MoCTCA, Local Committees, Private sectors around the area
LONG TERM				
1	Set up a consortium/ authority to conduct projects of reconstruction assistance	DoA	KMC, Ward Offices, Local community	DoA
2	Reconstruction of cultural property structures as per priority	DoA	KMC, Local Volunteer Groups, SONA, NEA	DoA, KMC, Guthi Sansthan, Private Sectors such as Banks
3	Restoration of water supply system and sewerage system	KVWSMB	Ward Offices, KMC	MoUD
4	Restoration of telecommunication lines	Nepal Telecommunications Authority	Ward Offices, KMC	Nepal Telecommunications Authority
5	Restoration of electricity lines	Nepal Electricity Authority	Ward Offices, KMC	Nepal Electricity Authority
6	Improvements in road access	Department of Roads (DoR)	Ward Offices, KMC	Ministry of Physical Infrastructure and Transport (MoPIT)
7	Encourage and assure continuity of cultural activities in the area	Caretakers of the shrines	Local Community leaders	Caretakers of the shrines, Local Community leaders

References

1) A temple of dubious reputation, Nepali Times(1), 2000.
2) Coming soon: The Bagmati Heritage Walkway, Nepali Times, 2015, March 13-19.
3) DoA. (n.d.): काठमाण्डौउपत्यकाकासांस्कृतिकसम्पदाकाविवरण (Kathmandu Valley's Cultural Properties Inventory), Kathmandu: Government of Nepal.
4) Kathmandu Metropolitan City Office. (n.d.): Retrieved from www.kathmandu.gov.np/
5) Kathmandu Metropolitan City Office: The Teku - Thapathali Walkway Ahead, 2014.
6) KVDA & UNDP.: Support to Develop Risk Sensitive Land Use Plan (RSLUP) and Building Bye-Laws of Kathmandu Valley, 2014.
7) Manandhar H & Joshi M: Steps to the Heavenly Abode: Ghats of Kathmandu. Business Architecture, 2011, April.
8) Shilpakar M: Tripureshwar Mahadev Temple, Business Architecture, 2012, August.
9) Teku Thapathali Research Group Report, 1994.

2.3 Cultural Heritage in Middelstum, Groningen, the Netherlands

Ilse A.E. DE VENT
Senior inspector, Dutch State Supervision of Mines

1. Introduction

Gas withdrawal induces seismic events in the province of Groningen, the Netherlands. An area that has never been exposed to earthquakes before is now facing a major hazard. In the context of the International Training Course (ITC) on Disaster Risk Management for Cultural Heritage 2015, the risks for cultural heritage in the historical village of Middelstum have been assessed. The potential consequences of an earthquake are compared to those of a strengthening campaign.

2. The historical village of Middelstum

The north-eastern part of Groningen is characterized by flat, open polderland scattered with villages. There one finds some of the oldest remaining buildings in the Netherlands: brick masonry churches dating back to the 13th century. A typical, well-preserved example of such a village is Middelstum. Among the characteristic elements of Middelstum is a cluster of three wierden, man-made refuge mounds, a radial street pattern, and a strict boundary with water ways. Architectural features include the monumental 15th century church with wall paintings, historical buildings in the central area (protected village view), a windmill and several listed masonry houses from the early 20th century. Fig. 1 gives an overview of the cultural heritage attributes.

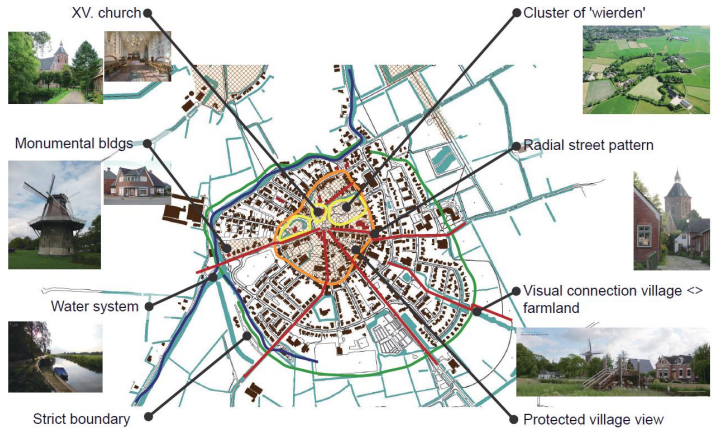


Fig. 1 Cultural heritage in Middelstum

3. Induced seismicity

Groningen has another, hidden asset: Europe's largest on-shore gas field. Government revenue amounts to about 10 to 15 billion euro on a yearly basis, circa 9 % of the total Dutch revenue in 2013. Its benefits, however, come with a drawback: induced seismicity. While this phenomenon was subject of discussion and research since the late 1980s, the size of its potential impact was only realized in 2012, when a relatively strong earthquake (M = 3.6 at a very shallow depth of 3 km) struck the village of Huizinge[1].

The Huizinge earthquake was the onset for a series of studies to better assess the risks of gas withdrawal in Groningen. These turned out to be much higher than expected: many of the Dutch masonry buildings are not earthquake-resistant. Therefore, a large-scale strengthening program has been proposed[2].

4. Risk assessment

Seismic events can have a devastating impact on cultural heritage. To truly assess this risk, not only the direct impact of an earthquake needs to be taken into account, but also its indirect effects. For the purpose of this ITC, two scenarios have been considered, see Fig. 2.

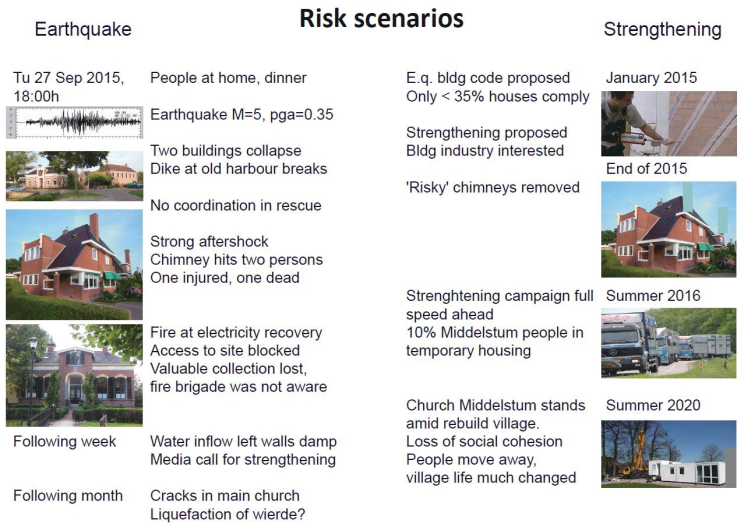


Fig. 2 Two scenarios.

The first scenario is that of a strong earthquake hitting the village of Middelstum. This would directly affect cultural heritage, for instance by damaging buildings. Indirect effects could include the outbreak of fire, a dike burst, or liquefaction of a *wierde*. Valuable collections or paintings could be at risk when, for example, the fire brigade is not informed on their existence. While this could lead to loss of material and objects, it should be realized that some cultural heritage attributes may also pose a threat in themselves, like high chimneys, fragile buildings and narrow streets.

The second scenario investigates the potential impact of the proposed strengthening campaign. Beginning 2015 over 60 % of all one-family houses in the area were assumed not to comply with the proposed norms for seismic resistance[3]. Reinforcing these structures would make typical Dutch buildings less vulnerable to seismic loading. Initial plans were to restructure 3000 buildings in 2015 alone, aiming at a similar amount in 2016[4] and probably continuing for several years.

The effect of a large-scale, regional strengthening campaign can hardly be overestimated. It would have an enormous impact on buildings and inhabitants alike. While improving structural response, the removal or reinforcement of architectural features would lead to a loss of original material and could easily damage the characteristic village view. In addition, full-scale implementation would imply people temporarily having to leave their houses. The social impact of such a campaign therefore needs careful consideration, since it may affect both tangible and intangible cultural heritage aspects associated with village life. The question arises: is this the appropriate way to reduce the risk ?

5. Prevention and mitigation

Based on above assessment, a number of risk-reducing measures are proposed, see Fig. 3. Apart from the vulnerability of existing building stock, strengthening and lack of (shared) knowledge are indicated as threats. A distinction has been made between organizational and technical measures, and between preventive and mitigating ones[5].

The most direct preventive measure would be to reduce or change gas extraction. Monitoring and documenting the state of objects would help to identify damage in an early state. In order

for strengthening of buildings not to become a threat in itself, cultural heritage experts and local communities should be closely involved, for example in developing strategies for prevention and recovery. This would also provide a more solid basis for emergency response, allowing coordinated actions of stakeholders in cultural heritage and disaster risk management.

Considering the village of Middelstum more specifically, cultural heritage can prove to be beneficial in times of disaster, too. For example, the *wierden* provide safe spaces for evacuation in case of flood events, see Fig. 4, while the radial street pattern allows easy access and exit. Specific attention for the role of cultural heritage elements within disaster risk management could strengthen their position in daily life.

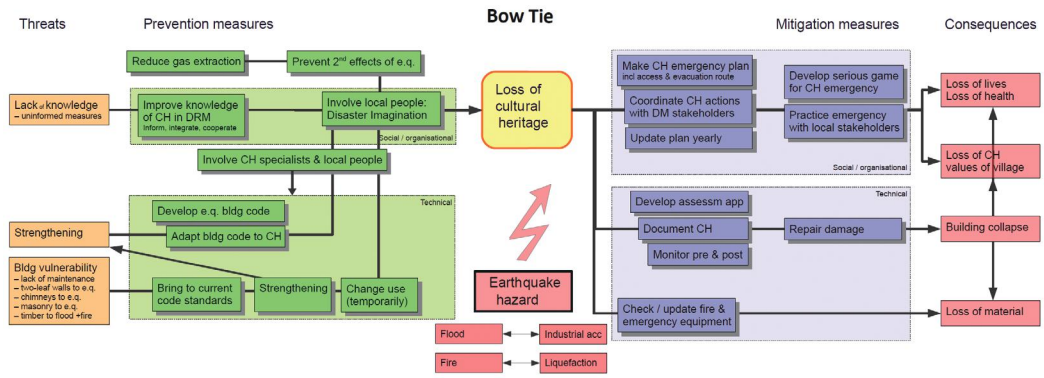


Fig. 3 Prevention and mitigation measures.

6. Recommendations

Three pilot projects are proposed for the Groningen area, see Fig. 5. They are aimed to better integrate cultural heritage and disaster risk management. The first pilot is to develop a smartphone application that assists in assessing and documenting the state of a building, while simultaneously providing feedback on preventive measures. The second proposal is to set up an emergency response training aimed at cultural heritage, by using a serious game that integrates real building information with the different stakeholder roles. The third suggestion is to organize local workshops in which community, municipality, and experts from cultural heritage and disaster risk management can discuss, share knowledge and views, and come to an integrated and supported approach.

7. Conclusions

While the impact of a major earthquake is being considered for the Groningen area, the impact of large-scale strengthening seems underestimated up till now. For rational decision making, the scope of disaster risk management should be widened, not only focusing on fatalities and direct costs in case of a disaster, but also including indirect effects on well-being[6]. Cultural heritage is part of this well-being and should therefore be an integral part of disaster risk management. Indeed, cultural heritage can help reduce the impact of a disaster. The ITC in itself proves how valuable a dialogue between professionals from disaster risk management and cultural heritage is – and how much this is needed.

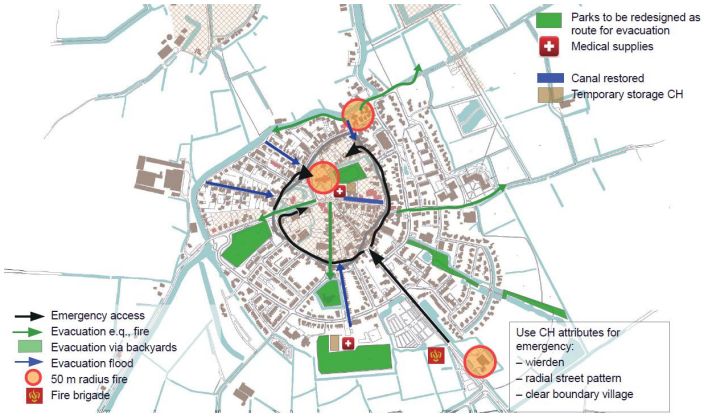


Fig. 4 Emergency plan for Middelstum and the role of cultural heritage in it

Fig. 5 Pilot projects.

References

1) de Vent I.A.E.: Bevingen, bodemstijging en zinkgaten: onvoorziene effecten van ondergrondse mijnbouw in Nederland. WTA studiedag Schade aan bouwkundig erfgoed door bewegingen in de ondergrond, 20 November 2015, Antwerpen, Belgium. English version titled Tremors & sinkholes: unforeseen effects of mining in The Netherlands, submitted for the 10th International Conference on Structural Analysis of Historical Constructions, 13-15 September 2016, Leuven, Belgium, 2016.
2) NAM: Hazard and risk assessment for induced seismicity Groningen – Update 1st May 2015.
3) Stuurgroep NPR: Impact assessment Nederlandse Praktijk Richtlijn Aardbevingsbestendig bouwen, 8 January 2015.
4) Centrum Veilig Wonen: Tweede kwartaalrapportage 2015, 28 August 2015.
5) ISO 17776: Petroleum and natural gas industries – offshore production installations – guidelines on tools and techniques for hazard identification and risk assessment, 2000.
6) UNISDR: Making development sustainable: The future of disaster risk management. Global Assessment Report on Disaster Risk Reduction, Geneva, Switzerland, 2015.

Acknowledgements

This paper has been written in the personal capacity of the author. The input from the Dutch Cultural Heritage Agency, Heritage Inspection, Libau, Ministry of Defence, Municipality of Loppersum, National Coordinator Groningen, Province of Groningen, Safety Region Groningen, Stichting Oude Groninger Kerken, UNESCO Netherlands and others is gratefully acknowledged.

2.4 Formulating Disaster Risk Management Plan for Ribt Ala Edeen, A Case Study from the Old City of Jerusalem, Palestine

Bashar I. HUSSEINI
Old City of Jerusalem Revitalization Program, Welfare Association

Fig. 1 General view of the Old City of Jerusalem

1. Introduction

This article briefs some of the important points concerning the knowledge gained in the R-DMUCH course for the case of a site inside the Old City of Jerusalem.

The Old City of Jerusalem (Fig. 1) is located in the center of the modern city of Jerusalem with an area of about 0.9 km2, the population is less than 40,000. The Old City gained its outstanding universal value not just of its historical, architectural values but also through its importance to the three- monolethetic religions. The Old city along with its surrounded historical walls was been inscribed on UNESCO's World Heritage list in 1981 and as a 'World Heritage Site in Danger' in 1982.

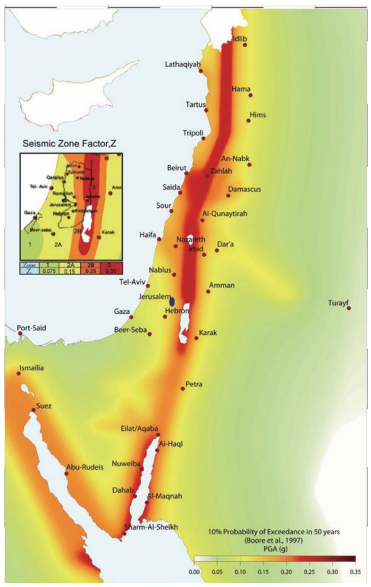


Fig. 2 Seismic Hazard Map

The Old City is suffering from the deterioration of the social, economic and housing conditions of its Palestinian residents as well as the deterioration of the physical conditions of its buildings, monuments and utilities. The ongoing conflict also affects its heritage and its management, especially the architectural heritage; which is been clearly seen through underground excavations, demolition of some historical buildings and the housing crisis for the Arab Palestinians because of preventing Palestinians (as well as adding obstacles) for the construction of new buildings inside the city. This affects the Old City through the huge pressure implied from its residents to add inappropriate additions to the historical buildings. On the other hand, the Old City is located in a seismic area (Fig. 2), where it is expected that every 100 years a strong earthquake affect the Middle East including Jerusalem city.

Strong earthquakes rocked Jerusalem and its environs several times throughout the history and the last of which occurred in 1927 (7-8 Richter) caused loss of life and buildings. Strong earthquakes are expected to strike the region again with a 90% probability in the next 50 years.

2. Selecting a Case Study

A historical group of buildings was been selected as a case study to formulate a DRMP inside the old city "Ribat Ala-Aldin al-Basir and Ribat al-Mansouri (Fig. 3)", which is one of the earliest Mamluk buildings in the Old City of Jerusalem. It was found in year 1267 and originally built as a pilgrim's hospice, later, during the ottoman period was used as a prison until 1914 and since then used as a residential complex. The site area is located near one of the entrances of the Aqsa Mosques (which is the 3rd important religious building for Muslim in the world). It consists of a group of buildings, mainly two ribats which consists of cells (small rooms) around inner courtyard. During the last decades, new concrete additions were added to the cells covering most of the courtyard.

Fig. 3 The Entrance of Ribat al-Mansouri

3. Site Analysis (Attributes, values)

The site was analyzed thoroughly in addition to the site attributes and values (Fig. 4). In addition to that the management of the site includes several parties: * the owner (the Jordanian governmental and Awqaf endowment department), * Palestinian NGOs Heritage organizations, * the Palestinian Authority, * the Israeli Occupation Authorities (including Antiquities Authorities, Jerusalem municipality and other Israeli departments such as fire department, civil defense, Police, parks, nature, …etc), and * the International team as it is a world heritage site like UNESCO (ICOMOS/ICCROM experts)

	Attributes of your Site and their location (Refer Map)	Type of attribute	Associated Values (in bullets).	Stakeholders for these values	Scores for each Value 1(low), 2(Medium), 3(High)
1.1 1.2 2.	- Ribat Ala-Aldin al-Basir Cells (The Ancient Historical Parts of Cells (Now used as part of Residential units from) 1.1 till 1.16) - Entrance inscription and special colored stone. **(Red Color)** Entrance, Porch, inscription and special colored stone. **(Blue Color)**  New Additions (Residential) **(Green Color)**	Immovable / tangible/ Cultural Immovable /	• Outstanding Universal Value (criteria 2+3+6). • Historical (Mamluk Period). • Architectural Style (Ribat Design) . • Authenticity (design) • Location and Context (close location to the al-Aqsa mosque and Dome of the Rock) • Social(African Community) • Residential. • Aesthetic Value • Aesthetic Value • Economical (Livelihood especially in religious occasions like Ramadan month Social (Private Space)	• International Community (Unesco) • Users(Residents). • Owners (Arab Awqaf Department). • Heritage NGOs (Palestinian). • Local Committees. • Palestinian Authority. • Israeli Municipality. • Israeli Antiquities Authority. 	2 3 3 3 2 3 3 2 1

Fig. 4 One of the tables showing the analysis of the attributes and its values and site

4. Risk Assessment

After the risk assessment was done to the site and the city as a whole, several hazards and threats were identified whether it is natural or man-made in which the most catastrophic hazards are Earthquakes, political conflict, underground excavations, and unplanned expansion.

The Vulnerabilities of the site are: 1) urban pressure, 2) high density, 3) lack of maintenance, 4) past Interventions and inappropriate additions, 5) Concrete Usage in restoration projects, 6) lack of Management Strategy, 7) lack of proper Infrastructure, 8) lack of stakeholders' coordination, 9) narrow streets, 10) small entrances and 11) limited accessibility, 12) lack of monitoring and alarm system as well as 13) weak structures.
The impact of the above vulnerabilities may vary depending on the hazards and threat as well as its density, which may cause loss of life and loss of historical buildings, structural damage and loss of values.

5. Mitigation

The suggested mitigation measures included are:

- Short term measures such as advanced Inventory and documentation with structural study and behavior with survey of the underground layers, soil examination especially the tunnels and its surroundings. Extended survey of the site and surroundings including 3D laser scanning of the current situation as well as simulation of the disaster (mainly earthquake). Applying Technical Measures for strengthening consolidation of historic structures against earthquakes. Help to propose evacuation plan including new exits, emergency routes safe areas and signage system especially to open areas like Aqsa Mosque yards (Fig. 5). Specialized Training for Involved People in Risk Mitigation, Preparedness
- Long-term measures such as Help Create Community based Risk Management committee, drills and of course the political solution to be solved. Propose special activities for professionals as well as community members in Formulating Fire /escape Risk Plan, Earthquake Risk Plan

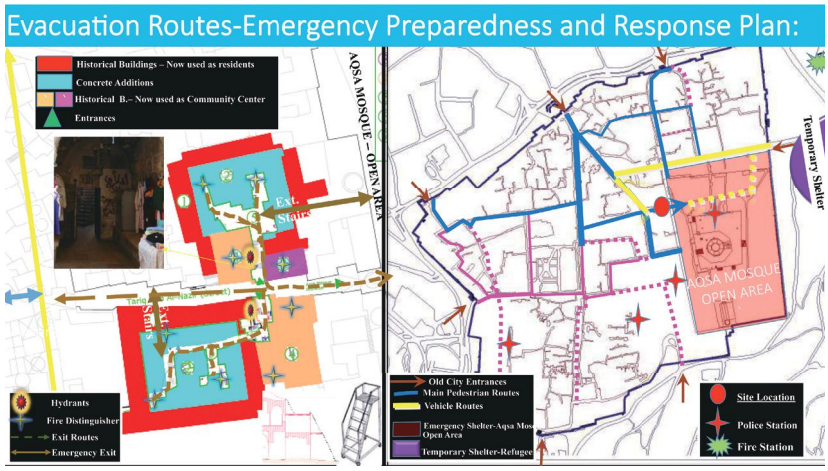


Fig. 5 Evacuation Routes-Emergency Preparedness and Response Plan:

6. Emergency Response and Recovery plan

In the event of significant damage to the site, response and recovery measures are required. Immediate action should address the immediate humanitarian response focusing on making the site safe. After that the inspection of the site with rapid assessment including preliminary documentation in the medium term will be applied in which actions is taken so as to prevent further loss and stabilize the unstable structure. Advanced documentation in the long term should be taken as a first step in

preparing the redevelopment of a comprehensive DRMP for site including hopefully the substantial reconstruction of additions and redevelopment of the site to minimize the threats (Fig. 6).

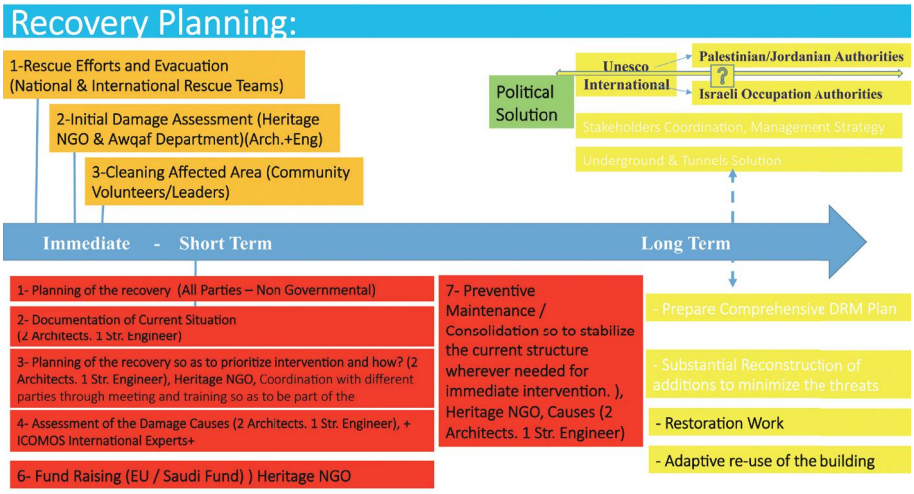


Fig. 6 Preliminary Recovery plan

7. Conclusion

The main goal of this assignment was to formulate a DRM plan to prepare a safe environment for Ribat Ala Edeen site inside the Old City of Jerusalem to be a model for the other sites inside the old city as well as Palestine as a whole. the assignment has helped in identifying what is required to achieve the above:

- Help in establishing and Outreach Program for risk preparedness/ mitigation to minimize the threats as possible.
- Help in creating a Special Program to formulate a Cultural DRM Policy to formulate an Earthquake risk plan for the site as well as fire risk plan for the site including evacuation plan.
- Help in rehabilitating/consolidating buildings so as to be Earthquake proof and minimize the loss of people and Heritage to minimum.

Formulating DRM in this case concentrated on the community based / NGO level as the reaching the other levels of engagement needs a political decision and solution for the city of Jerusalem. Until now, Jerusalem is still under occupation and dispute is not likely to be resolved in the next few years, so the proposed work need to understand the status quo of the city as well as respecting the parties involved, especially the occupied side. This can be done also with the help of International Actors such as UNESCO/ICOMOS ..etc.

References

1) Rohit Jigyasu, Vanicka Arora : CULTURAL HERITAGE IN URBAN AREAS - A Training Guide, published by Research Center for Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University(RitsDMUCH), Kyoto, Japan, 2013.
2) Welfare Association - OCJRP Archives, HYPERLINK "http://ocjrp.welfare-association.org/en/" http://ocjrp.welfare-association.org/en/
3) *Mamluk Jerusalem: An Architectural Study* by Michael Hamilton Burgoyne, D. S. Richards, British School of Archaeology in Jerusalem by the World of Islam Festival Trust, 1989.
4) http://www.sasparm.ps/en/?page=one&cat=21 *website visited in 9-8-2015*
5) Other Internet websites

2.5 Water-based Cultural Landscape Values and Disaster Risk Management of Ban Pak Klong in Bangrakam Sub-district, Phitsanulok Province, Thailand

Witiya PITTUNGNAPOO
Faculty of Architecture, Naresuan University, Phitsanulok, 65000, Thailand

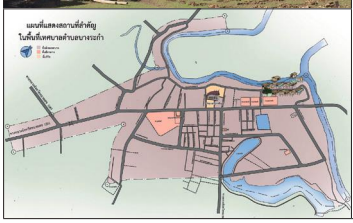
1. Introduction

Ban Pak Klong is a small traditional fishing village located along the Yom River in Bangrakam Sub-district in Phitsanulok Province, the North Region of Thailand. The total area of this sub-district is about 3 square kilometers with the total of population of 4,653 persons who are Buddhist (100 percentages). Ban Pak Klong has reflected how people have learnt to adapt their living spaces in harmony with flooding. Adaptability in water-based architectures and water-based cultural landscapes have been unique attributes which can be seen in either tangible or intangible aspects (Bangrakam Sub-District Municipality, 2014).

2. Water-based Cultural Landscape Values

There are various attributes and values of water-based cultural landscapes in Ban Pak Klong; especially their local knowledge on adaptability to flooding which can be seen in water-based architecture (raft houses, and stilt houses), water-based landscapes, water-based livelihood, wooden canoes, and fishing wicker works. However, the main attributes with high values are water-based architecture which was selected for further assessment to deal with flooding disaster in this study; as its values can be seen both tangible and intangible as shown in Table 1.

Table 1

Attributes: Water-based Architectures	Associated Values	
	Tangible	Intangible
Raft houses  Stilt houses   	・Rarity ・Unique housing characteristics - Floating houses/ Rafts - Wooden stilt houses - Wooden structure/ bamboo elements - Built with local materials - Open planned - Adaptability of domestic spaces ・Continued use - Practical use during wet/ dry season ・Ecological value - Friendly environment/ Energy saving ・Economic value - Fishing for living ・Traditional settlement - Amphibious settlement ・Visual value - River link ・Cultural value - Daily used of wooden canoes - Fishing instruments wicker works - Bamboo pontoon/Buoyancy	・Local wisdom - Integrated knowledge to water - Bamboo floatation - Local building technology -Amphibious ways of living (Swimming, canoe rowing, fishing) - Fishing instruments wicker works ・Cultural values - Vernacular building styles/ Identity - Water-based culture - Water-based festival - Wooden canoe racing

3. Disaster Risk Management

Long stay flooding is a potential scenario; due to several driving forces which are monsoon and depression, climate change, upper stream dam collapsed due to earthquake, mismanagement of heavy rain, block from upper and lower built-up areas, rapid urbanisation, road development, loss of agricultural land and natural drainage system, expansion of built-up areas, and failure of land use planning. These rampant factors have resulted in long stay flood scenario leading to building collapsed, electricity leakage, some people injured, land sinking, soil erosion, road blocked, no water supply, no food, no toilets, loss of belongings, no living spaces, loss of kinship, and decline in water-based architectures and cultural landscapes in eventually as presented in Fig. 1.

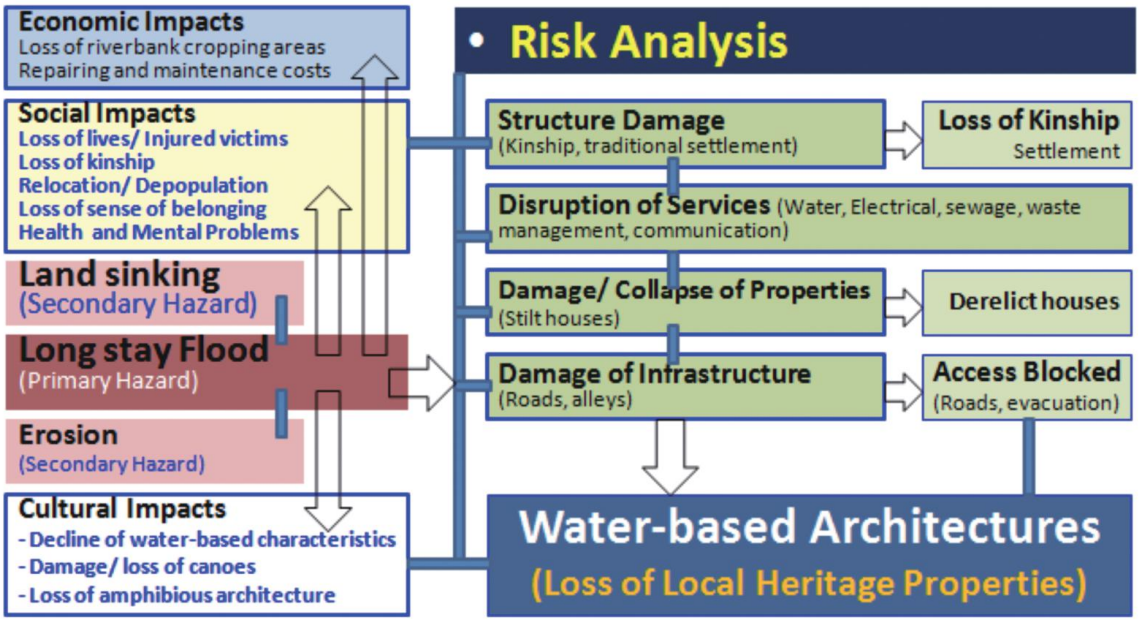


Fig. 1 Risk Analysis

To deal with the long stay flooding scenario in more comprehensively; there are three salient mitigation approaches will be implemented, namely, physical, social, and awareness interventions in either short term or long term and for achieving this collaboration across relevant organizations is required to work together as illustrated in Table 2.

Table 2 Flooding Mitigation Approaches for Water-based Architecture

<table>
<tr><th>Impacts</th><th colspan="2">Mitigation Approaches</th><th>Stakeholder</th></tr>
<tr><td rowspan="2">- Damage of property/ materials
- Collapsed Buildings
- Loss of Safety/ Loss of lives
- Lack in access to food, water, toilets, basic infrastructure
- Road blocked
- Loss of vernacular architecture
- Loss of local wisdom
- Relocation/ Derelict houses
- Decline in water-based uniqueness
- Repairing/ maintenance costs
- Decline in kinship settlement
- Health and mental problem</td><td>Short term</td><td>Long term</td><td rowspan="4">Local Level:
- Bangrakam Municipality (Mayor) Provincial Office
- Provincial Office of Disaster Risk
- Prevention & Mitigation Dep.
- Temple (Priest)
- Provincial Tourism'
- Local communities
Regional academic:
- Naresuan University (Architecture, Sociology, Humanities, Heritage, Agriculture, Environment etc.)
National Level:
- Office of National Resources and Planning
- ICOMOS, Thailand
- Department of Cultural Promotion
- Anthropological Centre of Ministry of Culture
- Department of Tourism
International Level:
- ICOMOS, Thailand
- UNESCO Bangkok
- SEAMEO SAPAFA</td></tr>
<tr><td>Physical Interventions
- Strengthen structure
- Apply water-resistant materials to exposed areas
- Proper material uses
- Green buffer zone
- Soil stabilisation
- Supply of daily uses</td><td>Physical Interventions
- Flood risk management policy
- Flooding adaptation strategies
- New building development
- Erosion control
- Green embankment
- Underground water tank
- Infrastructure development
- Dam reinforcement</td></tr>
<tr><td>Vulnerabilities</td><td colspan="2"></td></tr>
<tr><td>- Proximity to the river
- Weak structure
- Improper reconstruction
- Lack of maintenance
- Non-waterproof materials</td><td>Social Interventions
- Building adaptation Guide
- Promote kinship
- Regular maintenance
- Flood forecasting and warning system
- DSM teamwork
- Operational plan</td><td>Social Interventions
- Wetland Protection Act
- Building regulation
- ssue land tenure
- Mitigation initiatives
- Mitigation team building
- Disaster logistics plan
- Flood insurance
-Local Heritage team</td></tr>
<tr><td></td><td>Awareness Interventions
-Flood preparedness
-Health guide
-Increase community ties
-Knowledge transfer</td><td>Awareness Interventions
-Community capacity building on local heritage management
-Workshop/ DRM Trainings
-Local heritage preservation</td></tr>
</table>

4. Recovery Plan and Emergency Response

The recovery plan and emergency response has been proposed in advanced to relevant stakeholders in line with physical, social, and awareness interventions to achieve future sustainability. Available funding sources are crucial factor to push planning into practice that challenges for locals to work collaboratively with relevant organizations. Each stage of recovery plan with more details is illustrated in Fig. 2.

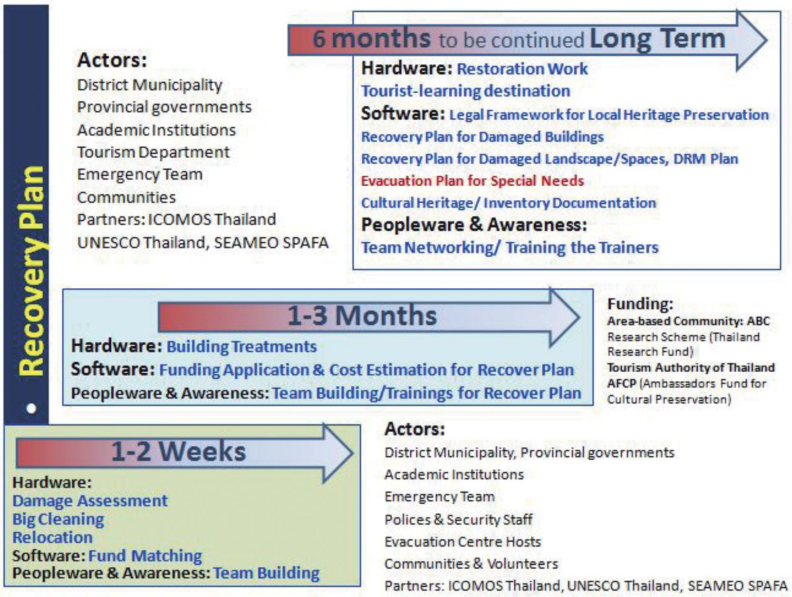


Fig. 2 Recovery Plan

Emergency plan during flooding has been designed by integrating with indigenous knowledge. Evacuation routes are considered for flow of people, flow of movable heritage, and flow of food supply based on kinship settlements; while canoes are used as emergency engines to evacuate people which can be used as storage and waste collecting vessels also. Existing evacuation centers are officially provided by local authorities and emergency response team should be assigned with relevant bodies, namely, the Mayor of Bangrakam Sub-District who is a site manager, local officers, local leaders, security team, and evacuation center hosts.

5. Conclusion

This paper reflects integration between cultural heritage and disaster management. Before investigating impacts or preparing for disaster risk management; it is important to understand values of cultural heritage first. This paper shows how importance of water-based architecture and cultural landscape are; as these areas have been few considered by Thai scholars. Without proper planning and flooding risk management water-based traditional communities as national heritage settlement of Thailand may be no longer exist. Further applications on how to achieve sustainable and resilient future are challenging to maintain local heritage to survive against disaster.

References

1) Bangrakam Sub-District Municipality: 3 Year Development Plan (2015-2017), Bangrakam District, Phitsanulok Province, 2014.
2) Bangrakam Sub-District Municipality: Action Plan of 2015, Bangrakam District, Phitsanulok Province, 2014.

2.6 Disaster Risk Management for Bam and its Cultural Landscape in Iran

Mohammad RAVANKHAH
Academic assistant in Department of Environmental Planning & PhD candidate in International Graduate School: Heritage Studies, Brandenburg University of Technology, Germany

1. Introduction

Iran is situated in the Middle East and borders the Caspian Sea, Persian Gulf, and Gulf of Oman. Iran is one of the oldest civilization worldwide according to its cultural evidence such as Shahr-i Sokhta (Burnt City) dating back to 3200 BC. “The Iranian plateau is part of the major Eurasian plate with the tectonic setting of the region dominated by the collision of the Arabian, Eurasian and Indian plates” (Manafpour, 2003) and therefore, the major destructive natural hazard in Iran is earthquake.
One of the recent tragic seismic events in Iran was a magnitude 6.6 earthquake which struck the city of Bam in December 2003 and caused a serious loss of life and enormous destruction of cultural heritage (Fig. 1). The city of Bam is located in a desert environment in the southeastern of Iran, and “the origins of Bam can be detected to the Achaemenid period, 6-4th cent. B.C.” (Bam’s WH nomination, 2004). Immediately following the earthquake, Bam and its Cultural landscape has been inscribed on the UNESCO WH list in 2004 through an emergency nomination.

2. Heritage Value Assessment

The most visible part of the property is Arg-e Bam (Bam Citadel) which was residential till 19th century and was gradually abandoned through migration of local people to the buildings within their date palm orchards surrounding the citadel. Bam citadel is an outstanding example of fortified and trading settlement in the Central Asian region that was located at the crossroads of the Silk Road trade routes (Bam’s WH nomination, 2004). The structure of this well-known earthen architecture is based on combined mud layer (Chineh) with sun-dried mud bricks (Khesht). Another important element of the property is Qanat which is an ancient underground irrigation system vital for continuity of cultivation in such an arid environment. The values of the property and its setting (Fig. 1) have been assessed in regard to the following tangible and intangible attributes by a value assessment matrix, developed in the ITC workshop 2015.

- Tangible attributes: Arg-e Bam, surrounding architectural structures, Qanat, date palm orchards, archaeological sites, surrounding vernacular architecture, valuable collections in the citadel;
- Intangible attributes: earthen construction know-how, religious rituals and ceremonies in the citadel, social structure of Qanat water distribution system, traditional life-style.

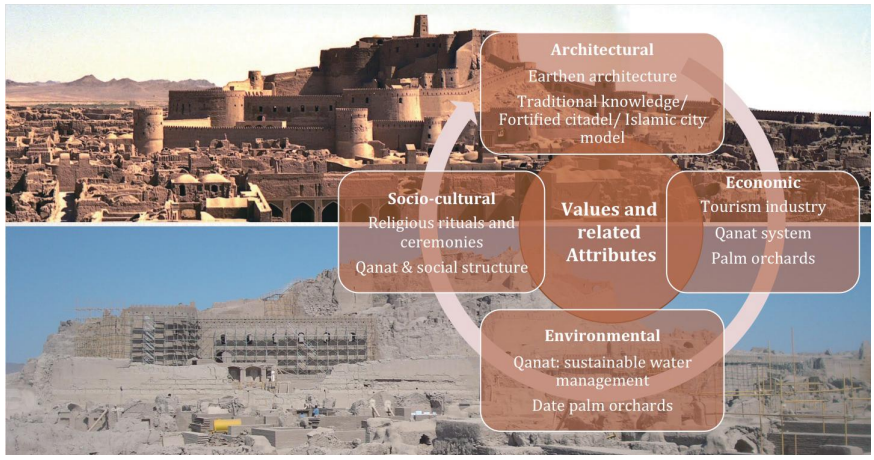


Fig. 1 Values and associated attributes of Bam and its Cultural landscape. Arg-e Bam, before the earthquake ©Fernand Mobu, 1999; and after the earthquake ©Moh Ravankhah, 2008

3. Disaster Risk Assessment

In order to identify and analyse disaster risks, the elements of risk including 'hazard' and 'vulnerability' need to be assessed. Vulnerability itself can be determined by a combination of exposure, sensitivity, and existing DRM system. Apart from structural sensitivity, vulnerability of cultural properties to natural hazards is greatly linked to pre-disaster interventions. In the case of Arg-e Bam, Langenbach (2005, p. 1) argues that it was not only the earthquake caused such a huge damage to the citadel, but "the collapse of the walls was caused largely by a combination of the effects of the additive changes made to the walls during recent restorations (…), damage from termites, and loss of the cohesion of the clay from drying out". Some other factors such as improper interventions resulting in changes to the original plans and seasonal winds and sandstorms contributing to poor seismic-resistance of Bam citadel are also mentioned by Mokhtari, Nejati, and Vatandoust (2008, p.314).

A disaster scenario has been developed for the case of Bam. In an integrated approach, the above mentioned risk elements have been assessed "in a multi-hazard context considering primary hazard, secondary hazards, and potential human-induced threats and human-errors during and after a disaster" (Ravankhah and Schmidt, 2014) (Fig. 2). The risks have been analysed based on four main criteria of probability of hazard/ disaster, severity of damage/ loss, level of uncertainty of data, and loss in heritage values (based on ITC 2015). The last criterion, "the consequence in terms of loss of value", has been stressed by Jigyasu et al. (2010, p. 29) as an additional specific criterion which reflects impact on particular features of a World Heritage site conveying its Outstanding Universal Values.

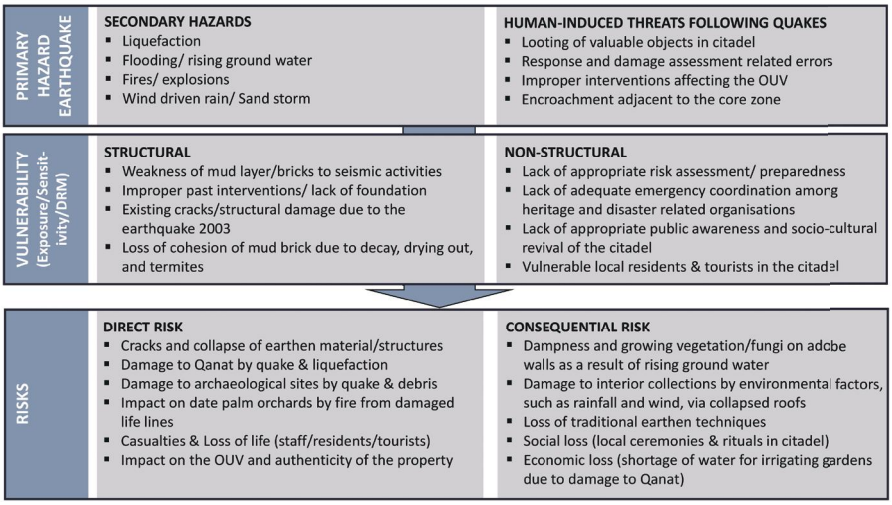


Fig. 2 The process of risk identification based on multi-hazard and vulnerability assessment

4. Disaster Risk Management

To ensure the effectiveness of the site's DRM, it should be integrated into the overall urban planning and disaster risk management system of the city of Bam through a multi-stakeholder mechanism. Fallahi (2008, p.22) states that "although the Bam earthquake was the immediate cause, this destruction instigated a process of urban renovation" in which "many elderly buildings and structures were demolished in order to allow for the construction of stronger and sturdier structures". Based on the output of risk assessment, a disaster risk management (DRM) plan including risk mitigation, preparedness, and recovery has been prepared for the property as follows:

4.1 Mitigation strategies

MITIGATION STRATEGIES			
Short Term Strategies	Main Actors	Long Term Strategies	Main Actors
Reviewing and updating **existing data- base** of cultural properties and natural/human-induced hazards	*ICHHTO/ KDMO Municipality*	Integrating DRM of the property into the exiting urban planning/ urban DRM to enhance **multi-sector cooperation**	*ICHHTO/ KDMO/Bam municipality*
Developing **fire prevention measures** via installing fire detective, fire hydrant, and early warning system	*ICHHTO/ Fire department*	**Retrofitting of adobe structures** using traditional and modern techniques, while considering the OUV/ authenticity	*ICHHTO*
Stabilising those parts of the citadel and Qanat which seriously cracked and damaged by the earthquake 2003	*ICHHTO/ OPMBCL*	**Regular maintenance** of the citadel and Qanat to improve seismic-resilience and effectiveness of risk preparedness	*ICHHTO/Bam recovery office*
Identifying local, national, and international **stakeholders** to support the DRM plan/ **Fundraising activities** among private and public sectors	*ICHHTO/ KDMO*	Determining **specific retrofitting methods & codes for earthen constructions** in order to strengthen adobe structures	*ICHHTO/Bam recovery office*
Promoting **DRM of the property in the Comprehensive Management Plan** of Bam and its Cultural Landscape (2008-2017)	*ICHHTO/ Bam municipality/ OPMBCL*	Promoting **coping capacities** of local staff/people and responsible organisations via seminars and workshops preferably inside the Arg	*ICHHTO*

ICHHTO: Iranian Cultural Heritage Organization, OPMBCL: Office for Planning and Management of Bam and its Cultural Landscape, KDMO: Kerman Disaster Management Organization

4.2 Emergency response

PREPAREDNESS/ EMERGENCY RESPONSE	
Strategies	Main Actors
Establishing a multi-sector **emergency response team** and chain of commands	*ICHHTO*
Preparing a **directory of emergency-related contacts**	*ICHHTO/ KDMO*
Preparing an emergency evacuation plan/layout in case of fire and earthquakes	*ICHHTO/ KDMO*
Installing **early warning system** (earthquake/ fire) and fire hydrant/ extinguisher, while considering the OUV of the property	*ICHHTO/ Fire department*
Regular inspection of the lifelines and installations, as well as emergency equipment	*Municipality/ ICHHTO*
Developing **emergency drills and communicating the updated emergency plan** with local staff & people through training workshops	*KDMO/ ICHHTO/ Police/ Fire department*
Providing **evacuation and salvage plan for movable cultural heritage**, and identifying **safe storages** to protect them from damage and theft	*ICHHTO/ Police*
Identifying **water sources** connected to Qanat and related streams for fire prevention	*ICHHTO/ Fire department*
Generating a **risk map** including cultural heritage value map, hazard boundaries, and vulnerability map	*ICHHTO/ Bam municipality*

4.3 Recovery plan

RECOVERY PLAN			
Short Term Strategies	Main Actors	Long Term Strategies	Main Actors
Damage assessment of the citadel (specifically the in-use buildings), Qanat system and surrounding attributes	*ICHHTO/ Bam recovery office*	**Retrofitting** of the affected adobe structures and Qanat, using traditional and modern techniques, while considering the OUV & authenticity	*ICHHTO/ Bam recovery office*
Establishing a multi-disciplinary restoration/**recovery team** including CH and DM agencies & specialists	*ICHHTO/ OPMBCL*	**Archaeological excavation** and investigation within the citadel and its surrounding with a full documentation	*ICHHTO/ Bam recovery office*
Documentation of the new situation and **preparing updated data-base** considering newly emerged layers and objects/ updating the inventory and map of cultural heritage	*ICHHTO/ Bam recovery office*	Developing investigations and workshops on strengthening **seismic-performance of adobe structure** using traditional and modern techniques	*ICHHTO/ Bam recovery office*
Stabilising those parts of the citadel and Qanat which seriously cracked and damaged by the earthquake, liquefaction and fires	*ICHHTO/ Bam recovery office*	Promoting **tourism industry** through encouraging **private sectors**/ improving tourism facilities in citadel	*ICHHTO/ Municipality*
Restoration of those buildings which are used for rituals and ceremonies to revival the **socio-cultural values** of the property	*ICHHTO/ Bam recovery office*	Integration of heritage into **risk preparedness training programme and drills** in the city	*KDMO/ ICHHTO*

References

1) Fallahi A : An Interdisciplinary Analytical Study on the Risk Preparedness of Bam and Its Cultural Landscape, a World Heritage Property in Danger in Iran, Australia, The Australian Journal of Emergency Management, vol. 23, no. 2, pp. 21-30, 2008.
2) ICHHTO, World Heritage Nomination for Bam and its Cultural Landscape, Iranian Cultural Heritage Organization, 2004.
3) ITC 2015, 10th International Training Course (ITC) on Disaster Risk Management of Cultural Heritage, organized by Ritsumeikan University as part of the UNESCO Chair Programme on Cultural Heritage and Risk Management, 12th to 28th September, 2015, Kyoto, Kobe and Tohoku area, Japan.
4) Jigyasu R, et al.: Managing disaster risks for world heritage. UNESCO World Heritage Centre, ICCROM, ICOMOS, IUCN, Paris, 2010.
5) Langenbach R: Performance of the Earthen Arg-e-Bam (Bam citadel) during the 2003 earthquake, Earthquake Spectra, volume 21, no. S1, Earthquake Engineering Research Institute, pp. 345–374, 2005.
6) Manafpour A: The Bam, Iran Earthquake of 26 December 2003, Field Investigation Report, Halcrow Group Limited, EEFIT, 2003.
7) Mokhtari E, Nejati M and Vatandoust R: Consolidation and Reinforcement of Destabilized Earthen Structures in Bam after the Earthquake of December 2003: Some New Approaches. International Collaborations to Preserve Earthen Architectural Heritage. Terra 2008, pp. 312-316 2008.
8) Ravankhah M, Schmidt M: Developing Methodology of Disaster Risk Assessment for Cultural Heritage Sites. Residential Doctoral School (RDS) at 4th International Conference on Building Resilience, Salford Quays, UK, 8-10 September 2014. Conference proceeding. pp. 13-22 http://www.preventionweb.net/english/professional/publications/v.php?id=41475, 2014.

2.7 Integrated Disaster Management Plan: The Archeological Area of Agrigento, Valley of the Temples, Italy

Aurelio DUGONI
Regional Director of Sicily Committe of National Association of Public Assistance

1. Introduction

"the value of planning is reduced in proportion to the complexity of the state of things".
Emperor Octavian Augustus

The park, covering some 1300 hectares, retains an extraordinary architectural heritage and landscape that includes the ruins of the ancient city of Akragas and the territory surrounding it to the sea. In the Valley of the Temples, declared in 1997 by UNESCO "World Heritage", it is one of the largest archaeological sites in the Mediterranean (Fig. 1)

Fig. 1 Valley Of the Temples - Source: Park Management Authority

Designed with an unique agricultural landscape the Valley is characterized with ancient olive trees and almond trees. Akragas (the ancient name) was one of the most important Greek colonies in Sicily, extended about 450 hectares, founded around 582 BC by settlers from the nearby Gela and from Rhodes. During the years of democracy (471-406 BC) established by the philosopher Empedocles of Akragas it was built the extraordinary series of Doric temples of the southern hill. (Fig. 2).

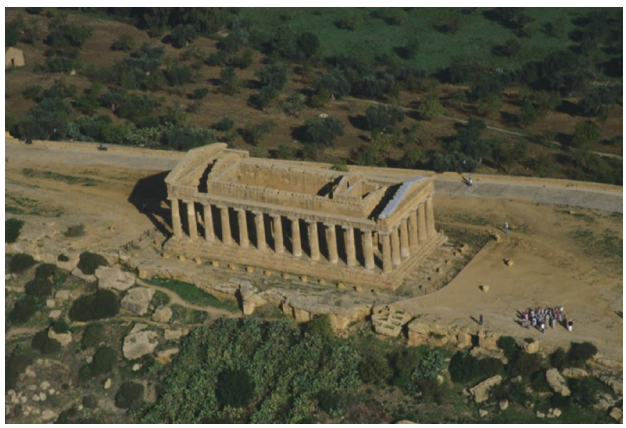


Fig. 2 Concordia Temple – Source: Park Management Authority

During the Punic Wars Akragas was the basis of the Carthaginians against the Romans in 210 BC They conquered it and changed the name to Agrigentum. Under Roman rule the city went through another period of prosperity also linked to trade sulfur (II-IV century AD.). In Christian times the Hill of the Temples were built churches and cemeteries. When in 829 the city was conquered by the Arabs living quarters were already perched on the hill of Girgenti, called by the name of the medieval city (from Gergent or Kerkent), which covers the present-day town of Agrigento

2. Attributes and Values

The UNESCO Committee decided to inscribe the Vally on the basis of criteria (i), (ii), (iii) and (iv), considering that Agrigento was one of the greatest cities of the ancient Mediterranean world, and it has been preserved in an exceptionally intact condition. Its great row of Doric temples is one of the most outstanding monuments of Greek art and culture (Table 1).

Table 1

WATH	ATTRIBUTES	VALUES
One of the most big city in the Mediterranean area during the Ellenic Period	Archeological tangible area over a Plateu surronded by 2 rivers	Very High Archeological
The 10 Doric Temples and the 4 Shrines	Unique examples of Greek Art, and Architectural structures survived from the iV Century B.C.	Very High Architectural
The Roman and Early Christian Necropolis	Historical examples of the different ages have been developed in the Area	Very High Historical
Kolimbethra Garden	Water Management system to collect water for agriculture	Very High Technologic Agriculture and Social
Landscape Design	Unique Landscape Planning Community based	Very High Identity
Regional Archeological Museum	Unique collection of archeological and historical relics from Greek and Roman period	Very High Historical
Table - *Source:* Author		

3. Hazards and Vulnerability

The Valley Of the Temples is vulnerable to a range of natural disaster and , unfortunally , human interferences (Fig. 3). There is no recorded evidence of damage due to seismic actitvity, even if the Valley is not far from the Belice Valley where, in 1968, a major earthquake, destroyed cities with great losses. In 1865 a landslide hit the east part of the valley, fortunally without consequences for the Doric temples. The 19 July 1966 a major Landslides of 45 Hectares strike the west of Agrigento, Despite this, the main hazard is the heavy rain ad soil erosion with landslide possibility.

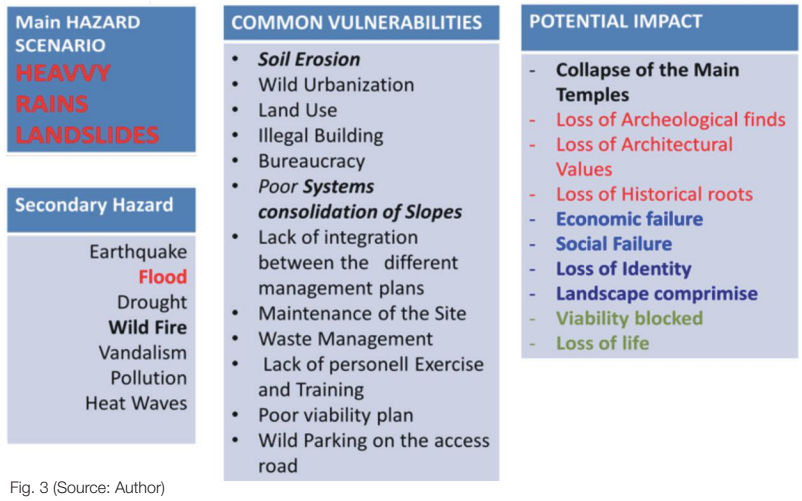


Fig. 3 (Source: Author)

4. Emergency Preparedness and Response

The Protection of Cultural Heritage is established by the Italian Constitution - Art. 9 – In 2004, with the new Code of Protection of Cultural Heritage and Landscape, Italy have a Legal Framework as basis for all the next Laws on this topic. The National Service for Civil Protection System established in 1992, in the Art. 1/bis declare to protect and to prevent disaster for human and all the goods and properties included Heritage and Landscape. The Organized Volunteers are one of the most important operational component of the Italian Civil Protection System – Art 11 – Law 225/1992. The Sicily Region , among their Civil Protection Operative Functions have " the Cultural Heritage" issue among the permament component in the emergency situations. Despite this important statment the problem is to integrate the "existent" differents plans, managing by several actors in the scenario. Actually the status quo in the Valley Mangement to prevent and to respond to disasters or natual hazard is represented in the Fig. 4.

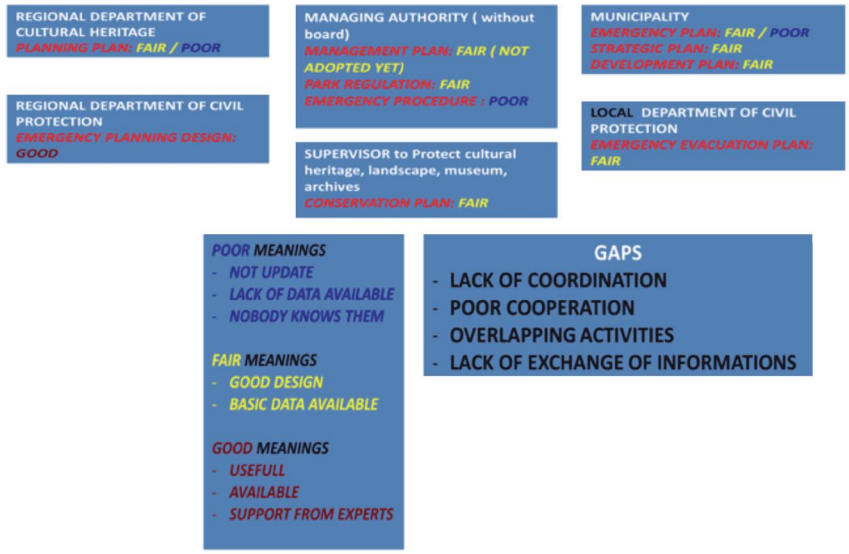


Fig. 4 (Source: Author)

5. The Integrated Plan (Fig. 5)

The goal is to integrate the existing plans in one INTEGRATED Emergency Plan, with the different actors and stakeholders, involved for their main responsibility and duties. A solid cooperation amongst actors is needed to avoid overlapping activities and to save money that could be allocate to preparedness measures and prevention exercise. One of the main Actor for the implementation of the Integrated plan is the Municipality of Agrigento, that according to the Civil Protection law, is the main authority in case of emergency. Another important issue is represented by the Organized Volunteers and the communities that are actually involved in the management of the Valley: professional, experts, touristic guides, citizens. Communities engagement is the key to have a clear prevention and day by day, prevention measures on the possible response to natural or man-made hazard (i.e. wildfire). Periodical exercise and, or drills, permanent training and cooperation between institutions are important assets that the INTEGRATED Plan should be take in account.

GOALS
- Integrated Emergency Plan
- Set Up of CLUSTER to Share Informations among Actors
- Set up of CLUSTER of Volunteers trained to protect Cultural Heritage

OUTCOMES
- Agreement with Valley Managing Authority
- Agreement with Municipality
- Agreement with Superintendency
- Agreement with Fire Fighters Department

OUTPUTS
- N° 1 Integrated Emergency Plan
- N° 20 Volunteers trained
- N° 10 Meetings with Communities

Fig. 5 (Source: Author)

References

1) Sicily Region: Department of Cultural Heritage and Sicilian Identity
2) Unesco: http://whc.unesco.org/en/list/
3) Supereintendency of Agrigento -
4) Agrigento Municipality: Emergency Plan - Section A – B – C
5) Regional Department Of Civil Protection – PAI - and Hydrogeological Mitigation
6) National Department of Civil protection – Civil Protection National Service
7) INGV – Seismic Area and sismogenetic zones
8) http://www.quirinale.it/qrnw/statico/costituzione/pdf/costituzione.pdf
9) http://www.beniculturali.it/mibac/multimedia/MiBAC/documents/1240240310779_codice2008.pdf

2.8 Disaster Risk Management of Robben Island World Heritage Site, South Africa

Pamela MAC QUIKAN
African World Heritage Fund

1. Introduction (Fig. 1, 2, 3, 4)

Robben Island is one of South Africa's most significant and iconic heritage sites which symbolizes for South Africans, Africans, and people from all over the world the "triumph of the human spirit over enormous hardship and adversity". The 2-kilometre-long island located 11 km off the coast of Cape Town (Table Bay), became a National Monument in 1996 and a UNESCO World Heritage Property in 1999 under the category of cultural landscapes. Robben Island is a multi-layered landscape that was used at various times between the 17th century and the 20th century as a prison, a hospital for socially unacceptable groups, a banishment place for indigenous communities, and a military base. It also has fauna and flora aspects. Its buildings, and in particular those of the late 20th century maximum security prison for political prisoners, testify to the way in which democracy and freedom triumphed over oppression and racism.

Fig. 1 Aerial view of Robben Island ©Robben Island Museum

Fig. 2 Entrance Arch to Robben Island ©Robben Island Museum

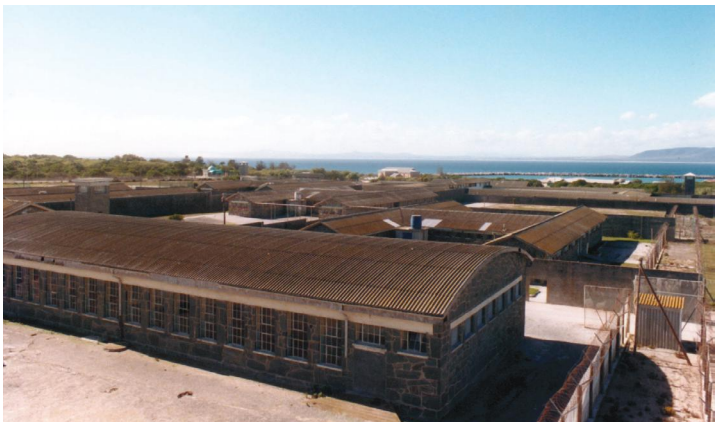


Fig. 3 View of main prison buildings of Robben Island ©Robben Island Museum

Fig. 4 Main prison buildings ©UNESCO

2. Attributes and Values

Robben Island has over 700 individual buildings and structures such as the stark and functional maximum security prison of the Apartheid era, Kramat and the tomb of Hadije Kramat who died in 1755, the 19th century 'village', two chapels/churches and parsonage, a small lighthouse, cemeteries (Irish and Lepers), World War II military equipment and structures, shipwrecks, and three quarries. The Jetty 1 facilities and the Mayibuye Archives based on the mainland form part of the attributes of Robben Island. The Island is part of the Cape Floral Kingdom and has additional ecological importance as a seal colony and as a breeding site for many bird species. The importance of Robben Island is also drawn from its intangible heritage which lies strongly in memory encompassing the living and recorded memories, mental constructs, values, impressions and thoughts of all people who lived or spent time on the Island, dating back to the beginnings of recorded history. Robben Island has multiple and multi-layered values ranging from archaeological, historical, natural, educational, touristic, and economic to political, symbolic, spiritual, aesthetic, social, and memorial.

3. Protection and Management

Robben Island is legally protected as a National Heritage Site through a range of cultural and natural legislation including the National Heritage Resources Act (No 25 of 1999); the World Heritage Convention Act (Act No 49 of 1999); the various National Environmental Management Acts and the World Heritage Convention. Robben Island falls within the municipal boundaries of the City of Cape Town. The delegated management authority is the Robben Island Museum Council which has an operational management plan running from 2013-2018. The Island receives around 350,000 visitors per year which is controlled through a ferry system. The village on the island houses about 200 people, mainly staff members, service providers and agents of state departments with infrastructure on the island.

South Africa has a relatively young history of disaster management protection which includes the State of Emergency Act of 1997, the National Veld and Forest Fire Act of 1998, and finally the Disaster Management Act of 2002. The latter Act created an integrated and coordinated disaster management policy which is run nationally by the National Disaster Management Centre. The Act includes the Ministry of Environmental Affairs as a stakeholder, however, the Ministry of Arts and Culture is not included. This, and the lack of disaster risk management highlighted in cultural heritage legislation, has resulted in cultural properties not having adequate protection against the threat of disasters. As such, Robben Island World Heritage Site does not yet have a disaster risk management plan, yet it's increasingly becoming an important aspect of World Heritage site management.

4. Disaster Risk: Hazards and Vulnerabilities (Fig. 5)

The National Disaster Management Centre has indicated that the most predominant threats in South Africa are flood, fire, storms, drought, hail, rain and wind. According to the 1990-2014 International Disaster Database (EM-DAT): the highest frequency of disasters in South Africa is attributed to floods and storms, followed by wildfire. Flood causes the highest mortality, with drought having the biggest impact on the economy. In the Western Cape area of South Africa, where Robben Island is located, there is a predominance of flood, fire, storms, rain, wind and heavy swells.

The topography of the Robben Island is extremely low-lying with the highest point measuring 24 metres above sea-level. Analyses of 50 years of data measured in Southern Africa, indicate that on the western coast of South Africa the sea level is rising by about 1.87 mm/year. This rise in sea-level combined with the increase in frequency and intensity of sea storms is contributing to a higher risk of damage by storm surges, greater tidal influence, increased flooding and coastal erosion, and more frequent destruction of property and infrastructure. Climatic conditions on Robben Island are more extreme than the mainland with stronger winds, and colder and drier winters. The area of Robben Island also has a high level of fire risk due to the vegetation type. Another threat is the power station

located on the shores of Cape Town directly opposite the island, of which any disasters related to it will affect the island.

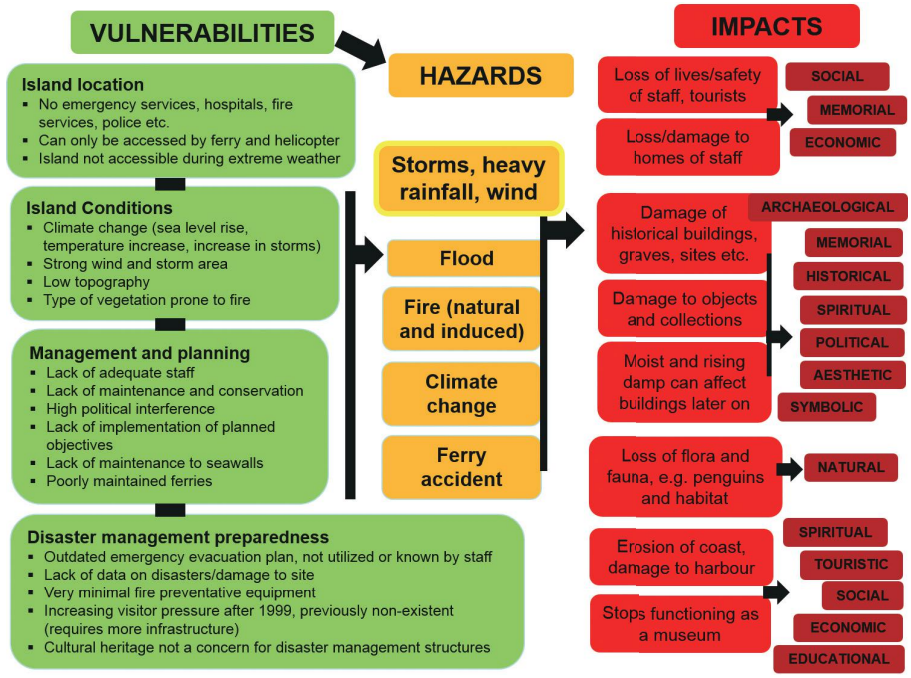


Fig. 5 Vulnerabilities of Robben Island with the related hazards and impacts

5. Mitigation Measures (Table 1)

There are a number of prevention and mitigation measures that can be put in place at the National and Site level to address the vulnerabilities of the property.

6. Emergency Preparedness and Response

An emergency multidisciplinary response team should be established and headed by the Management Authority (Robben Island Museum). The Authority should connect with both internal and external stakeholders within the multidisciplinary disaster risk management team. Numerous issues need to be considered including: radio communication, updated emergency signage, a second in command, emergency evacuation brochures, emergency contacts directory, backup power generators, register of people on island at all time, emergency supplies +-3 days, and emergency drills/training. The current emergency evacuation plan needs to be updated taking into account all the hazards and vulnerabilities of the site.

Table 1 National and site level mitigation measures for the vulnerabilities of Robben Island

NATIONAL LEVEL – medium to long term			
	Vulnerabilities	Prevention and mitigation	Stakeholders
Disaster Management Preparedness	Cultural heritage not a concern for disaster management structures	Inclusion of Arts and Culture as a stakeholder in the National Disaster Management Framework	• Department of Arts and Culture • National Disaster Management Centre • South African Heritage Resources Agency • UNESCO, ICCROM, ICOMOS • African World Heritage Fund • South African Universities • Robben Island Museum
	Disaster risk not a concern for cultural heritage structures	Emphasis of disaster risk in policies concerning the protection of cultural heritage	
		Disaster management plans as a requirement for national heritage properties and World Heritage Properties	
	Little knowledge and understanding of DRM of cultural heritage by heritage professionals	Production of national guidelines for DRM of CH (for DRM plans and identification of hazards)	
		Capacity building workshops on the identification and management of disaster risks	
	Lack of data on disasters/ damage to site	Promotion of research on disaster risk management of cultural heritage in RSA	
		Creation of database on disasters affecting CH in RSA (past, present and potential)	
SITE LEVEL – medium to short term			
	Vulnerabilities	Prevention and mitigation	Stakeholders
Island Conditions	-Climate change (sea level rise, temp. increase, increase in storms) -Strong wind and storm area -Vegetation prone to fire (invasive species)	Monitoring system on sea level rise for RIM	Multi-disciplinary DRM team • Robben Island Museum • Cape Town DMC • City of Cape Town • CT coast guard • CT Fire services • SAHRA & HWC • DAC/DEA • SA weather services • Dept. of public works • Robben Island Residents • SA Navy • Eskom
		More effective early warning weather system	
		Removal of invasive species	
		More sustainable use (solar power etc.)	
Management& planning	-Lack of adequate/trained staff -Lack of maintenance/ conservation -Lack of maintenance to seawalls, ferries, dry vegetation, fire breaks -Lack of clear planning/data	Capacity building for staff/residents on DRM	
		Regular maintenance/ conservation to all structures, coast and land	
		Documentation (incl. on state of conservation , previous restoration, digitization of intangible)	
		Creation of a DRM plan and risk map	
DM preparedness	-Outdated emergency evacuation plan, not utilized or known by staff -Minimal fire preventative equipment -Cultural heritage not included in disaster management structures	Update emergency evacuation plan	
		More effective/extensive fire preventative equipment throughout area & alarm system	
		More guards monitoring areas of island	
		RIM included in Cape Town DMC team	

7. Recovery Activities (Fig. 6)

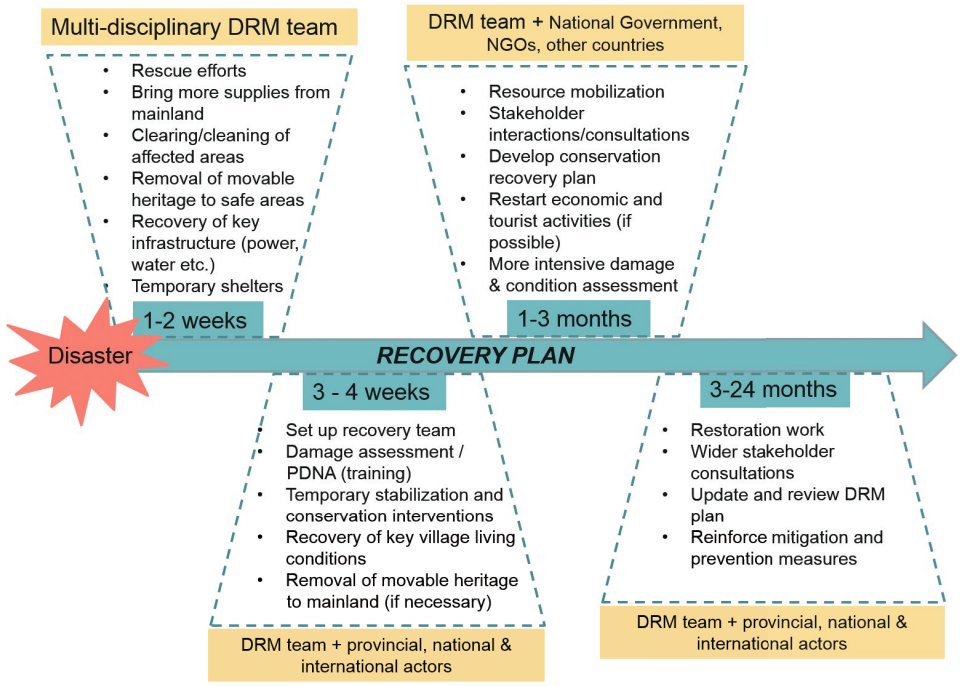


Fig. 6 Recovery plan in disaster scenarios.

8. Conclusions

Robben Island Museum Council, in collaboration with the African World Heritage Fund, have plans underway to create an Integrated Disaster Risk Plan (IDRP) for the site. Extensive stakeholder consultations and the gathering of conclusive research is needed to inform the formulation of this plan to ensure it is a practical, comprehensive and implementable plan that covers all the values of the property.

References

1) South Africa, Republic of. : Disaster Management Act, 2002 (Act No. 57 of 2002). Pretoria: Government Printer. Government Gazette No. 24252. 2003.
2) South Africa, Republic of. : National Heritage Resources Act, 1999 (Act No. 25 of 1999). Pretoria: Government Printer. Government Gazette No. 11974. 1999.
3) NDMC, 2005. SA National Disaster Management Framework, 2005. Unpublished internal report. Retrieved on 15 July 2014 from World Wide Web: http://www.ndmc.gov.za/Documents/Framework.aspx.
4) RIM (Robben Island Museum). : The Robben Island Museum 2nd Integrated Conservation Management Plan 2013-2018: Operational Management Plan. South Africa: Robben Island Museum. 2013.
5) CRED EM-DAT (Feb. 2015): The OFDA/CRED - International Disaster Database www.emdat.be Université catholique de Louvain Brussels - Belgium. 2015.
6) http://www.preventionweb.net/english/countries/africa/zaf/
7) Goschen, W.: Coping with sea level rise and storm surges. National research Foundation: South African Environmental Observation Network. http://www.saeon.ac.za/enewsletter/archives/2011/april2011/doc08.
8) National Disaster Management Centre: http://www.ndmc.gov.za/

2.9 Disaster Risk Management Plan for Ashanti Traditional Building - Ejisu Besease Shrine

Benjamin Kofi AFAGBEGEE
Architect/Assistant Conservator of Monuments, Ghana Museums & Monuments Board

1. Introduction

Ten Ashanti Traditional Buildings survive and speak to the vernacular architecture produced during the height of the Asante Kingdom. These buildings are located in the Ashanti Region of Ghana, around Kumasi and Obuasi. As the popularity of Christianity, Islam, and other religions grew, the practice of Animism at these shrines decreased and many fell into disuse. The 10 Ashanti Traditional Buildings were inscribed on UNESCO World Heritage List in 1980 as *"Rare surviving examples of a significant traditional architectural style of the influential, powerful and wealthy Asante kingdom".*

These buildings served mainly as palaces,shrines ,houses for the powerful deities who protected the kingdom,homes for the affluent and as mausoleums and are mainly wattle and daub construction with thatch roof.There are 10 Traditional Buildings remaining, 9 are within 35km radius of kumasi.

Asante Traditional Buildings have strong symbolic, social, religious, and historical values. Each Traditional Building represents the memory of the village and links the community to the strong Asante traditions. Some of the Traditional Buildings also have economic value for the communities through tourism. This financial impact is not evenly spread on all Ashanti Traditional Buildings. Some remote Traditional Buildings do not receive tourists.

These group of buildings represent a unique artistic and aesthetic achievement. The decorative motifs executed on the walls show adaptations of traditional "Adinkra" symbols which are not only unique but are very rare in the world. (Justification for inclusion in the World Heritage List as Cultural Property. 25th May 1978)

The need to conserve the remaining examples of Asante traditional architecture was recognised in the 1950s. In 1972 they were declared national monuments. The Ashanti Traditional Buildings were included on the 2012 World Monuments Watch. This provided an opportunity to raise awareness on the importance of safeguarding this fragile and important heritage, raise funds, give the local communities a sense of ownership, and also reunite the stakeholders living around the heritage sites (Fig. 1, 2).

Fig. 1 Ejisu Besease Traditional Building:UNESCO World Heritage Site

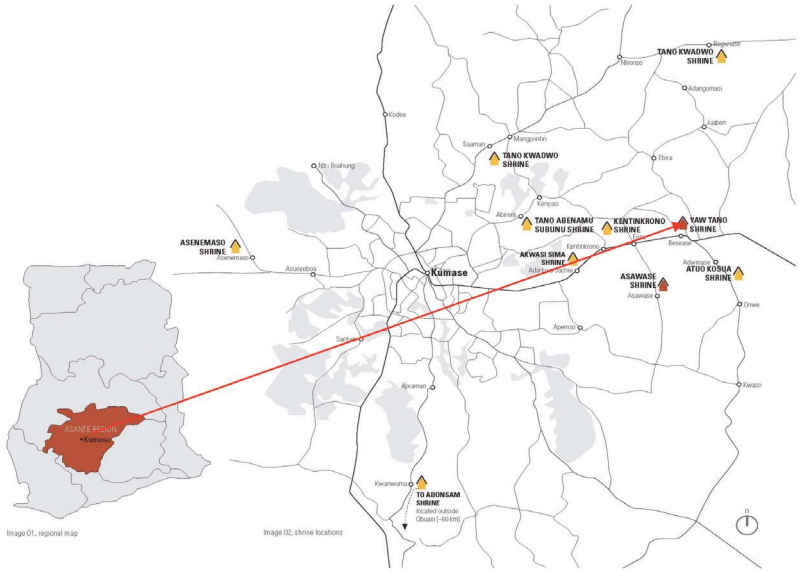


Fig. 2 Regionalization and Location of Ashanti Traditional Buildings
(Ejisu Besease Traditional Building location arrowed)

2. Site Description and Definition- Ejisu Besease Traditional Building

This article focuses on DRM Plan for Ejisu Besease Traditional Building, located adjacent to paved road crossing Besease in the Ashanti Region of Ghana. It is surrounded by new residential and commercial development that directly impacts the site. It is widely visited by Ghanaian and international tourists because it has been marketed as a tourist attraction and has undergone the most extensive restoration and interpretive work by CRAterre and GMMB (Fig. 3).

Fig. 3 Courtyard and Intricate Bas -relief wall decorations .Ejisu Besease Traditional Building

3. Site Attributes and Values

Table 1 Site Attributes and Values

Attributes of Ejisu Besease Traditional Building/Shrine	Type of attribute	Associated values	Scores for Value 1(Low) 2(Medium) 3(High)	Stakeholders for these values
Intricate Bas Relief Murals	Immovable Tangible Cultural	Cultural Educational Spiritual Symbolic historic	3	UNESCO Ghana Museums & Monuments Board Ashanti Traditional Council
Intricate Panel Door Designs	Immovable Tangible Cultural	Cultural Educational Use value Spiritual Symbolic historic	3	UNESCO Schools ,Colleges, Universities Ghana Museums & Monuments Board Ashanti Traditional Council
Steep pitched thatch roof with bamboo rafters	Immovable Tangible Cultural	Cultural Educational Use value Symbolic historic	3	UNESCO Ghana Museums & Monuments Board Ashanti Traditional Council
Ceremonial Stools, Brass basins, Drums	Movable Tangible Cultural	Cultural Use value Spiritual Symbolic Historic	2	UNESCO Ghana Museums & Monuments Board Ashanti Traditional Council
Ritual Dances	Movable Tangible Cultural	Cultural Educational Spiritual Symbolic	2	UNESCO Ghana Museums & Monuments Board Ashanti Traditional Council Africans in the diasporas
Sky Altars	Immovable Tangible Cultural	Cultural Educational Spiritual Symbolic Historic	3	UNESCO Ghana Museums & Monuments Board Ashanti Traditional Council

4. Vision of DRM Plan for Ejisu Besease Traditional Building: Statement of Goal

Mitigation of risks to the site resulting from the potential negative impacts of the heavy annual rainfall in the region, termite attack and the risk of fire outbreak in the building and protection of objects which are directly linked to the Outstanding Universal Value of the site. The DRM Plan seeks to raise awareness of the importance of the protection of cultural heritage sites in Ghana.

5.Risks and Vulnerabilities Assessment

Table 2 Risks and Vulnerabilities by heavy rainfall and windstorms

Heavy Annual Rainfall/Windstorms	
Vulnerabilities	Impact on Site
Nature of materials	Infiltration of rainwater
Thatch roof	Ripping away of thatch roof Detaching and removal of portions of thatch roof
Bamboo rafters	Fungal attack and disintegration of bamboo rafters
Bas relief clay murals	Eroding and weathering of bas relief clay murals
Tree bark ridge	Fungal attack and disintegration of tree bark ridge

Table 3 Risks and Vulnerabilities by termite attack and infestation.

Termite attack and Infestation	
Vulnerabilities	Impact on Site
Panel doors	Deterioration and disintegration of door
Wooden Propping of lintels	Deterioration and collapse of wooden lintels
Bamboo Rafters	Deterioration and yielding of bamboo rafters
Jalousie windows	Deterioration and disintegration of windows by termite attack
Wooden Sky altars	Deterioration and disintegration of wooden base of sky altars
Structural timber framework	Deterioration and yielding of structural timber framework supporting roof

Table 4 Risks and Vulnerabilities by fire.

Fire	
Vulnerabilities	Impact on Site
Lack of management and fire safety policy	Destruction and annihilation of heritage
Panel doors	Destruction and/or collapse of doors
Wooden Propping on lintels	Destruction and/or collapse of wooden propping on lintels
Bamboo Rafters	Destruction and/or yielding of rafters
Wooden sky altars	Destruction and/or collapse of wooden sky altars
Structural timber framework	Destruction and/or collapse of structural timber framework

6. Risk Mitigation Measures

The mitigation measures are to address the main threats to the site which are heavy rain falls, fire and termite attack.

Strategic Level Measure s (Long Term)

1) Regular monitoring and enforcement of legal provisions for demolitions and removal of unauthorized structures encroaching the site.
2) National Building Code has provision for fire safety but no provision for cultural heritage. It is recommended provision is made for inclusion of cultural heritage in the code .
3) Making provision for cultural heritage in the National Disaster Management framework .

Planning Level Measures (Mid to Long Term)

1) Making a Site Management Plan for the site
2) Undertaking Risk Assessment for the site

3) Undertaking a cultural attribute and value assessment for the site by recording, mapping and digitizing all aspects of the cultural heritage.
4) Local area building byelaws have provision for fire safety but no separate provision for cultural heritage .It is recommended that building bye laws include cultural heritage needs.
5) Establishing standard operating protocol for Disaster Risk Management of cultural assets.

Technical Level Measures (Mid to Short-term)

1) Undertake periodic maintenance of the bas relief murals and building fabric.
2) Improving security of the site.
3) Carrying out regular maintenance especially during the rainy season.

Community Level Measures (Mid to Short-term)

1) Building awareness among the local community and tourists about the cultural value of the site and the effects of disaster risks on the site.
2) Encouraging the community to take up voluntary watch in the area.

7. Emergency Preparedness and Response

The emergency preparedness responses is primarily meant to address the pertinent threats to the site which are weathering and erosion of the intricate bas relief murals due to heavy rainfall, termite infestation and fire which is the most probable catastrophic threat captured in a recent hazard mapping of the site and immediate community. There is an existing fire station a few kilometers away from the site. The proposed emergency preparedness and response relies largely on self help by way of an immediate response by the local community. This entails the creation of an onsite stake holders emergency response team with roles clearly assigned to persons to network with the fire service department in the municipality.

Some proposed measures are as follows

1) Training response team members especially site tour guides to guide the public and visitors safely.
2) Installing firefighting equipment including battery operated smoke detectors and alarm, fire extinguishers, water hose and pump system.
3) Creating obstacle free routes to evacuation areas.
4) Designating a parking area for fire engine on the site parking lot.
5) Evacuation of collections and objects such as brass pans, stools, drums and historic photographs on exhibition panels to the public library adjacent the site in the event of fire.

8. Recovery Plan

The proposed recovery plan for the site involves all stake holders .They range from Traditional authorities and Governmental Agencies to individual users. The descriptions below explain the responsibilities of the stakeholders and is to be carried out in three phases namely short, medium and long term as detailed in the table.

Table 5 Recovery Planning

Agencies/Stakeholders	Short Term	Medium Term	Long Term >5 Years
1.Ghana Museums & Monuments Board 2.Conservators, 3.Curators, 4.Building Inspectors 5.Site Manager 6.Tour Guides	1.Evacuation of Artifacts 2.Cultural heritage site management 3.Clearing of site debris 4.Community mobilization	1.Re inventory of Cultural and Heritage Values 2.Repair works and replacement 3.Capacity building Research awareness seminars	1.Review of DRM Plan 2.Regular monitoring of site 3.Restore Site to original context
1.Municipal Authority 2.Fire Department 3.LocalCommunity 4.Volunteer Groups	1.Securing Public infrastructure 2.Restoring public services 3.Removing debris	1.Upgrading and maintaining services like water supply and installation of fire safety measures	1.Conducting regular fire drills

9. Pilot Project and Conclusion

The pilot project is to make and Implement a comprehensive Management Plan for the site and also a Disaster Risk Management Plan which will be integrated into the Management Plan.

The actors are the Ghana Museums and Monuments Board.

Time frame: Two years

Resources will be sought from Organisations in Ghana and abroad who finance activities for the Conservation and protection of Heritage Sites.

References

1) Sebastien Moriset ;Asante Traditional Buildings: Survey And Condition Assessment , pp.88-96, January 2014.
2) Jigyasu ,Rohit and Arora Vanicka:Disaster Risk Management of Cultural Heritage in Urban Areas, A Training Guide,Kyoto,Research Centre for Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University, 2013.
3) WHC Nomination Dossier; Ashanti Traditional Buildings, PP.3.June 1978.

2.10 Preparing Disaster Risk Management Plan for Boudhanath Stupa, Nepal

Sonam LAMA
Nepal Engineering College, Department of Architcture

1. Background & Introduction (Fig. 1, 2)

Nepal lies between China to its north and India to the South, West and East. The capital city of Nepal Kathmandu Valley is home to seven UNESCO world heritage sites namely Kathmandu Durbar Square, Patan Durbar Square, Bhaktapur Durbar Square, Changunarayan, Pashupatinath, Swayambhunath and Boudhanath.

Boudhanth Stupa is one of the living heritages of Kathmandu Valley. According to historical accounts, the Stupa is built around 5th century. As Nepal plays an important role to connect its southern plains and India and northern Himalayan region and Tibet, it was and still is an important trade-transist. However due to mountaneous geography, traders and pilgrimas has to set trek as means of transportation.

Believers of Buddhism have a strong tradition to set such an arduous journey with great devotion to make it success. Hence, traders, pilgrims and travellers sought a blessing for the safe passage over the high mountains and thanksgiving to it upon their arrival. Stupas are built to accumulate good karma, to ward-off evil spirits and to remove the sin.

The legend has it that King Vikramajit's son, prince Manadeva built the stupa to atone the sin. The King Vikramjit had been going through difficult time to feed the population due to severe drought. He was suggested by an astrologer to sacrifice an ideal man with 32 virtues in front of dry royal waterspout. He asked his son to accompany in the middle of night and commanded to behead the person shrouded in white robe without looking at him. The prince obeyed his father but of course with great horror only to find it was none other than his own father.

Fig. 1 Aerial view of the Stupa by Frank Schönau 2015

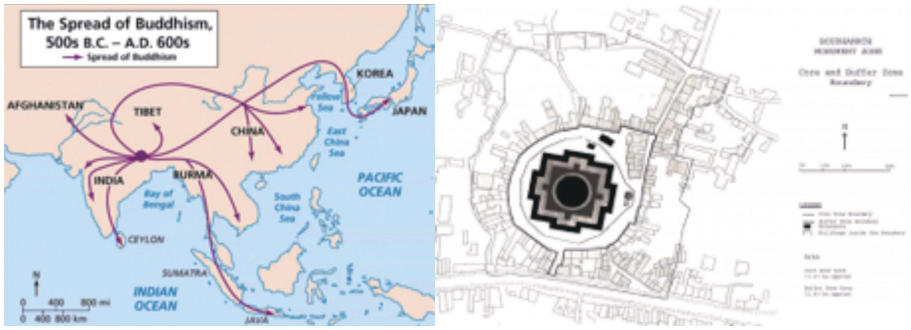


Fig. 2 Boudhanath core and buffer area

2. The Heritage Attributes

Boudhanath Stupa attracts not only tourists from around the world but more importantly and still remains centre for Buddhist learning, practice and an integral part of local people.
Unique coexistence with Buddhism and Hinduism with animist rituals and Tantrism
Besides the stupa's symbolic significance of Buddha body, it provides a common space to several sects of Buddhist practitioners such as Ngyingmapa, Sakyapa, Gelugkpa, Kgyupa, Bonpo as well as Hindu and animist believers.

2.1 Exceptional Architectural style

Boudhanath Stupa is probably the biggest stupa in the Asia. Apart from its grandness, the architectural style consists of mandala plan with dome representing the universe laid over the mandala. Mandala is the Buddhist representation of cosmology followed by cube with eyes on its four sides. The thirteen steps made of bricks covered with copper plate represent paths to the enlightenment. The Chhatravali is an umbrella shaped protective layer. The top is a pinnacle made of copper.

2.2 Interface of great culture from the north and south of the Himalayas

The stupa is an important pilgrimage site as well as transit trading station from Tibet and India Craftsman working with copper inhabits the Stupa and its surroundings.

2.3 A place of living traditions while taking into account inevitable changes

Festivals such as Lhosar, Timal and various rituals have been taking place in and around Boudhanath Stupa since centuries.

3. Disaster Risk Management Plan of Boudhanath Stupa (Fig. 3)

Geographically, Nepal lies in seismically active zone. Historically, Nepal and surrounding region has records of major earthquakes in interval of 80-100 years. After 1934 AD earthquake, recent earthquake of magnitude 7.8 and 7.3 killed more than 9000 people and destroyed thousands of houses, public buildings, trails, bridges and other man-made structures.
The earthquake affected Boudhanath Stupa (see in the middle picture below). Parts of the thirteen steps and the dome got cracked. According to the Department of Archaeology, soksing "the main central strut" was found tilted. Greater re-building has been undergoing with different line ministries and agencies. However, the disaster risk management plan of the site still remains unknown.
Hence, the author takes this opportunity to use available information and his knowledge towards preparing Disaster Risk Management Plan of Boudhanath Stupa (DRMP-BS). The main objective of this document is to help guide organizations on formulating actual disaster management plans.

Fig. 3 Boudhanath Stupa before 2015 earthquake and re-building under progress

4. Risk Scenarios

An earthquake of magnitude 8.0 hits with its epicenter in Kathmandu of Nepal on Timal Jatra at 5pm. Crowd, congregation & chaos, surrounding walls starts to collapse, fire broke out from nearby restaurant, monasteries, shortage and lack of access to water sources, blockage of narrow pathways, the top of the main stupa starts falling apart, stampede, looting of religious artifacts from Ajima temple,

rescue, evacuation is interrupted by crowd tourists were trapped in restaurants and stuck in roof tops, elderly and children got trapped.

As a result, there is a huge loss of lives, loss of local property, loss of authenticity of the stupa and psychological impacts among devotees.

5. Disaster Mitigation Measures

Disaster Mitigation Measures are most difficult to prescribe however organization of possible measure and events can better organize with respect to time.

Drilling on earthquake risk and training on management of risks from earthquake can be short-term (6-12 months) while establishing early warning system, management of haphazard electric cable, incense burning and butter lamps may be included in both short-term as well as mid-term (1-2 years). Surrounding roads and narrow pathways are important conduit not only during the daily activities but more importantlty in post-disaster time. Hence, management with regards to maintainance of already connecting pathways needs to be well identified in order to be functional during disaster times. In regards to rapid and haphazard urbanization of Boudhanath Stupa and its vicinity, management of land-use would need many years of and continuous effort from the authorities such as Kathmandu Valley Preservation Authority, Kathmandu Metropolitan City. Coordination among concerned agencies such as Department of Archaeology, Boudhanath Area Development Committee, ward offices and Boudha Gyang Guthi would also need long-term mitigation plans.

6. Response and Recovery

Response and recovery after the disaster such as an earthquake would not be a straightforward and as simple as predictions based on present circumstances. However, basic considerations such as who should be doing what and when would help on at least on minimizing the post-disaster chaos that often becomes another disaster.

National level offices such as Ministry of Culture, Tourism and Civil Aviation and Ministry of Home would be main point of contact to understand the overall co-ordination strategy. Initial level of planning and coordination shall not always be straightforward too. Boudhanath Area Development Committee (BAD-C) or Boudha Gyang Guthi (BGG) or combination of both may be trained to develop basic coordiantion skills. Experts from Department of Archaeology (DoA) together with assistance from International agencies such as UNESCO experts shall carry out quick documentation activities. DoA, can launch major fund-raising campaign however, these days, funds are also raised with the help of Prime Minister Relief Trust. Individual and private fund raising campaign needs to be co-ordinated with local agencies such as BAD-C and BGG.

Similarly, training and awareness on local level management of post-disaster sites can be complex nexus between several concerned agencies. Rescue, first-aid and triage are the activities followed by training. Ministry, UNESCO may provide necessary funds in general while local level agencies shall play role in identifying the resources such as tools, materials and manpower to execute recovery and developmnet.

Following the principle of disaster risk management, the process my give a sense of start and end however runs in a cyclic hence phases of recovery and development again lays another beginning to prepare for next disaster.

References

1) Bipad Byavasthapan tatha Nagarik Surakshya Nirdesika 2070 (Disaster Management and Civil Protection Directives 2013), Kathmandu Metropolitan City
2) Kathmandu Valley World Heritage Site, Integrated Management Framework, Department of Archaeology in close collaboration with the World Heritage Centre and UNESCO-Kathmandu Office, 1 June 2007.
3) National Strategy for Disaster Risk Management in Nepal, National Society for Earthquake Technology (N-SET), March 2008.
4) Keith Dowman, The Great Stupa of Boudhanath, Robin Books, 2002 (revised third edition).

2.11 Disaster Risk Management of Cultural Heritage in the Philippines: The Case of Sto. Niño Shrine & Heritage Museum, and People's Center & Library

Gerald Vallo PARAGAS
Urban and Environmental Planner, City Government of Tacloban, Philippines

1. Introduction (Fig. 1, 2)

The scale and magnitude of the impact of Typhoon Haiyan (local name: Yolanda), which hit central Philippines on 8 November 2013, created overwhelming needs in Tacloban City. Some experts estimate the storm as strongest ever to make landfall.

Given the enormous coordination and operational challenges in the City, one would observe that cultural heritage sector is missing in post-disaster efforts, from emergency response to recovery. Case in point is the Sto. Niño Shrine & Heritage Museum, and People's Center & Library in Tacloban, which was partly damaged by Haiyan and the resultant storm surges. This set of buildings even made headlines as the site, particularly the People's Center and Library, served as spontaneous evacuation center for more than 100 families, and that books were reportedly used by evacuees for kindling and toilet paper during the first few days after the mega-disaster hit.

Fig. 1 The Sto. Niño Shrine and Heritage Museum, which serves as a chapel, museum and guesthouse, is one of the frequently visited tourist spots in the city as it displays priceless art pieces and antique collections (Photos credits: lakwatserongtsinelas.com)

Fig. 2 Beside the Shrine is the People's Center and Library which originally housed almost 50,000 books, periodicals, educational tapes and magazines

1.1 Description and Historical Background of the Buildings

The Sto. Niño Shrine and Heritage Museum is a two-storey building with a floor area of more than 2,000-sq.m. located at Real Street, Tacloban City. Then First Lady Imelda Romualdez Marcos built the religious landmark in 1979 to pay homage to the Holy Child (Baby Jesus). The Shrine is widely famous for its display of priceless and politically controversial art pieces, antiques, collection of religious Russian icons, ivory figurines, and huge paintings of the Romualdez clan and Marcos family.

Just beside the Shrine is the People's Center and Library (PCL), the biggest library in Region VIII. The PCL, also a project of the former First Lady, is a neoclassical structure of a multi-purpose center,

gymnasium, conference hall and library in a two-storey building.

The Shrine and the PCL were both sequestered by Presidential Commission on Good Government (PCGG) and are the subjects of litigation in a civil case with the anti-graft court Sandiganbayan for recovery as ill-gotten wealth. The buildings are under the administration and control of the PCGG since 1986 while resolution of the case involving its rightful ownership is still pending.

2. Vulnerability and Disaster Risk Assessment

2.1 City's Geographic Realities

The location and physiographic characteristics of Tacloban City (population: 221,174) make it vulnerable to different forms of natural disasters. The city is situated in the mid-section of the country's Pacific side, a location that is susceptible to the direct and indirect effects of the roughly 20 typhoons that hit the country each year. It also lies in the portion of Leyte Gulf that tends to invite the strongest storm surges due to its funnel effect.

The city lies only 145 kilometers west of the Philippine Trench, a subduction zone capable of producing strong earthquakes that can affect Tacloban through liquefaction and intense ground shaking in the coasts that could reach up to Intensity VIII (destructive) based on the Philippine Earthquake Intensity Scale. It is also capable of producing tsunamis of the same scale as the storm surge from Super typhoon Haiyan, further increasing the city's risks from disasters.

2.2 Threats and Impacts to Heritage Buildings

Aside from typhoon/storm surge as a primary hazard, also posing danger to heritage values are fire and human interventions and negligence, including lack of maintenance and poor management. Threats, vulnerabilities and their impacts are further illustrated in Fig. 3.

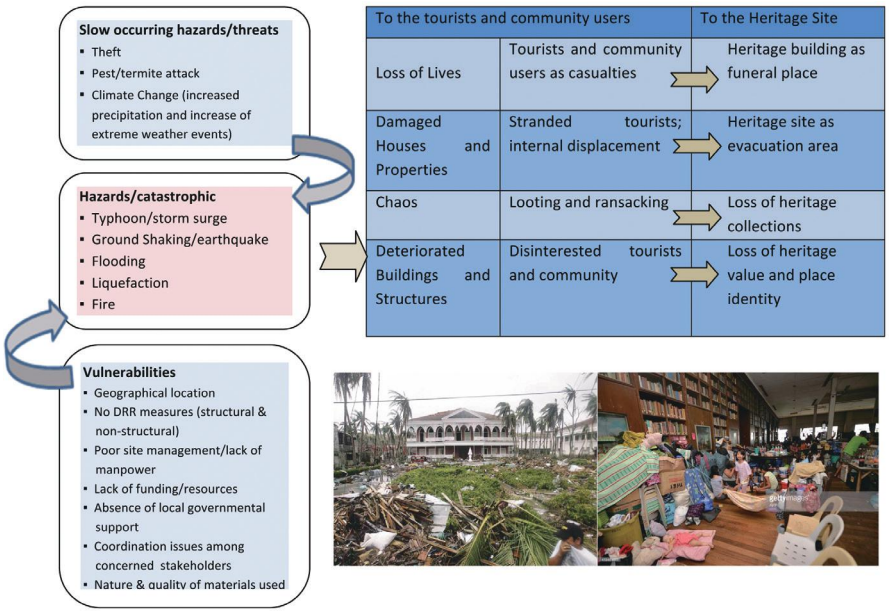


Fig. 3 Hazards and their Impacts (Inset: Photos of the Shrine and PCL in the aftermath of 2013 Super typhoon Haiyan) Photos credits: globalnation.inquirer.net, AFP Getty Images)

3. Disaster Risk Management (DRM) Planning

The DRM planning aims to integrate disaster risk reduction in the cultural heritage management of the buildings, and to demonstrate a good practice of mainstreaming the cultural aspect in the ongoing recovery and rehabilitation planning of the city post-Haiyan. Behind the DRM planning process of Cultural Heritage is a core team composed of the following: (1) PCGG, (2) Leyte-Samar Heritage Society/LSHS, (3) City Disaster Risk Reduction and Management Office/CDRRMO, (4) United Architects of the Philippines/UAP-Eastern Visayas Chapter, (5) Department of Interior and Local Government/DILG-Region 8, (6) Barangay No. 50 or the village that covers the site, and representative from Roman Catholic Archdiocese of Palo (Leyte Province).

The core team of Cultural Heritage sector, an addendum to the cluster approach system of coordination for City Disaster Risk Reduction and Management Council, will also advise through CDRRMO the City Mayor and concerned national agencies on matters relating to Culture and Heritage management in the City consistent with the policies and scope of DRM law (Fig. 4). The team will also develop and ensure implementation of DRR standards and procedures in carrying out cultural heritage programs, including disaster prevention and mitigation, preparedness, response and recovery works (Philippines' four thematic areas of DRM).

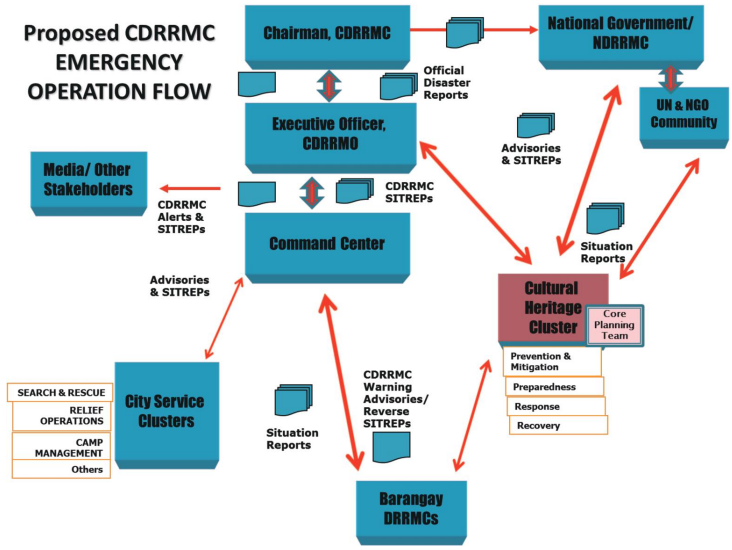


Fig. 4 Proposed City Disaster Risk Reduction and Management Council (CDRRMC) Operation Flow of Coordination – before, during and after Emergency

3.1 Proposed Prevention and Mitigation Measures

Although some of the measures are already proposed and partly implemented by Tacloban Recovery and Sustainable Development Group (TRSDG) based on its Haiyan roadmap Tacloban Recovery and Rehabilitation Plan (TRRP), key operational and institutional activities are worth highlighting.

- Construction of wind protector for windows and doors
- Installation of fire protection system (fire alarms, sprinklers, extinguishers, fire exits)
- Removal of encroaching obstructions (e.g. ambulant vendors)
- Establishment of rainwater harvesting and storage tanks, fitted with filtration equipment
- Construction of a drainage system, and flood control measures along major rivers
- Capacity-building activities (emergency planning, trainings and drills) with site management staff, members of CDRRMC and barangay (village) leaders
- Special seat/representation of LSHS (on behalf of culture sector) in the CDRRMC

- Private-public partnership agreement with Tourism Department, Corporate Social Responsibility (CSR) foundations, and University of the Philippines-Tacloban campus
- Digitalization of records and off-site documentation
- Review and localization of building code (protecting vista points and sight lines of cultural site)

3.2 Preparedness and Emergency Response (Fig. 5, Table 1)

It is likewise crucial for the Cultural Heritage team to ink deal with the local government units and management of prospected evacuation centers to ensure exclusion of the heritage buildings in the list of storm shelters for internally displaced persons, thereby avoiding confusion in times of emergency.

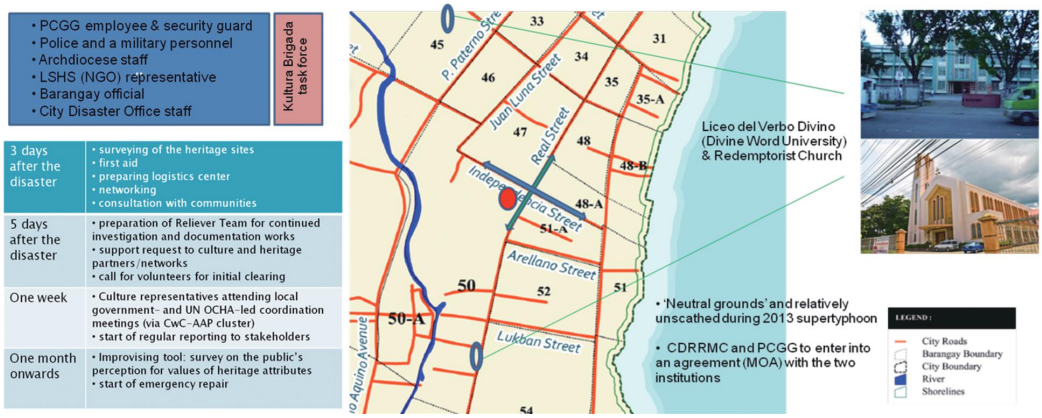


Fig. 5 The Composition and Functions of Emergency Team, and the Proposed Evacuation Site for Heritage Fragments and Collections

Table 1 Recovery and Rehabilitation

Activities/Procedures	Priority Level	Implementer	Funding Source
Create a team to formulate recovery plan	Immediate	PCGG and multi-sectoral partners (LSHS, UP Tacloban, Archdiocese, UNESCO, professional groups	Government (policy level)
Review of structures needing immediate restoration and replacement works	Immediate	PCGG, LSHS, professional groups, UNESCO	Government (TIEZA)
Acquisition of container vans (temporary storage of delicate/ sensitive materials	Short term	PCGG	TIEZA, UNESCO, private company/ donors
Hold donor's forum to present the proposed recovery projects	Short term	PCGG and LSHS	Government: TIEZA and PCGG
Creation of Cultural Heritage Council	Short term	Local government and multi-sectoral partners	Government (policy level)
Enactment of ordinance on heritage tax incentives	Medium Term	Local government	Government (policy level)
Promotion of heritage tourism	Long term	Department of Tourism, local governments	Government, private sector

**Immediate term (0-4 months), Short term (1 year), Medium term (3 years), Long term (5 years up)*

References

1) Tacloban City Government & UN-Habitat: Tacloban Recovery and Rehabilitation Plan (Draft Report, May 2014)
2) Tacloban City Planning & Development Office: Comprehensive Land Use Plan of Tacloban City, 2013-2022

2.12 Disaster Risk Analyses and prevention in ŽIČA monastery, Serbia

Marko ALEKSIĆ
Central Institute for Conservation

1. Introduction (Fig. 1, 2)

Žiča is an early 13th-century Serb Orthodox monastery near Kraljevo, in South-West Serbia. The monastery, together with the Church of the Holy Salvation, was built by the first King of Serbia, Stefan the First-Crowned and the first Head of the Serbian Church, Saint Sava. Žiča was the seat of the Archbishop (1219–1253), and by tradition a coronation church of the medieval Serbian kings.

The monastery complex was several times, in its history, burned and demolished, and reconstructed again. Today's appearance and composition is a state from first broad conservation work from early XX century. The complex consists of religious buildings (Church of Holy Salvation, Church of St. Theodors, Church of St. Sava, etc), administrative buildings, living quarters for monastic community, and economic buildings. It has been recognised as national heritage of great importance (highest level of protection).

Fig. 1 Monastery Žiča, aerial view (photo archive of Monastery Žiča)

Fig. 2 Monastery Žiča site plan (Central Institute for Conservation in Belgrade)

2. Hazards and Vulnerabilities

Serbia is landlocked Balkan country, whose geography varies from flatlands in the north to mountain area in south and has a very rich river network. In the past, this region was affected several times by earthquakes, floods, landslides and forest fires. Hazard analysis was undertaken for this site with the aim to mark and evaluate levels of the possible risks. History of disasters was gathered from the records and accordingly, a list of hazards was identified – humidity, moisture, floods and flashflood, landslides, earthquakes, fires and wild fires. Identifications of the main risks was done by linking the hazards with site exposures and specific vulnerabilities to them. According to the analysis, the most serious hazard affecting the site is earthquake, with its destructive power and possibilities to trigger a landslides or fire, and flood and flashflood, not as direct impact but as a secondary consequence thereby rising the moisture and humidity level, activating a landslide, and affecting the local community and economy, to which a monastery is linked (Fig. 3).

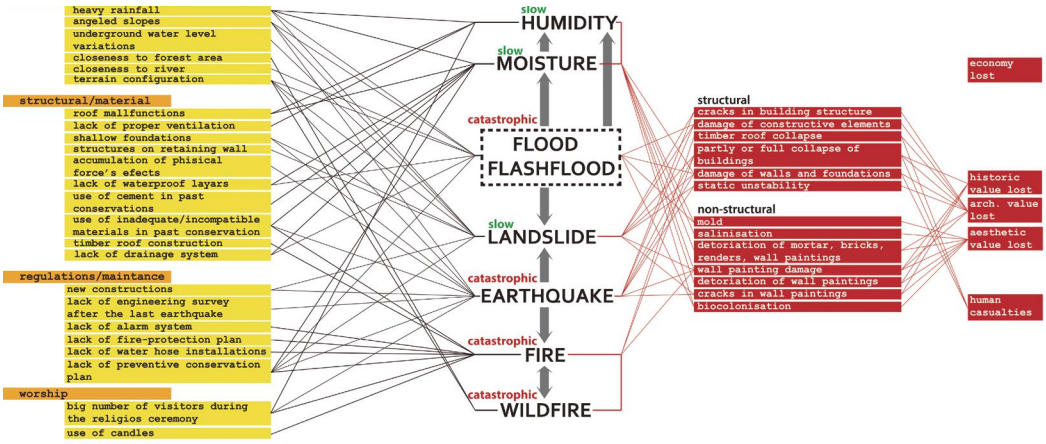


Fig. 3 Interconnections and relations between vulnerabilities, hazards and risks at Žiča Monastery

3. Plausible Disaster Scenario

The most plausible disaster scenario was created for evaluation of present emergency response abilities: *Earthquake M8 strikes at midday on religious holiday, when lot of believers are in the main church and lot of clergy are in Episcopal palace. Main church tower collapses in upper part and falls down to the left side, to the church of St. Sava. In same church, east vault collapsed during the previous damage. Fortunately no one was in it. Ceilings are damaged in Episcopal palace but there is no severe damage. Elders in monastery residence, main church and Episcopal palace need assistance for evacuation. Post earthquake fire starts at the monastery shop, ambulance and outer narthex in main church. Water sources near monastery shop, monastery yard and residential areas are not working due to damage to the water network supply*. According to imagined scenario, a virtual simulation of emergency situation was undertaken, which has highlighted main problems and challenges – lack of the wide access roads, lack of the evacuation paths, problems with water sources, and high vulnerability to post-earthquake fires (Fig. 4).

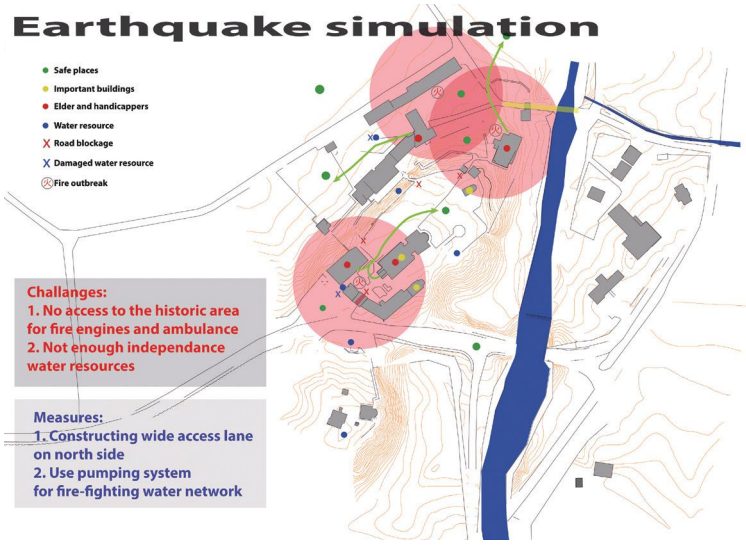


Fig. 4 Earthquake simulation showing the problems and challenges during emergency situation

4. Disaster Risk Mitigation

Risk reducing measures were suggested for the plausible scenario. A mitigation measure was suggested for every risk from the specific hazard after determining risk severity and the cost of undertaking measure, for easier calculations and implementation.

For an instance, missing of evacuation plan protocol was recognized as a critical challenge, and suggested measures include:

- IIdentifying monastery area safe zones in DRM plan of local settlement. These zones are located on higher ground and are clear of any obstacles so that these can serve as refuge areas for people in different catastrophes-floods, earthquakes, forest fires. Besides saving human lives, this measure is aimed at creating a better coordination between the monastery and the surrounding population as they can play an important role in disaster response and preparedness;
- Creating evacuation routes inside monastery historic area, and marked it with visible signs on several language (Serbian, English, Greek, and Russian);
- Creating a free access to historic area, by redesigning exiting east gate. Access should be large enough for passing of the fire truck, but should also allow fast evacuation of area, and should not contain structural elements which can collapse in case of earthquake and produce blockage, and should have certain level of incombustibility;
- Planning an emergency response in case of fire and determination of roles and activities of nuns and staff during the event. Forming a voluntary emergency unit from local near population and organizing training and drills.

Total 18 measures for risk mitigation proposed, designed to block, avoid, reduce and detect risks.

5. Disaster Preparedness

Planning for disaster preparedness was started by drawing a list of human and financial resources, identifying possible number of people to be evacuated during emergency situation, and developing realistic expectation of the emergency equipment. The evacuation plan was designed to answer to all emergency situations, and to reduce to minimum human casualties. Also in addition to evacuation plan, emergency response team is created with clear responsibilities and chain of command. The list of necessary emergency equipment and its locations on the site are created according to plausible disaster scenario and risk mitigation measures (Fig. 5).

Fig. 5 Evacuation plan proposal

6. Recovery Measures

Post disaster measures are suggested such as first aid measures in the short term, and recovery of disaster damage and reducing further disaster risks in the long term. A responsible agency for implementation is indicated for each measure:

Instance of short term measures are:

- Secure affected and damaged area by setting the emergency tape immediately after the disaster. In case of serious damage of spaces which contains valuable artifacts, a guard person should be arranged to watch the sensitive area until its cleaned and investigated.
- Rapid damage assessment of all buildings and area, on site heritage first aid by conservation experts.
- Providing the temporary accommodation for monastic community, with special consideration of the needs of elderly nuns.

Long term measures include:

- Analysis of conditions of the buildings with necessary specialist investigation and survey.
- Determine priorities for repair, restoration or reconstruction, where necessary.
- Regular monitoring of buildings and area with high risk of collapse and landslide (total station measures, laser scanning, plumb lines, angle level).
- Installing a fire alarm system.

7. Conclusion

DRM plan for cultural heritage is a complex set of actions and decisions with aim to reduce risk for human casualties and damage to building to minimal possible level, but also to ensure the protection of heritage values. It is aimed at building certain resilience of heritage site, so that it can survive in future catastrophic disasters and continue to serve as monuments and documents of human culture. The plan is not static but needs to be constantly rechecked and evaluated, and this analysis of disaster risk of Žiča Monastery, which started on International Training Course 2015 in Kyoto, Japan, is only a first step in its planning and implementation.

References

1) Čanak Medić M, Todić B: Manastir Žiča, Republic Institute for Protection of Monuments of Culture of Serbia, Belgrade, 1999.
2) Nenadović S: Restauratorski radovi na manastiru Žiči u proteklih sto godina, J. Saopštenja, Vol.1, Institute for Protection of Monuments of Culture of P.R. Serbia, Belgrade, 1956.
3) Global Facility for Disaster Reduction and Recovery: Post-Disaster Needs Assessments Guidelines, Vol. B, Social Sector-Culture, 2014.
4) UNISDR: Sendai Framework for Disaster Risk Reduction 2015-2030, Third UN World Conference on Disaster Risk Reduction, 2015.
5) Floods Protection Operational Plan for City of Kraljevo, 2014.
6) Seismological Survey of Serbia: Report on Results and Activities after the Kraljevo Earthquake 03.11.2010 at 1:56, Belgrade, 2010.

3 Activity after the International Training Course by Former Participants

3.1 Preparing for and Responding to the 2015 Gorkha Earthquake, in Nepal, 2008

Kai WEISE
ICOMOS Nepal, ICORP, UNESCO Consultant

1. Introduction

Since participating in the International Training Course on Disaster Risk Management of Cultural Heritage in 2008 I have had the opportunity to converting this knowledge into practical application in Nepal. Various activities were directly linked to the course and research activities carried out by Ritsumeikan University and I remained closely linked as a resource person. These preparations led up to an actual earthquake in April 2015 which tested all that we had done over the previous seven years.

One kept hearing of the great Nepal Bihar Earthquake of 1934 and regularly experienced smaller tremors. This raised concern that the next great earthquake would have devastating effect on the Kathmandu Valley which had over the decades developed with uncontrolled urbanization. During the past years the Kathmandu Valley World Heritage Site has been preparing for the earthquake that was to strike Nepal. The rough assessment by the geologists, that there was a slip deficit along the section of the Himalayan arc in western Nepal and an earthquake was eminent came to be true. On Saturday 25 April 2015 a 7.8-magnitude earthquake did strike Nepal, with the epicentre about 40 kilometres northwest of Kathmandu. Even though there were several hundred aftershocks, with one of 7.3-magnitude on 12 May 2015, the geologists have warned that not sufficient energy has been released.

2. Preparing for the great earthquake

Throughout history it was through recurring tests of endurance and trial that communities learnt to improve their cultural expressions and create a resilient cultural environment. Similarly in Kathmandu during the early part of the second millennium CE the traditional buildings were first adapted to fire hazards by introducing a system of brick fire walls that stopped the spread of fires from one building to the next. These brick and timber buildings were then phase wise adapted to withstand earthquakes by inserting wooden ties and pegs to dampen the seismic forces. Innovative solutions were used to ensure structural stability against earthquakes for example by building square timber temples laced with wooden bands on high stepped plinths that functioned as base isolations.

In anticipation of the next big earthquake preparations were undertaken (Fig. 1). Several key government officials went to training courses on disaster risk management. Regular community meetings were held. Part of the international training course on disaster risk management for urban heritage was carried out in Kathmandu. In November 2013 a week long symposium “Revisiting Kathmandu” was organized by ICOMOS Nepal, ICOMOS Scientific Committee for Risk Preparedness, UNESCO and Department of Archaeology with support from the local site managers in preparation to the countdown, linking the discussions between authenticity, management and community with disaster risk reduction. The eightieth anniversary of the 1934 Great Nepal Bihar Earthquake started the countdown to the next big earthquake.

One is however never fully prepared for such a formidable display of natural forces. Even though the question of additional strengthening of monuments might be controversial for most conservation experts, the need for maintenance and restoration was clearly witnessed. The system and procedures for immediate response would also have needed to be established.

Fig. 1 Collapsed structures of the Hanuman Dhoka Palace Museum, Kathmandu © Kai Weise

3. The earthquake did strike – immediate response

On Saturday 25 April 2015 just before noon the 7.8 magnitude earthquake struck. It was an earthquake that seemed to specifically damage vernacular buildings and historical monuments. Villages in 39 districts were affected with about half a million houses collapsing and a further quarter million being severely damaged. The most badly affected were eleven districts within the area spanning between Gorkha and Dolakha. Listed monuments were affected in 20 districts with 190 being recorded as having collapsed and 663 having been partially damaged.

The immediate response after the earthquake struck was to look for survivors. There were locations where special events were being held on the Saturday and when the structures collapsed large numbers were buried. The phenomenon we could observe in most heritage sites in the Kathmandu Valley was that people seemed to instinctively contribute to salvaging and safeguarding the components of the collapsed and damaged monuments (Fig. 2).

The first coordination meeting took place at the UNESCO Kathmandu Office just five days after the earthquake, together with the various authorities and stakeholders, as well as organizations involved in the cultural heritage sector. The following week the Earthquake Response Coordination Office (ERCO) was established at the DOA. To ensure that all stakeholders for the preservation of historical monuments were working together with a shared approach the first two months were declared a response phase. This meant that everything possible needed to be done to prepare

Fig. 2 Community and armed forces helping salvage from collapsed temple in Patan © Kai Weise

the heritage sites for the onslaught of the Monsoon. The main construction materials such as wood, brick, roofing tiles and stone along with the artefacts and ornaments which were lying in a pile of rubble needed to be salvaged and stored. Damaged structures needed shoring and protection from the rain. It was decided that a proactive approach would be applied to the World Heritage properties, the sites on the Tentative List and the monuments on the categorized list of the Department of Archaeology. The remaining monuments would need to be left to the communities and local authorities for them to restore, however providing them with support and expertise where required.

4. Strategic planning – pacing reconstruction

The earthquake response in respect to cultural heritage has been strategically segregated into phases. The first phase of two months was exclusively reserved for earthquake response which involved preparing the affected cultural heritage for the oncoming rains. This was followed by the monsoon season when the rains don't allow for much construction work to be carried out. The efforts of the response phase are being monitored especially in respect to the effects of the rains on damaged monuments. This next phase focused on planning and research is comprised of five approaches.

4.1 Legal Approach

There was an immediate need for the preparation of policies and guidelines. The Post Earthquake Rehabilitation Policy for Cultural Heritage was formulated by a team from the Earthquake Response Coordination Office (ERCO) and was submitted to the ministry for adoption. The Conservation Guidelines for Post 2015 Earthquake Rehabilitation (Conservation Guidelines 2015) were formulated in line with the policy. The guidelines also look at sites, monuments and historic buildings over time and introduce provisions for maintenance and renewal. This will be augmented with a document defining rehabilitation processes and a related checklist.

4.2 Research Approach

Extensive research is required to better understand the complexity of the sites in historical as well as technical terms. Detailed structural and material research of the damage on monuments such as the Swayambhu Mahachaitya and Hanuman Dhoka palace will help retain most of the original structure. Urban archaeology will investigate the foundation of collapsed temples and cross-sections of the Durbar Squares to better understand the chronology of these sites. Geological research is required to study stability of slopes and soil conditions. Furthermore the safeguarding and sorting of salvaged artefacts would need to be carried out in systematic manner with detailed inventories. Along with this, the conservation of mural paintings will also need to be carried out.

4.3 Planning Approach

Several of the complex cultural heritage sites and historic settlements will require specific "Rehabilitation Master Plans". These will be prepared for Hanuman Dhoka, Swayambhu, Changu Narayan as well as Sankhu, Nuwakot and Gorkha. The Rehabilitation Master Plan will help clarify the multitude of involved donors, managers, supervisors and the communities. It will also define how and over what time period the reconstruction will realistically be carried out. This will require procedures for supporting the restoration of settlements and traditional dwellings (Fig. 3).

Fig. 3 Archaeological investigations on the foundations of Kastamandap which possibly was the oldest structure in the Kathmandu © Kai Weise

4.4 Practical Approach

The rehabilitation and reconstruction of the monuments will only be possible if we have knowledgeable and skilled artisans. The master crafts-persons must be identified and acknowledged. They must be seen as “living national treasures” as the Japanese do for “keepers of important intangible cultural properties”. The system of apprenticeship must immediately be expanded to ensure that sufficient artisans are trained to allow for the restoration of the tangible heritage. This would have to be coordinated with the procurement of appropriate materials.

4.5 Information Approach

The damage assessment is linked to the collection of a lot of information which will be closely linked to the preparation for post-earthquake rehabilitation. This will require a systematic database and easy access to information. For this it was decided to establish a database system using ARCHES as the information platform. The process of establishing the database, working on the adaptation of the software as per local requirements and the establishment of inventories has been challenging.

5. Considerations for rehabilitation and cultural continuity

The rehabilitation of the communities and the cultural heritage will take many years. An initial six year plan is being prepared so that certain targets are met by July 2021. Though there will be a formal system of carrying out the rehabilitation of many of the heritage sites, it will be the informal interventions by the community that will be most critical. The response in most areas has been controlled and communities have been obstinate not to give in to the dire circumstances. It is this spirit of the communities that will be vital to ensure that recovery will take place rapidly.

In the reconstruction process, great care must however be taken to ensure that the reduction of vulnerability is considered. This does not only mean structural stability of buildings but also the socio-cultural systems that provide communities with support and resilience.

Great expectations are placed on intangible heritage as the vehicle for cultural continuity. The rehabilitation of the cultural sites will depend more on the strength of the intangible than that of the tangible heritage. We talk of strengthening the monuments to withstand the impact of earthquakes. There are misconceived ideas floating around promoting the use of modern technology and materials to ensure resilient structures. Over time it is not the structures that will persist. Cultural continuity can only be ensured through the knowledge and skills of the community being passed on from generation to generation.

After a major disaster such as the recent earthquake, communities resort to their cultural roots to provide strength and reassurance for their healing and rehabilitation. The fervour with which the festivals are celebrated with people singing and dancing through the rubble strewn streets shows their will to ensure continuity. This can be the means of unifying communities and creating resilient societies (Fig. 4).

Fig. 4 Community celebrating Gaijatra festival in Nuwakot in the damaged palace complex © Kai Weise

3.2 Global Contribution of the International Training Program towards Management of Cultural Heritage During Disasters without Borders, in Turkey, 2008

Zeynep Gül ÜNAL
Yıldız Technical University Faculty of Architecture Restoration Department GEA Search and Rescue Group

1. Introduction

Since ten years, Ritsumeikan University ITC on Disaster Risk Management of Cultural Heritage (R-DMUCH ITC) has been an important training program for experts and people who dedicate their life to protect cultural heritage and its users against disasters. This is good evaluation period to see what has been done and establish a road map for the future.

While contributing to my occupation, preserving cultural heritage, as well as voluntary human search and rescue operations that I was part of, the program that I have been following for last six years, enabled to establish new networking for these activities. It can be said that R-DMUCH ITC that has been evolved beyond just training program in time with continuously expanding instructors and participants, has effectively contributed towards activities aimed at managing disaster risks of cultural heritage in different parts of the world. I can list the works that has been done with substantial contributions from my colleagues who are in ITC network during this time.

2. Establishing national committee of ICOMOS ICORP Turkey

ICOMOS ICORP International Committee on Risk Preparedness and ICOMOS Turkey established the ICORP Turkey after approval by ICOMOS Turkey during the National Committee meeting that took place on June 9th, 2011 in Istanbul.

The main goal of ICORP Turkey is to promote sharing of experience and the development of a multi-disciplinary network to stimulate the protection of cultural heritage, and enhance the state of risk preparedness for cultural heritage sites against natural and human induced disaster in national level.

Zeynep Gül Ünal (Chair) and Meltem Vatan Kaptan (Vice Chair), who are on the board of directors of ICOMOS ICORP Turkey are R-DMUCH ITC 2010 participants.

3. Development of higher level strategy papers on disaster risk management of cultural heritage in Turkey

Since start of the preparation for the Sendai Framework on Disaster Risk Reduction 2015-2030, substantial work has been done to include cultural heritage in disaster risk reduction action plan which Turkey has prepared. By publishing the directive, Republic of Turkey Disaster and Emergency Management Authority (AFAD) assumed coordinator role for Turkey Disaster Management Strategy Document (TAYSB); a higher level policy document which is advisory and binding for national strategy, plans and actions matters that are related to disaster management.

Specifically ICORP Turkish members provided support with their expertise during preparation for draft document. *"Preserving historical and cultural heritage against disaster with critical infrastructures and resources"* was identified one of the four main goals that was determined in accordance with *"Minimize the effects of disasters on Our Country"* vision in Turkey Disaster Management Strategy Document. Works are being continued to make this matter a "strategic priority".

4. You can rescue heritage project

The project, "Youcanrescue – Role of Architects and Urban Planners in Reducing Disaster Risk", that was launched with Yıldız Technical University International Center for Urban Studies YTU ICUS and GEA Search and Rescue Group partnership was exhibited in Bhutan, Finland, Japan, Spain, with contribution of the team from R-DMUCH ITC network. A presentation and exhibition named "Power of Collaboration: Youcanrescue Initiative" took placed during ITC 2014 training course as part of this project. At the end of the course, announcement was made for "Youcanrescue Heritage" that is new section of the project that has so far reached more than 11.200 people by activities such as conferences, exhibitions, publications prepared between 2010 and 2014.

A description of the project is as follows: "Our Rich Cultural Heritage is increasingly threatened by Natural and Human Induced Disasters. "Youcanrescue Heritage" is an initiative launched by ICOMOS-ICORP, YTÜ-ICUS and GEA SAR TURKEY aims at raising awareness for protecting our cultural heritage from disasters by taking proactive activities aimed at mitigation and preparedness". The project is continuing with support from partners (Fig. 1).

Fig. 1 Signature ceremony of You Can Rescue Heritage Project that was held in Sendai 2015

5. Activities for preserving cultural heritage in conflict areas

As we know, conflicts generate significant risks to cultural heritage and its users due to destruction in areas where they occur. In order to support preserving cultural heritage in Middle East where armed conflicts are taking place, a team including Rohit Jigyasu, Bijan Rouhani, Zeynep Gül Ünal, Robert Bevan organized ICOMOS E-Learning Course: The Protection of Syrian Cultural Heritage In Times of Armed Conflict between 2012-2013. The course context was shared in English, French and Arabic language.

Support is given to prepare expert report "Cultural Heritage is Under the Risk due to Armed Conflicts in Iraq and Syria" by the subcommittee on World Heritage Areas at risk due to Armed Conflict that was established by UNESCO Turkey National Commission on tangible cultural heritage. Within this framework, doctoral dissertation "Protection of Cultural Heritage in Forced Migration Due to Natural and Human Induced Disaster" by Saadet Gündoğdu Fidan that was coordinated by Zeynep Gül Ünal has been included among the projects supported by YTÜ coordinatorship of scientific research projects between 2016-2018.

6. Support for research and rescue operation, humanitarian assistance and documentation of damaged cultural heritage after April 25th 2015 Gorkha-Nepal earthquake

In 2015, one of the most important development besides projects, conferences, articles and training especially focusing Preparation – Mitigation – Recovery stages of DRM, might have been the support of heritage experts in search and rescue operations just after the disaster during "emergency response" stage.

GEA search and rescue group was alarmed just after earthquake struck Nepal on April 25th 2015 at 11:56 local time. First news about the situation about the region was received from our colleague Kai Weise (R-DMUCH ITC 2008) who lives in Kathmandu. Soon after that communication had started with colleague Rohit Jigyasu (R-DMUCH ITC Professor) and communication had been continued for 25 hours on and off. Prof. Jigyasu who knows the region very well, communicated important data about the status of historical buildings and cultural sensitivity.

On the same day GEA search and rescue group consisting of 13 members left for Kathmandu and archived documentation works about status of the damaged historical structures in Kathmandu World Heritage Sites with approximately 3000 pictures in order to share with experts with permission of local authorities after completing the search and rescue operations (photo 2-3-4-6).

After Gorkha earthquake, a decision had made to organize a workshop since both Istanbul and Katmandu are at the top of the list of 20 riskiest cities.

Fig. 2 Support photos form all around the world for You Can Rescue Heritage Initiative

Fig. 3 Photographic documentation works in Kathmandu World Heritage Site by GEA SAR after Gorkha earthquake.

Istanbul Branch of the Chamber of Architecture, Union of Chambers of Turkish Engineers and Architects has included “Heritage in Debris: Lessons from Nepal Earthquake” as a case study in the 2015 Fall issue of its periodical Mimar-ist. Journal. Rohit Jigyasu, Kai Weise, Zeynep Gül Ünal, Aparna Tandon, Meltem Vatan Kaptan who are the instructors and/or participants in the international training course contributed with their articles for this special issue, which I edited (Photo 5).

All the above activities show that ITC during last 10 years, is an important program carrying importance beyond borders and globally contributing towards DRM of cultural heritage. Hoping for the continuation of this successful program and expansion of its impact.

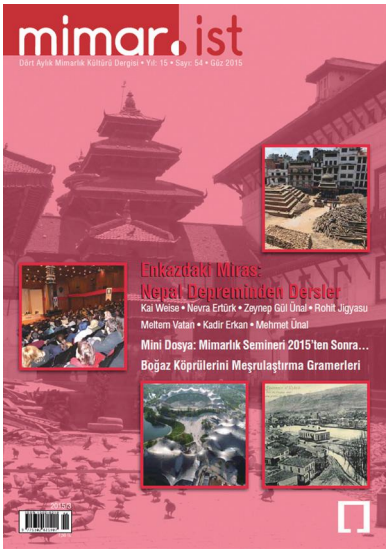


Fig. 5 Fall issue of Mimar-Ist. Journal-Instructors and/or participants in ITC program contributed with their articles which form the "Case File"

References

1) Jigyasu R: Reducing Disaster Risks to Urban Cultural Heritage: Global Challenges and Opportunities, Dossier Heritage in Debris: Lessons from Nepal Earthquake, Mimar-İst. Journal, Year 15, Vol. 54, pp.46-52, 2015.
2) Ünal Z G: Bringing Order to Chaos : Managing Seismic Risk for Historic Structures, Conservation Perspectives The Getty Conservation Institute Newsletter, pp.14-15, Spring 2015.
3) Ünal Z G: Disaster Risk Management in Heritage Sites: Reduction of Grey Zones, Dossier Heritage in Debris: Lessons from Nepal Earthquake, Mimar-İst. Journal, Year 15, Vol. 54, pp.41-45, 2015.
4) Vatan M: Seismic Risks on Cultural Heritage: Lessons for Istanbul Learnt From Nepal, Dossier Heritage in Debris: Lessons from Nepal Earthquake, Mimar-İst. Journal, Year 15, Vol. 54, pp.53-59, 2015.
5) Weise K: “Cultural continuity through cyclical renewal: Responding to the 2015 earthquake in Nepal”, Dossier Heritage in Debris: Lessons from Nepal Earthquake, Mimar-İst. Journal, Year 15, Vol. 54, pp.28-33, 2015.

3.3 A Result of Arson on Wooden Heritage and Disaster Mitigation Planning, in Korea, 2012

Sangsun JO
Senior Researcher, National Research Institute of Cultural Heritage (NRICH), Rep. of KOREA

1. Brief history of disaster mitigation system in Korea and abstract of presentation

The cultural heritage protection law was enacted in 1962 in Korea. Also management of cultural heritage by national government began in the same year. After that, there were so many damages to cultural heritage caused by fires, earthquakes and typhoons, etc. but the arson in Sungnyemun*1on 8th February 2008 has changed management system totally.

In management system of Korea, the serial number of cultural heritage has an enormous meaning. Especially the national treasure number 1, Sungnyemun located in center of Seoul, is a representative of Korea itself. On February 8, 2008, a 70-years old man who had a complaint about the land compensation lit fire in the gate by gas lighter and thinner. As the gate was located in center of Seoul city, many firefighters and fire engines arrived immediately and started to extinguish the fire. But unfortunately they did not know the structural characteristic of traditional architecture*2.

The fire was broadcast in the country in real time and was extinguished after 4 hours. It caused severe damage to the entire structure. Next morning, we noticed that entire 2nd floor and part of the 1st floor roof was destroyed.

I took part in its restoration as a technical and historical researcher for five years until reopening. This incident brought many changes to the management system of cultural heritages. Due to it, firefighting equipment and disaster prevention system of all wooden cultural heritages in the country were checked and upgraded. Also, precise survey and measurement of the wooden cultural heritage was simultaneously undertaken by the national and local government simultaneously for years. And its result and drawings were distributed to fire stations. Cultural Heritage Security Policy Division was established in CHA (Cultural Heritage Administration) and regular monitoring system was installed at important heritage sites. And the day of the incident was designated as a 'disaster prevention day of cultural heritage' and the fire station of each province conduct a fire fighting exercise on cultural heritage annually. Most of all, this accident brought awareness to public that cultural heritage could be a target of terror. And it roused up social interest about conservation and management of cultural heritage.

I, as a technical and historical researcher, took part in the Sungnyemun restoration project and implemented the disaster prevention system. During the project, I participated in ITC 2012 and presented about the arson and its recovery process (Fig. 1-3).

*1 One of the four main gates of the Seoul city wall built to protect the capital in 1396. The gate was renovated in 1448 and later between 1961~1963. It had since remained the oldest building in Seoul until 2008. It was designated as national treasure 1 in 1962. It is consisted of wooden 2-storied pavilion and stone basement. And it has special architectural characteristics of early 15th century and also is a representative heritage of Korea until today.

*2 The basic structure of traditional wooden building is consisted of wooden column, beam and purlin. And above this, a thick roof which is consisted of rafter, wooden plate, wood chip, soil and roof tiles. And firefighters extinguished only visible fire on column, floor and rafter. But while they concentrated on those visible fires, invisible fires spread out inside of roof. When they realized this situation, it was too late. Though they did their best that they could, they have no choice but to watch the collapse of national treasure.

Fig. 1 Arson on Sungnyemun (Feb. 10, 2008)

Fig. 2 The result of arson (Feb. 11, 2008)

Fig. 3 Restored Sungnyemun (May. 4, 2013)

2. Result of training and application in practice

The International Training Course (ITC) 2012 was a very helpful opportunity to my work related to disaster prevention and mitigation. And the network between trainees and lecturers is a very helpful source of that field. Through it, I got useful information and conducted exercises during the field work. Among many lectures of ITC 2012, DIG (Disaster Imagination Game) was so impressive and I could adjust its concept and methodology to my work site.

After the course, I wrote a report on it and summarized all lectures. Then I uploaded it to internal notice board system and shared with my colleagues of CHA. Of course, I have also referred to it for planning and installation of disaster prevention system at Sungnyemun.

As I mentioned before, the main reason for failure of fire extinguishing system was the ignorance of traditional architecture and it could be solved through adequate education. But considering the inherent vulnerability of wood to fire, I needed to find a more practical solution. So I and my team installed special fire resistant textile inside the roof to prevent spreading of fire. As the arson was caused by people, we have examined and installed various equipments such as infrared camera, motion-detection camera and alarm system, and heat-detecting sensors. Of course, many fire extinguishers such as water gun, portable fire extinguisher, halon fire extinguisher have also been installed. And as I have learned, we have simulated a situation of fire. And according to its result, we have set a evacuation route and fire engine's route. In the management office and guard posts, more than 5 people always monitor the system at Sungnyemun. So in case of emergency such as a fire, they will activate all system and try first step of extinguishing according to the manual.

Eventually, it was the first example of disaster prevention system. Before this site, there was no

'system' but only 'tools' existed. But currently, CHA give subsidies to local governments which need budget to install disaster prevention system of important cultural heritage. And local governments or owners of cultural heritage visit Sungnyemun as a reference (Fig. 4, 5).

Fig. 4 Dashboard about monitoring equipment and emergency route of Sungnyemun

Based on the training results, as an associate member of ICOMOS-Korea committee, I suggested the basic principle of disaster prevention and plan of disaster mitigation at the gates of Seoul city wall. And I also presented its result to public at 'symposium for inscription as UNESCO World heritage, conservation, management and use of the Seoul city wall'.(May 15, 2013, Seoul) Now Seoul municipal authority prepare a detailed management plan for the Seoul city wall (Fig. 6, 7).

Fig. 5 Simulation training in case of fire at Sungnyemun

Fig. 6 A poster on symposium of Seoul city wall

Fig. 7 Presentation about disaster mitigation of gates of Seoul city wall

3. Current state and future plan

I currently work at local branch of National Research Institute of Cultural Heritage (NRICH) in Naju city as a senior researcher. And I am in charge of excavation sites of my institute and conduct monitoring on other archaeological sites in Jeolla province. Also as an official, I am in charge of consultation with local municipalities and archaeological bodies.

But I and my colleagues know well that the disaster prevention and mitigation is very important and it should be studied in various fields such as architecture, archaeology, museology, etc. In next year, a disaster prevention team will be set up at NRICH. The team will be in charge of periodic monitoring of important heritage and will conduct analysis on structures. Also it will carry out various researches on disaster mitigation of cultural heritage. And I would like to add my capacities to the team and if I get a chance to join it, I will strive to develop a disaster prevention plan for conservation of cultural heritage.

References

1) http://english.cha.go.kr
2) Cultural Heritage Administration: Sungmyemun, its journey of glory, loss and recovery, 2009.
3) Lee eun wa : An evaluation study of defense measures for wooden cultural heritage since the Sungnyemun fire with a focus on Jongmyo shrine and the four main palaces, University of Seoul, MA.2012.

3.4 Risk Management Planning for the Archaeological Sites in İzmir, Turkey

Sibel Yıldırım ESEN
Architect / Culture and Tourism Expert, Ministry of Culture and Tourism; METU; Turkey

1. Introduction

During the International Training Course (ITC) on Disaster Risk Management (DRM) of Cultural Heritage, organized in 2012 by the Institute of Disaster Mitigation for Urban Cultural Heritage at Ritsumeikan University, I worked on formulating a DRM Plan for the Agora Archaeological Site in İzmir, Turkey. After the ITC, risk assessment and management of archaeological sites informed much of my work. First, it shaped the premise of my doctoral research, which scrutinized factors threatening archaeological remains in and around historic city of İzmir. Through my PhD dissertation, titled "Risk assessment of archeological heritage at territorial scale: the case of the İzmir Metropolitan Area"[1], I proposed a new methodology to evaluate the risk map of archaeological sites, combining alphanumeric and cartographic data about natural and human-induced hazards and managerial and contextual vulnerabilities of sites, through geographic information systems (GIS). 229 archaeological sites located in the İzmir Metropolitan Area have been taken into account when developing an assessment system (Fig. 1). A further progression of this assessment framework has been possible through carrying out a postdoctoral research at ICCROM, Rome[2]. Utilizing the vulnerability and risk maps prepared through my doctoral research, lately, my recent work has been developing the initial framework of a DRM plan for the archaeological sites located in the 21 districts of İzmir, including Aliağa, Balçova, Bayındır, Bayraklı, Bornova, Buca, Çiğli, Foça, Gaziemir, Guzelbahçe, Karabağlar, Karşıyaka, Kemalpaşa, Konak, Menderes, Menemen, Narlıdere, Seferihisar, Selçuk, Torbalı, and Urla.

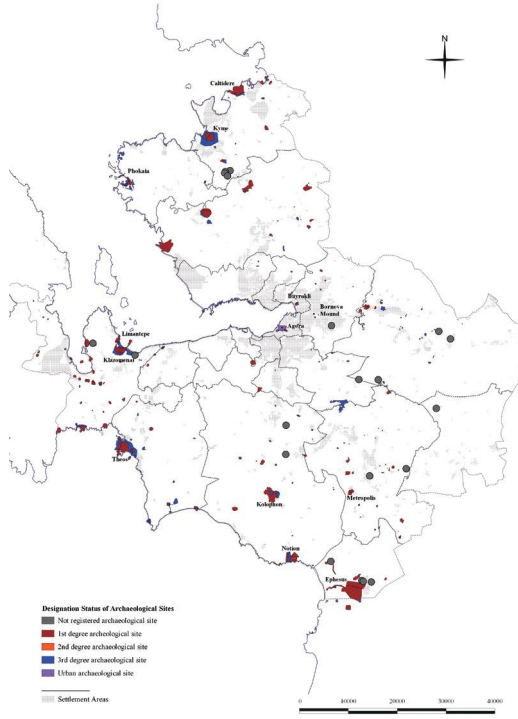


Fig. 1 Map of archaeological sites located in the study area. The information about archaeological sites has been provided by IBB and the Turkish Archaeological Settlements Project

2. Formulating a Disaster Risk Management Plan for the Archaeological Sites in İzmir

In urban settlement areas that have rich archaeological heritage, with considerable number of listed sites, strategies should be developed for reducing large-scale impacts of possible hazards on heritage values. Hence, formulating a DRM Plan is an important aspect of managing risks to cultural heritage in historic cities such as İzmir. İzmir is located by the Aegean Sea in the western Turkey. It is one of the oldest port cities of the world. Because of its significant location and natural characteristics, the city and its surrounding have housed important civilizations throughout the history encompassing at least 8,000 - 9,000 years[3]. Currently, being the third most populous city in Turkey, İzmir is a metropolis, where its metropolitan districts are managed by the Greater İzmir Metropolitan Municipality (IBB)[4]. In the study area, the archaeological sites include 209 registered sites and 20 assets without a registration status. The sites range from mounds to monumental structures, or ancient settlements. Among those sites, the ancient city of Ephesus is of international significance, as it is inscribed on UNESCO's World Heritage List. The sites which are currently being excavated include Ayasuluk Tepesi, Bayraklı, Büyük Kale, Küçük Kale, Ephesus, Ege Gübre/Kyme, Kadifekale, Klaros, Klazomenai, Limantepe, Metropolis, Panaztepe, Phokaia, Smyrna-Agora, Teos and Ulucak Hoyük[5]. As tourist destinations, Agora, Teos, Metropolis, Klazomenai, Klaros, Ephesus, Ayasuluk and St. Jean Archaeological Sites function as site museums[6], and have social, cultural and economic values (Fig. 2,3). Safeguarding archaeological sites in Turkey is among the main responsibilities of the Ministry of Culture and Tourism (MCT), which works at the national, regional and local levels. IBB has the responsibility of planning the built environment. Since 2000's, IBB has carried out conservation projects around the city center.

Fig. 2 Agora Archaeological Site

Fig. 3 Teos Archaeological Site

3. Hazards and Vulnerabilities of the Archaeological Sites

In addition to natural processes of decay, potential hazards that may have negative impacts on the archaeological sites are identified as earthquake, flood, landslide, and human factors, including urbanization, infrastructure development, aggressive agricultural activities, and illicit digging. For the purposes of this paper, two disaster scenarios are considered. The first scenario is about the occurrence of an earthquake, with a potentially disastrous outcome; because, İzmir is located on the seismically active parts of the Aegean Plate[7]. Significant quakes (magnitude 6.0 and greater on the Richter scale) have been recorded within the area in history[8]. The second scenario is that of a severe flood. Severe rainstorms have led to flash floods many times, with an increasing magnitude[9]. According to Kutluca and Ozdemir (2008), land-use and urbanization, topography with slopes, and geomorphology are the main factors affecting the impacts of floods in İzmir.

The lack of regular maintenance increases the vulnerability of the archaeological assets to natural hazards. Except for the sites that are currently being excavated and/or those that function as site museums, there is not a management system for the 93% of those studied 229 sites. Lack of maintenance of exposed archaeological remains adds to the risk of the damage to the heritage values. Due to their location, several archaeological sites in the study area are also vulnerable to damage during a severe flood. This is the case for the sites located within the Flood Hazard Areas in Menemen and Kemalpaşa districts[10].

4. Developing Strategies for Mitigation and Preparation

Developing and implementing preventive measures within the entire territory requires actions at different levels. At policy level, there is a need for integrating CHM into DRM systems administered by the Disaster and Emergency Management Presidency (AFAD); because, policies of AFAD do not include consideration for the cultural heritage that may be impacted by the disaster or the response to it. Besides, MCC should work on at the national, provincial and site levels to reduce risks to archaeological sites and values associated with the onset of a disaster (Table 1).

Table 1 The national level and provincial level strategies that may be implemented by the MCC

National Level Strategies	Provincial Level Strategies
• integrating a DRM approach in the National Conservation Law; • improving the administrative framework within the MCC, assigning units responsible for DRM; • prioritizing risk management of the sites, and highlighting the value that it would bring to the community, region, or country; • building financial, human, technical capacity to work on the challenges; • building partnerships with other public institutions, municipalities, and local communities to work towards safeguarding cultural heritage.	• building a strategy for mitigation works by prioritizing the sites that are at the greatest risk or pose the greatest danger and by taking into account urgency, values and attributes of the sites, and benefits to the communities; • engaging with the local communities, site managers, local administrations, disaster response agencies in formulation of an integrated DRM Plan.

At site level, mitigation strategies should be developed for each site separately to reduce risks associated with earthquake and flood. Within the MCC, teams that can supervise the development and implementation of the DRM plan in preparation for disaster as well as during the response and recovery phases need to be established.

5. Conclusive Remarks

Disaster risk management of cultural heritage is important to prevent damages and ensure preservation of the cultural heritage of İzmir. The General Directorate of Cultural Heritage and Museums, where I work as a Culture and Tourism Expert, has the authority and responsibility to develop strategies for protecting heritage values in the face of various hazards, through cooperating with all related public and private entities. The regional and local offices of MCC, AFAD, IBB, the municipalities, the excavation teams, the communities and various other stakeholders should be involved in the formulation, development, adoption and implementation of the DRM plan for the archaeological sites. In addition to territorial level planning, DRM plans should be formulated at the site level for sites that are at risk or pose danger. Given the risks associated with this region, and the challenges associated with the high population density, DRM of the cultural assets in İzmir is a vital part of building resilience for the future.

References

1) Yildirim Esen S: Risk assessment of archeological heritage at territorial scale. the case of the İzmir Metropolitan Area, Unpublished PhD Dissertation, Middle East Technical University, 2014. The author's PhD thesis was supervised by Assist. Prof. Dr. Ayşe Güliz Bilgin Altınöz and Prof. Dr. Ömür Bakırer. This dissertation was awarded by the University as the best thesis of the year.
2) The research undertaken at ICCROM in 2015 was supported by TUBITAK, Scientific and Techn. Research Council of Turkey.
3) Governorship of İzmir: İzmir tasinmaz kultur mirasi enventeri, İzmir Provincial Directorate of Culture and Tourism, 2012.
4) IBB : The Metropolitan Area Map, http://www.izmir.bel.tr/BuyuksehirSinirHaritasi/125/172/tr, accessed 27 November 2015.
5) İzmir Prov.l Dir. of Culture: Excavations, http://www.izmirkulturturizm.gov.tr/TR,77153/kazi-alanlari.html, accessed Sept. 2015.
6) General Directorate of Cultural Heritage and Museums: The list of museums and site museums, http://www.kulturvarliklari.gov.tr/TR,43253/bakanligimiza-bagli-muzeler.html?_tag1=635820317210000000, accessed on Nov. 2015
7) Kutluca A K & Ozdemir S: Landslide, earthquake & flood hazard risks of İzmir metropolitan city, A case: Altindag landslide areas, World Academy of Science, Engineering and Technology, v. 24, pp. 991-996, 2008.
8) Bogazici University Kandilli Observatory and Earthquake Research Institute National Earthquake Monitoring Centre : Historical earthquakes, udim.koeri.boun.edu.tr, accessed 10 November 2013; Kutluca, A.K. & Ozdemir, S. : ibid.
9) Kutluca A K & Ozdemir S: ibid.
10) Yildirim Esen S: ibid.

3.5 Flood 2014, Monumental Cemetery of Staglieno, in Italy, 2013

Barbara CARANZA
President of Chief (Cultural Heritage International Emergency Force) Onlus

1. Introduction, the event

From the beginning of the twentieth century the Bisagno' area has been affected by several architectural abuses. The result has been a series of cyclical floods with a frequency that has increased with every passing decade. The Staglieno Cemetery, located on a hillside in the Bisagno valley and extending over an area of 330,000 m² coincides largely with the area of the floodings of the river Bisagno and others streams, these latter completely buried and forced inside the buildings of the cemetery. On the night of the 9th to the 10th October 2014, and in the following days, there occurred a terrible flood, as a result of heavy rainfall, 395 mm in 24 hours, in different areas of the city and province. In the municipality of Genoa, the river Bisagno, Sturla, Fereggiano, and Torbella have overflowed. In the province of Genoa: Scrivia, the Stura, the Entella and rio Carpi (Fig. 1).

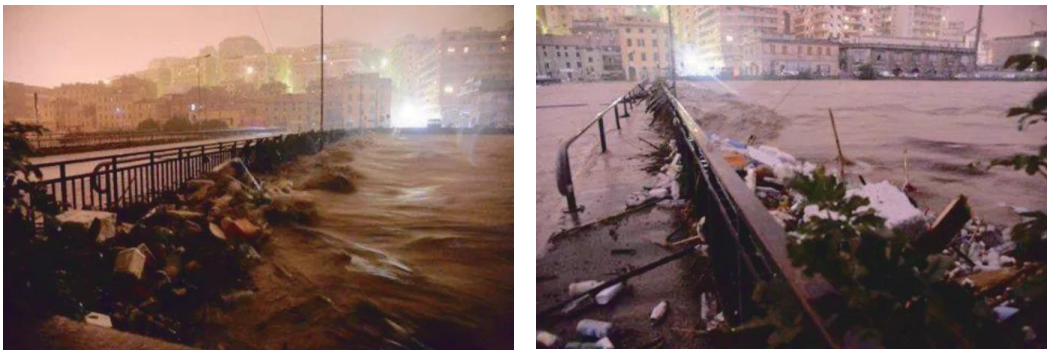


Fig. 1 The River Bisagno, the night of the 9th October

The damages calculated according to estimates, for now, amount to 250 million Euros in the province. In the estimation, only 25 million for the only city of Genoa. A meteorological event of wide proportions, aggravated by the strong self regenerating storm. The clash of the two streams, one of hot air and the other of cold air is the cause of the V-shape thunderstorm, so called for its V-shape and also called self-healing. After studying the meausurements of the winds, it was possible to understand as the encounter between northern cold currents, called Tramontana wind, and those southern hot humid currents, called Scirocco wind, from the Tyrrhenian Sea, cause a steady micro-wind fronte. The Consequence was continuous rainfall that fell on the same area again and again.

2. The rescue intervention

After the last flood, the non- profit association Chief Onlus has been charged by the Municipality of Genoa and by the Superintendence for the Architectural and Artistic Heritage of Liguria to rescue and to give first aid to the flooded monumental part of the cemetery. On the 18th of october the writer, with the aim of identifying the extent of the affected area and the best way to proceed, made a survey with the Municipality and the Superintendence. The water flooded even the highest galleries and everything was covered in mud. It was urgent and necessary to proceed as soon as possible in the removal of debris and mud and the cleaning of marble flooring. There were many problems with very little time. In many aeras the water pipes exploded and in other parts of the plumbing the pressure was very low. Electricity was not available. The marble floor of the galleries was damaged,

many tombstones of burials had moved from their areas. The underground rivers burst on the surface, caused the explosion of other recent burials. In addition to everything, we had to manage the problems related to public health and contamination. We also had to face with the psychological aspects for both families and operators who would have to intervene to rescue cultural heritage. We therefore decided that on the 19th and 20th of October we would contacted specialized operators for the recovery of bones. Meanwhile Chief Onlus would call a sufficient number of professional restorers of Cultural Heritage, residents in Liguria. The clause of residence in the region has become indispensable because the State of Emergency had not been declared and we could not offer our volunteers accommodation. Through our network of contacts gained after years of operations in the aeras of emergency in our country, we were able to reach in only two days 60 professionals volunteers with availability of one / two days. Reflecting on the physical nature heaviness of the work, because it would be too heavy to handle marble slabs and taking into account that the percentage of the volunteers were mostly female, the author decided to involve the Compagnia Unica of the port of Genoa in our activities. In the opinion of the author to involve more 'associations of the territory and historical corporations would make the community participate more (Fig. 2).

Fig. 2 The River Bisagno, the night of the 9th October

The history of the Compagnia Unica' birth linked to two factors: on the one hand, the needs of the port and the goods, which required a workforce available and flexible and at the same time reliable, professionally prepared and organized to cope with a very diverse and often unpredictable job; on the other hand, the bargaining power of workers hired for autonomy, critical skills and great organizational strength, created hardships for the same workers that were in other respects indispensable. The Compagnia Unica decided to give 20 workers volunteers, under the responsability of the Chief Onlus. The team of Chief Onlus has also managed to obtain the equipment needed to do the job. A lot of the material was donated thanks to a campaign on social networks and newspapers. On Monday 21st the volunteers began work, and the rescue operations in three areas: the gallery , the porch below the east section, and a portion of the front gallery (Fig. 3).

Fig. 3 Volunteers at work

The intervention of Chief was not for restoration work. Its task was to create the conditions of the site immediately prior to the flood. 80 Volunteers worked five days in almost 300 linear meters, and a total of 1500 square meters were cleaned. During the work and after, the media was contacted and informed about what was going on inside the monumental cemetery of Staglieno and the response was great even on social media like twitter and facebook and there was a large consensus also at institutional level (Fig. 4).

Fig. 4 Before and after the rescue intervention.

3. Conclusions

It remains clear that the intervention of Chief Onlus has only served to buffer the effects of the flood and that this will not prevent another disaster. The purpose of Chief Onlus currently is to push public opinion and the Municipality to implement all the necessary actions to secure the monumental cemetery of Stagliano and the Bisagno' area. This experience has prepared us for the future and could be an example of resilience. First, we have created within the city of Genoa and across the region, a strong coherent unit of volunteers and associations, a very strong network that will able, under the supervision of Chief, to intervene in case of disaster, with more determination and effectiveness. Secondly, we have created a relationship of mutual trust with the Compagnia Unica of the port. They have given to Chief a dedicated space in the port area where it's possible to keep the materials and equipment needed to intervene in a time of crisis. The port area is safe and accessible 24h a day.

3.6 From Disaster Risk Management Plan for Historic City of Ayutthaya towards Capacity Building in Disaster Risk Management for Southeast Asian Heritage, in Thailand, 2013

Hatthaya SIRIPHATTHANAKUN
Specialist in Cultural Heritage Conservation, Southeast Asian Ministers of Education Organisation-Regional Center for Archaeology and Fine Arts (SEAMEO-SPAFA)

1. Developing disaster risk management plan for the historic city of Ayutthaya

Since the most severe flood in the history of Thailand hit the Historic City of Ayutthaya in 2011, the Fine Arts Department, a governmental agency responsible to World Cultural Heritage Properties of Thailand, has attempted to restore and recover the city from the impact due to flood. On one hand the works comprising preliminary condition survey, salvaging as well as emergency consolidation and restoration were carried on mainly by the Department's regional office. On the other hand officials, from Office of Architecture based in Bangkok, including conservation architects, landscape architects and civil engineers were assigned to do condition survey and damage assessment and propose recommendation to protect the Historic City of Ayutthaya from professional point of view.

The Landscape Architectural Group proposed the Fine Arts Department to do disaster risk management (DRM) plan for the Historic City of Ayutthaya as a long term measure in order to prepare and mitigate any impacts from all potential natural hazards i.e. flood, earthquake etc. This proposal was agreed and I, as the Fine Arts Department's official at that time, was allowed to attend the 8th International Training Course on Disaster Risk Management of Cultural Heritage 2013 organised by the Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University, Kyoto, Japan with a mission to carry on disaster risk management plan for the Historic City of Ayutthaya after returning to work (Fig. 1).

Fig. 1 During the meeting to integrate disaster risk mitigation measure into the Master Plan for the Development and Conservation of the Historic City of Ayutthaya

The development of DRM Plan was initiated along with the project "Developing a Flood Risk Mitigation Plan for Ayutthaya World Heritage Site" which is a collaborative project of UNESCO-Institute for Water Education – IHE, UNESCO Bangkok, Asian Institute of Technology-AIT supported technically by Geo Informatics and Space Technology Development Agency - GISTDA and the Fine Arts Department while being funded by Asian Development Bank-ADB. Because of various activities done by FAD and UNESCO Bangkok such as workshops, meetings in particular with Head of Ayutthaya Provincial Office, Department of Disaster Prevention and Mitigation, public informing, public hearing and etc.

the first draft of Disaster Risk Management Plan for Historic City of Ayutthaya, using the methodology provided by the training course, came up in early 2015.
However it still needs to be developed further and subsequently implemented. As such recently the Fine Arts Department has decided to revise the Master Plan for the Development and Conservation of the Historic City of Ayutthaya. The draft of Disaster Risk Management Plan was introduced and has been integrated into the Master Plan as Disaster Risk Mitigation Plan. At present this work is still going on and due to complete soon. Afterwards the master plan will be submitted to the Cabinet to get approval for the implementation.

2. Workshop on disaster risk management planning for the Fine Arts department

When the formulation of Disaster Risk Management Plan for the Historic City of Ayutthaya was proposed to the Fine Arts Department, the capacity building activities for the department's staff such as training course or workshop were also considered. The reason is that the experience, knowledge and awareness in doing disaster risk management plan for cultural heritage of the involving staff was limited. Therefore the five-day-workshop on disaster risk management planning using Historic City of Ayutthaya as a case study which was supported financially by UNESCO project was held from 27-31 May 2014 at Ayutthaya Province, Thailand. Dr. Rohit Jigyasu was the key resource person for the workshop along with the experts from UNESCO-IHE and AIT while participants were the mid-career professionals in cultural heritage conservation i.e. architects, archaeologists, curators, site managers and conservation technicians from all World Cultural Heritage Properties which are managed by the Fine Arts Department. So officials from other heritage sites will get benefit from the workshop (Fig. 2).

Fig. 2 The opening session of Workshop on Disaster Risk Management Planning for the Fine Arts Department on the 27 May 2014

The workshop aims not only to increase the awareness of the Department's staff on disaster risks to cultural heritage and to provide the preliminary understanding on DRM planning methodology but to gather and produce information for developing the DRM Plan as well. The outcome of this workshop which was risk identification and assessment of the Historic City of Ayutthaya was included in the first draft of DRM Plan for the Historic City of Ayutthaya mentioned above (Fig. 3).

Fig. 3 Lecture and group work during the 2nd-5th day of the workshop

3. SEAMEO-SPAFA Initiative on disaster risk management for Southeast Asian cultural heritage

Within the Southeast Asian Region, in 2004 Tsunami hit Indonesia, Thailand and Malaysia and widely impacted South Asian countries such as Sri Lanka and India. Then the 2008 severe cyclonic storm Nargis in Myanmar, the 2011 catastrophic flood in Thailand and the 2013 Bohol earthquake and Typhoon Haiyan in the Philippines attacked the region. This devastated natural hazards brought tremendous loss of lives, economic damages as well as negative impact on cultural heritage. Accordingly Southeast Asian Ministers of Education Organisation - Regional Centre for Archaeology and Fine Arts known as SEAMEO-SPAFA has been increasingly concerned and aware of the necessity to protect the cultural heritage of this region from these disasters through strengthening the capacity of relevant professionals, disseminating the knowledge and information and facilitating the collaboration among the SEAMEO member countries in disaster risk management. Therefore the Centre proposed Disaster Risk Management for Southeast Asian Cultural Heritage Initiative under the Flagship Project on Conservation in the Tropics which hopefully will get technical support from international organisations and the Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University which has a long experience in the field. At the 30th SEAMEO SPAFA Governing Board Meeting held at Luang Prabang, Lao PDR from 14-15 September 2015 the proposal was approved by the Governing Board which comprises high level officials i.e. Director-Generals, Executive Directors or Rectors in charge of cultural heritage conservation, protection and education from all SEAMEO member countries.

According to this initiative, serial trainings and workshops will be carried out from 2016 to 2020. In principle the activity will be held once a year at a selected Southeast Asian historic city comprising various types of cultural heritage, movable and immovable, as well as tangible and intangible, in order to reach the goal of integrated and holistic conservation approach. Remarkably this initiative will be developed and discussed among the collaborators/partners as well as representatives from SEAMEO member countries to seek for the real needs of this region at a consultative meeting proposed to be held in April 2016.

3.7 Advocating DRM Planning for Cultural Heritage in Australia; and Case Study: Bushfire Mitigation for Natural and Cultural Heritage in Northern Sydney, in Australia, 2014

Catherine FORBES
GML Heritage, Australian Institute of Architects, Australia ICOMOS, ICOMOS-ICORP

1. Advocacy for DRM Planning for Cultural Heritage in Australia

Although Australia is relatively well organised in preparing for and responding to the various natural hazards that afflict the country on a regular basis (particularly storm, cyclone, flood and fire), very little attention is paid to inclusion of cultural heritage in emergency planning or in undertaking disaster risk management (DRM) planning for cultural heritage sites other than museums and galleries. Since completing the international training course (ITC) at Ritsumeikan University, I have been actively involved in promoting DRM Planning for cultural heritage at many levels. This has involved making presentations to government authorities at local and state level, as well as to members of professional bodies, including Australia ICOMOS and the Australian Institute of Architects. I have participated in local community meetings on flood risk, meetings with special interest groups, such as the Australian Meteorological and Oceanographic Society on flood mitigation and severe weather events, and a UNISDR round table session on Making Cities Resilient with Margareta Wahlström, representatives of the City of Sydney and infrastructure providers. I have also presented my ITC case study on DRM Planning for The Rocks, Sydney[1)], at disaster and heritage industry conferences.

2. DRM Planning for The Rocks, Urban Heritage Precinct in Sydney

Following presentation of my case study to the Sydney Harbour Foreshore Authority (SHFA) (the state authority that manages the historic urban precinct of The Rocks), there have been several positive outcomes:

- A new risk manager has been appointed and further discussions are planned to develop the DRM Plan for The Rocks.
- Tenders have been called for seismic upgrade of the historic power station chimney that stands high above the precinct and poses a serious risk to other built heritage within the precinct and people if it fails (Fig. 1).
- Tenders have also been called for much needed roof and masonry repairs to Campbell's Stores and drainage works to mitigate risks from flooding, tidal incursion and rising sea levels (Fig. 1).

Fig. 1 The power station chimney standing high above the heritage precinct of The Rocks is to be seismically upgraded and the nineteenth century stone warehouses of Campbell's Stores are to be repaired

3. Knowledge Sharing through ICOMOS-ICORP

One of the most positive things I have done in the last year has been to join ICOMOS-ICORP (UNESCO's International Council on Monuments and Sites – International Committee on Risk Preparedness). Through online discussions I have been able to learn from and share with other heritage and disaster experts around the world. As an expert member of ICOMOS and ICOMOS-ICORP I was invited to participate in the UNESCO reactive monitoring mission to Nepal to assess the state of conservation of the World Heritage property of the Kathmandu Valley. My training in DRM planning through the ITC at Ritsumeikan University and the knowledge I gained through ICOMOS-ICORP supplemented my many years of experience working as a heritage conservation architect and equipped me well for the task. This involved reviewing the earthquake damage to the heritage property, the emergency response undertaken by the local authorities and plans for recovery. The experience highlighted several issues that will need to be addressed by many countries, including Australia, following such catastrophic events. These include:

- The loss of traditional skills and knowledge resulting from modernization of the construction industry will make rebuilding our heritage in the future challenging, once it is lost.
- Past over-exploitation of resources means that the necessary materials may not be available for reconstruction. In the case of Nepal, quality building timber, a key element in the traditional seismic design of the heritage structures, is in very short supply.
- Buildings in poor condition, whether due to changing environmental conditions or lack of routine maintenance, do not survive well.

The need to address such issues will be highlighted in any future presentations or discussions I have on DRM planning for cultural heritage.

4. Project Work with GML Heritage

GML Heritage, the private heritage consultancy with which I work, has also provided opportunities to engage clients (both government and corporate) in the concept of DRM planning for their heritage sites. Potential risks are identified in conservation management plans for heritage sites and DRM Planning is recommended as part of the management of those sites. Two recent GML projects requiring implementation of disaster risk mitigation measures have included: the seismic upgrade of a six-storey unreinforced stone façade to a nineteenth century commercial building in Sydney; and bushfire mitigation for cultural heritage sites located in bushland on the northern shore of Sydney Harbour.

5. Case Study: Bushfire Mitigation for Natural and Cultural Heritage in Northern Sydney, Australia

Wildfires, known locally as bushfires, are seasonal hazards that affect most parts of Australia from the tropical north to the temperate south, and even cool alpine regions. Every year the country suffers significant losses of life, farmland, bushland, infrastructure, housing and cultural heritage. Bushfire management is an ever-evolving process in Australia, with each disastrous event carefully evaluated to improve mitigation, preparation and response strategies for the future. The annual fire season for Sydney is throughout the summer months, but over recent years, due to rising temperatures and the El Niño effect, this has extended to include spring and autumn[2)].

5.1 Physical context

The northern part of Sydney is at particularly high risk from bushfire due to its rugged terrain and pattern of urban development that extends along the ridgelines. Forests (bushland) fill the intervening valleys. The fires race up the steep slopes fanned by hot dry winds. The heritage sites that are the focus of a GML study are located on steep slopes close to the ridgeline of a headland that juts into Sydney Harbour from its northern shore. The buildings are surrounded by natural bushland, much of which is within the Sydney Harbour National Park.

5.2 Bushfire management

For this study, bushfire management must take into consideration not only the risk to human lives and built heritage, but also the risks to the natural environment and its fragile ecosystems. Although many Australian plants rely on fire for reproduction, others are very sensitive to it. In planning hazard reduction burns, which are generally undertaken in the cooler winter months to reduce fuel loads (Fig. 2), the intervals between burns are determined by the specific requirements of the various plant species[3]. Some plants die in bushfires, but the extreme heat produced activates the seeds stored within the soil. Others regenerate from under the outer layer of charred bark or their root systems. An ecological assessment of the study area revealed that there were several endangered species located in close proximity to the heritage buildings that must be considered in bushfire management of the area.

Zones of vegetation around the buildings (asset protection zones: APZs) are generally managed through clearing of undergrowth and thinning or removal of trees[4]. The steepness of the topography, orientation and the vegetation type and density determine the width of the APZs and the extent of clearing required. An existing car park and sports field provide protection to the eastern portion of the heritage site, but on the western edge, the bushland extends right up to the buildings making them particularly exposed.

Fig. 2 Leaves, twigs and bark shed constantly throughout the year create high fuel loads in the bush surrounding the heritage sites

Fig. 3 A line of fire hydrants in the bush provide a defensive ring around heritage buildings on the northern shores of Sydney Harbour

5.3 Australian Building Codes, Standards for Construction in Bushfire Prone Areas and Alternate approaches

Australian building codes (BCA) and standards for construction in bushfire prone areas require the use of fire resistant construction. However, their application to the heritage buildings on the site would have a substantial impact on their integrity and heritage values. BCA compliance would generally require fire upgrades to the buildings including replacement of roof structures and timber window and door joinery. The heritage impact of these measures is considered unacceptable and an alternate, more holistic approach to bushfire mitigation has been proposed. The use of a fire drenching system for the roofs and walls is being considered. Other mitigation measures include the installation of leaf guards to gutters to prevent the collection of leaves and twigs (a fuel source in case of fire); the enclosure of subfloor areas and protection of windows and vents with fine mesh

fire screens (to prevent fire embers from entering the buildings); the addition of seals to windows and doors; and the upgrading of doors using specially designed and tested fire kits. A line of fire hydrants and hose reels located between the buildings and the bush provide a further line of defene (Fig. 3). It is proposed that this line be strengthened with the addition of on-site water storage and that staff at the site be trained in their use. This is particularly important as the only access road to the site extends along the ridge through bushland and could be cut off preventing access by the professional fire services.

References

1) Forbes C: Disaster Risk Management Planning for Cultural Heritage Sites in Australia: Case Study ? The Rocks, Sydney Australia, published in Proceedings of UNESCO Chair Programme on Cultural Heritage and Risk Management, International Training Course (ITC) on Disaster Risk Management of Cultural heritage, Ritsumeikan University, 9th Year, 2014.
2) CSIRO: State of the Climate Report 2014, http://www.csiro.au/en/Research/OandA/Areas/Assessing-our-climate/State-of-the-Climate/2014-SoC-Report, accessed 22 November 2015.
3) NSW Office of Environment and Heritage: How Fire Affects NSW Plants and Animals, Environment NSW Website, http://www.environment.nsw.gov.au/fire/fireaffect.htm, accessed 22 November 2015.
4) NSW Rural Fire Service: Asset Protection Zones, http://www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/bush-fire-protection-measures/asset-protection-zones, accessed 22 November 2015.

3.8 Formulating a Disaster Risk Management Plan for Historic Cairo (WHS), in Egypt, 2014

Abdelhamid SALAH
Egyptian Heritage Rescue Foundation (EHRF)

1. Introduction

Realizing the current situation that most of Egyptian urban heritage is facing nowadays and specially Historic Cairo which listed by UNESCO as a World Heritage Site in 1979 and its boundaries approved in 2013 (Fig. 1, 2). Consequently, it is exposed to all the challenges that affect the city such as real estate and building speculation (Fig. 3a, b), pollution and deterioration.

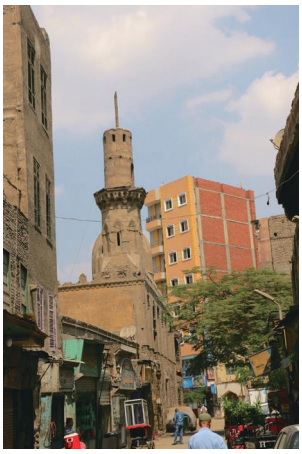
These challenges have been exacerbated during the four years following the 25th of January 2011 revolution. The lack of security and the chaos that the country experienced let the ground free for real estate speculators who raided historical areas, irreversibly destroying the traditional urban fabric. Those facts leave no doubt to us that Historic Cairo needs a developed Disaster Risk Management plan as a tool for efficient protection of cultural heritage and preventing risks as well as raising the awareness not just among the community but also between the professionals and experts to set up a list of priorities to recognize the real needs of the city.

That is why I applied to ITC on Disaster Risk Management of Culture Heritage to get the knowledge and sufficient information on that topic.

But to transfer that objective to a study can be implemented, so now I have research where I can gain this knowledge.

Fig. 1 Al-Darb Al-Ahmar St., one of the main streets in Historic Cairo

Fig. 2 Bab El-Wazer Sq,.



(a)

(b)

Fig. 3 Bab El-Wazer Sq,.
a, b show the speed growing of the unplanned real states in Historic Cairo after January 2011.

2. Attending ITC on Disaster Risk Management of Culture Heritage

During the course and through the knowledge we gain as well as a lot of discussion with the trainers and the recourse persons who were there all the course time, I could draw with them the first plan of DRM for Historic Cairo which was the aim of attending the course (Fig.4).

Fig. 4 ITC on DRM 2014, Japan

3. The vision of the study

To conserve the identity of the city and to find the potential factors to make it resilience

▽**The objective of the study:**

- Undertake an integrated risk assessment by analyzing the vulnerability of cultural heritage to disasters risks.
- Build an integrated system for disaster risk management of cultural heritage, incorporating a sustainable plan for mitigation, preparedness, response and recovery measures;
- Formulate risk management plans for cultural heritage that correspond to the urban and regional disaster management plans and policies
- Matching the needs of the DRM plan with the surrounding communities
- Raise the awareness of the need for DRM of Cultural Heritage among the stakeholders
- Conserving the identity of the city
- Setting a list of priorities for the intervention
- Assessing the values of the city
- Listing the roles of the involved stakeholders

4. The structure of the work plan:

Back home after the ITC on DRM, and I realized that to formulate a DRM plan it needs a huge team work starting from which data we have to collect, how we can collect the data, analyzing the collecting data, assessing the current context and who should be assigned within the team work to the start the following.

Assessing the various aspects of disaster risk management of cultural heritage within the context of historic Cairo and analyzing the collected data and documenting the heritage through a survey compiling essential facts such as: existing land and buildings use, type of ownership, date of construction, architectural elements, heights, state of conservation, etc… (Fig.5) putting in mind that until recently, only monuments with historic importance have been listed, and thus protected; the minor architecture forming the back bone of the urban fabric for which Cairo was listed by UNESCO as a World Heritage Site, has been totally ignored and left to decay. Also identifying the main hazards facing the city that can cause major loss on city`s values side by side with assessing the vulnerabilities of the city to come up with clear charts and scenarios identifying the

relations between them and expected impacts on the city`s attributes. This study will provide all the information needed to draft a DRM plan along with possible interventions on the zones and buildings at risk. Also the DRM plan will be an essential step to reach a conservation plan. It will follow a scientific methodology in order to reach proper solutions when it comes to the urban fabric.

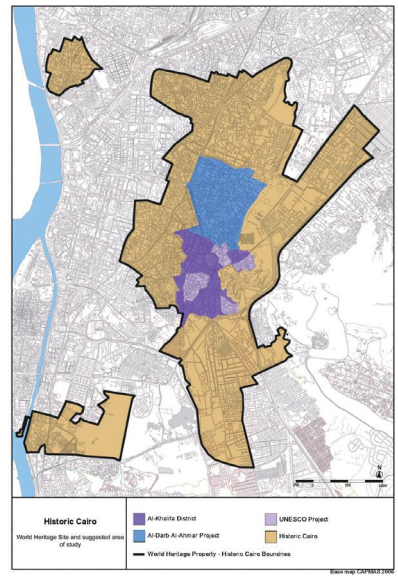


Fig. 5 Map of historic Cairo

5. Conclusions

- The study will formulate sets of criteria corresponding to the requirements of its varied cultural heritage and specific urban and regional policies.
- Identifying the involved parties and assessing their capacities in terms of financial and technical recourses. (Fig.6, 7)
- Produce integrated mitigation strategy on national level. The strategy is going to be divided from short to long term by planning a sequence of preventive measures including preparedness, adequate response and recovery measures.
- Set up a role model for future generations and a tool to be replicated in other heritage sites in Egypt and the region. The personnel trained will help in further capacity building.

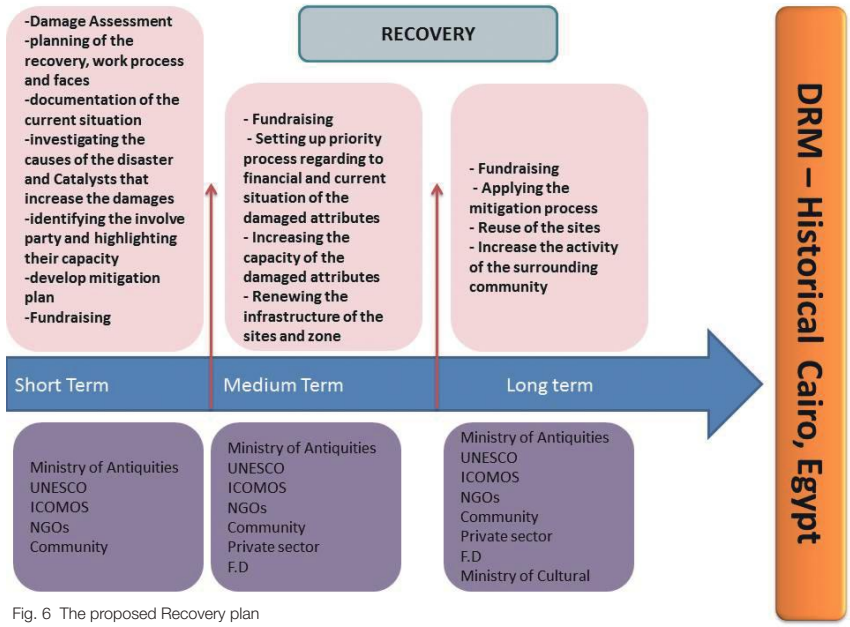


Fig. 6 The proposed Recovery plan

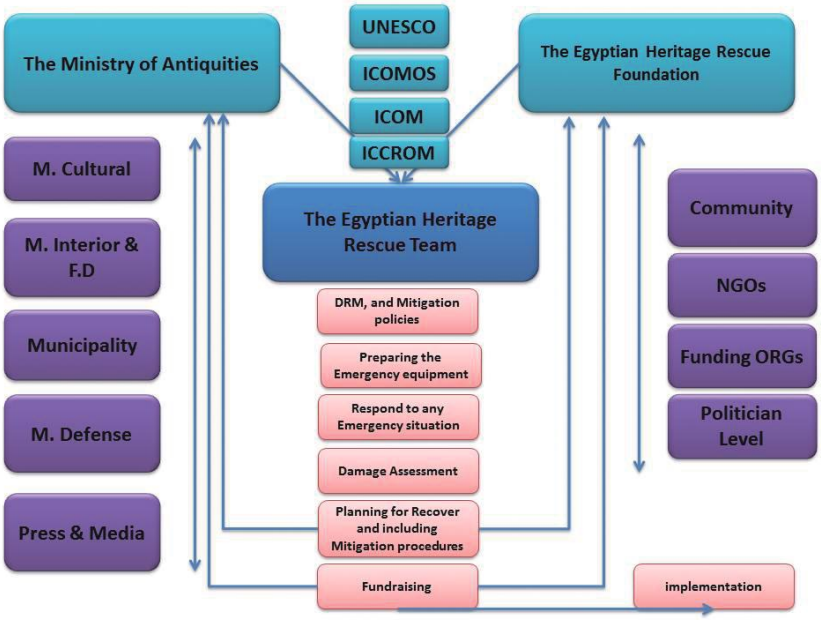


Fig. 7 The proposed shared responsibility between EHRF and MoA

References

1) ICOMOS Review Sheet on the Nomination of the Historical Center of Cairo on the World Heritage List, April 10, 1979.
2) Jigyasu, R.: Disaster Risk Management of Cultural Heritage in Urban Areas – A Training Guide, Research Center for Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University, Kyoto, Japan, 2013.
3) UNESCO, Urban Regeneration Project for Historic Cairo, FIRST REPORT OF ACTIVITIES, July 2010-June 2012.

Appendix

List of Resource Persons

(As of 2015 September)

Kozo WATANABE
Vice Chancellor,
Ritsumeikan University

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

Rohit JIGYASU
UNESCO Chair Holder,
President of ICCOMOS-ICORP,
Professor,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

Masafumi YAMASAKI
Professor,
Department of Architecture and Urban Design, College of Science and Engineering, Ritsumeikan University

Noriyoshi TSURUOKA
Manager, Cultural Asset Division,
Board of Education, Kyoto Prefecture

Ryoichi FUKAGAWA
Professor,
Department of Civil Engineering,
College of Science and Engineering,
Ritsumeikan University

Shinta YOSHITOMI
Professor,
Department of Architecture and Urban Design, College of Science and Engineering, Ritsumeikan University

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

Peter HEAD
Foundre & Chief Executive,
CBE FREng HonFSE FRSA

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

Vanicka ARORA
Conservation Architect and Board Member,
ICOMOS India

Kenji SAWAI
Professor Emeritus,
Setsunan University

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

Eric LUIJENDIJK
Urban Planner and Heritage Expert,
Board member of ICOMOS Netherlands

Hatthaya SIRIPHATTHANAKUN
Specialist in Cultural Heritage Conversation,
Southeast Asian Ministers of Education Organisation Regional Centre for Archaeology and Fine Arts (SEAMEO-SPAFA)

Hikokazu OMORI
Director,
Omori Architectural Office

Yoshinori MACHIDA
Citizens Safety Director,
Citizens Safety Section,
Safety and Ambulance Division,
Kyoto City Fire Department

Rajib SHAW
Professor,
Graduate School of Global Environmental Studies,
Kyoto University

Kai Ube Prasad WEISE
Architect,
Planners' Alliance for the Himalayan & Allied Regions (PAHAR Nepal)

Yasumichi MURAKAMI
Senior Administrator,
Hyogo Pref. Board of Education

Mayumi KUDO
Senior priest,
Kaminoyama Hachiman-gu Shrine

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

Wesley Webb CHEEK
Urban Studies Pre-Doctoral Fellow,
City, Culture and Community,
Tulane University

Takuya SUZUKI
Minamisanriku-Cho Nature Center Tomono-Kai

Kyuichiro SATO
Kaminoyama Hachiman-gu Shrine

Kie SUGAWARA
Minamisanriku-Cho Tourism Association

Isao KISO
Special Advisor to the Cabinet,
Former Ambassador Extraordinary and Plenipotentiary of Japan, Permanent Delegate to UNESCO

Qing WEI
Executive Director,
Cultural Heritage Conservation Center of Beijing Guowenyan Co., LTD

Akatsuki TAKAHASHI
Programme Specialist for Culture
UNESCO Office for the Pacific States (Apia, Samoa)

Aparna TANDON
Project Specialist, ICCROM

Abdelhamid Salah Abdelhamid SAYED
Chairman, Conservator in the Ministry of Antiquities,
Egyptian Heritage Rescue Foundation (EHRF);
Training & Capacity Building Unit Manager,
Egyptian Earth Construction Association (EECA)

Kumiko SHIMOTSUMA
Senior Cultural Properties Specialist,
Cultural Properties Department,
Agency for Cultural Affairs

German Tiangco VELASQUEZ
Chief of Section, Advocacy and Outreach
UN Office for Disaster Risk Reduction (UNISDR)

Joseph Alan KING
Director of the Sites Unit,
ICCROM

Giovanni BOCCARDI
Chief,
Emergency preparedness and response Unit (CLT/EPR),
Culture Sector, UNESCO

Naoko USHITANI ITAYA
Associate Professor,
Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University (R-DMUCH)

Yuko ISHIDA
Senior Researcher,
Kinugasa Research Organization,
Ritsumeikan University

Dowon KIM
Senior Researcher,
Kinugasa Research Organization,
Ritsumeikan University

Mingji CUI
Senior Researcher,
Kinugasa Research Organization,
Ritsumeikan University

List of Participants

Marcela HURTADO SALDIAS, Chile
Assistant professor,
Departamento de Arquitectura,
Universidad Tecnica Federico Santa Maria

Benjamin Kofi AFAGBEGEE, Ghana
Assistant Conservator of Monuments,
Ghana Museums and Monuments
Board

Stephan DONA, Haiti
Disaster Risk Reduction Advisor,
Plan Consult

Mohamad Faruk MUSTHAFA, India
Chief Executive Officer,
RAPID RESPONSE

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

Aurelio DUGONI, Italy
Regional Director of ANPAS Sicily
Committee,
National Association for Public Assistance
(ANPAS)

Hisila MANANDHAR, Nepal
Urban planner,
Kathmandu Valley Development Authority

Sonam LAMA, Nepal
Assistant professor,
Nepal Enginnering College

Ilse Anne Elisabeth DE VENT, Netherlands
Senior inspector, Geo-Engineering,
the Dutch State Supervision of Mines

Bashar Ibrahim HUSSEINI, Palestine
Senior Project Architect & Fast Track
Coordinator,
Welfare Association-Old City of Jerusalem
Revitalization Program “OCJRP”

Gerald Vallo PARAGAS, Philippines
Urban and Environmental Planner
(Licensed),
City Government of Tacloban

Marko ALEKSIĆ, Serbia
Associate,
Central Institute for Conservation in
Belgrade

Pamela Jane MAC QUILKAN, South Africa
Programme Officer,
The African World Heritage Fund (AWHF)

Witiya PITTUNGNAPOO, Thailand
Lecturer,
Faculty of Architecture,
Naresuan University

Ngoc Phu PHAM, Vietnam
Vice Director,
Hoi An center for Cultural Heritage
Management and Conservation

Photos of ITC 2015

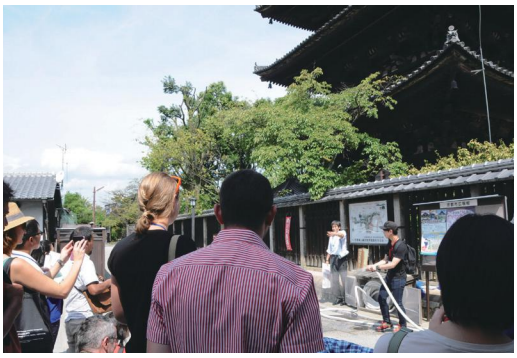
Opening address given by the Vice Chancellor, Ritsumeikan University

The First Presentations by the training participants

Site Visit 1 at Kiyomizu-Dera Temple

Site investigation of wooden heritage buildings at Kiyomizu-Dera Temple

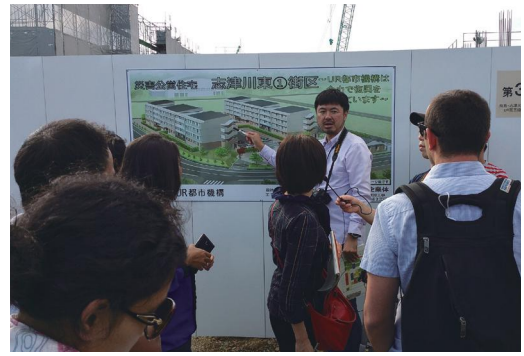
Field work for Risk Assessment at Sannei-Zaka Important Preservation District and there surroundings



Site Visit 2 at Sannei-Zaka Important Preservation District

Workshop 3 Risk Assessment Exercise: Presentation and Discussion on DIG

Observing Disaster Prevention Facilities for Cultural Assets at Ninna-ji Temple



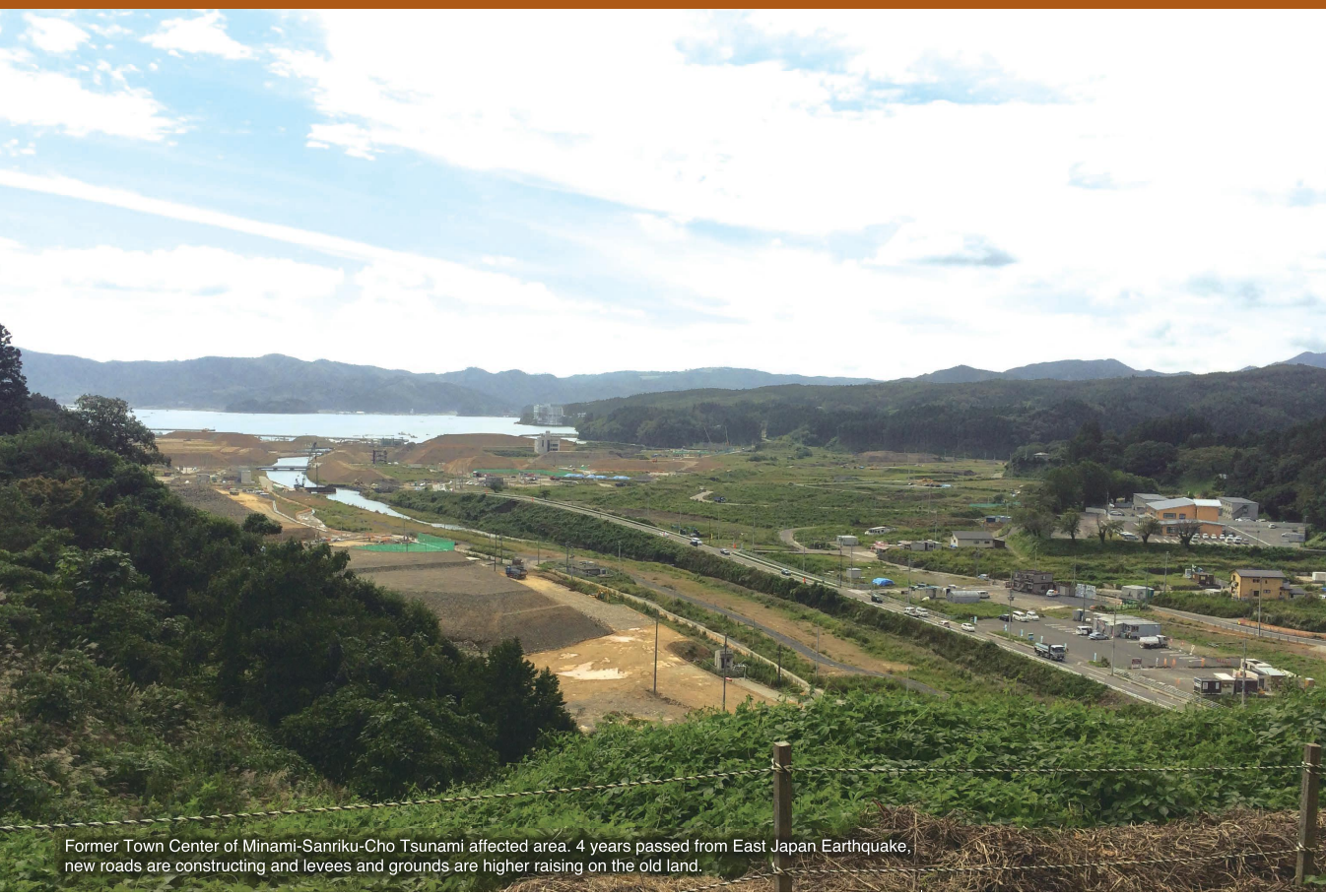
Site Visit 5 at Minami-Sanriku-Cho which affected by the Great East Japan Earthquake and Tsunami

Lecture 23 at Kaminoyama-Hachiman-Gu Shrine in Minami-Sanriku-Cho

Workshop 6 at Minami-Sanriku-Cho disaster affected area by the Great East Japan Earthquake and Tsunami

Presentation of completion certificates to the participants

The group photo of ITC2015 with the Experts of International Organizations



Former Town Center of Minami-Sanriku-Cho Tsunami affected area. 4 years passed from East Japan Earthquake, new roads are constructing and levees and grounds are higher raising on the old land.

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on
Cultural Heritage and Risk Management,
Ritsumeikan University, Kyoto, Japan